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$100 a month or $1,200 a year? Regulatory focus and the evaluation of temporally framed attributes

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Abstract

The costs and benefits of various products, such as insurance and subscription services, are recurring. Marketers can choose to frame these attributes either as a series of periodic occurrences (e.g., "$10 per month") or aggregate them over a longer period ("$120 per year"). Five studies show that the effectiveness of such temporal framing depends on consumers' salient regulatory goals. Compared with prevention-focused consumers, promotion-focused consumers are more likely to perceive benefits, costs, and losses to be larger when they are framed in aggregate (versus periodic) terms. Mediation analyses suggest that, relative to prevention-focused consumers' vigilant information-processing style, promotion-focused consumers' eagerness makes them more susceptible to temporal framing effects. The results suggest that regulatory goal is a consequential factor in determining the effectiveness of temporal framing.

Keywords: Temporal framing; regulatory focus; vigilance; numerosity heuristic

Products as varied as insurance, media streaming services (e.g., Netflix and Spotify), gym memberships, weight-loss programs, charitable donations, magazine subscriptions, and retirement annuities share one common feature – the costs or benefits of these products recur over time. Marketers often frame costs and prices in periodic terms (e.g., "Donate $10 per month" instead of "Donate $120 per year"). In contrast, they aggregate recurring benefits over longer periods (e.g., "Lose 4 pounds per month" instead of "Lose 1 pound per week"). Their intuition is consistent with findings from academic research. Studies have shown that across a variety of consumption contexts people are generally more attracted to periodic costs (Atlas & Bartels, 2018; Gourville, 1998; Hershfield, Shu, & Benartzi, 2020) and aggregated benefits (Burson, Larrick, & Lynch, 2009; Goldstein, Hershfield, & Benartzi, 2016).

This effectiveness of temporal framing has frequently been attributed to consumers' greater sensitivity to numbers, which tend to be more salient than other contextual information (Bagchi & Davis, 2016; Pelham, Sumarta, & Myaskovsky, 1994). For instance, consumers are more likely to feel that they are parting with a larger sum of money when they think about investing $150 per month (aggregate frame) versus $5 per day for a month (periodic frame; Hershfield et al., 2020). Although the two amounts are similar, $150 is numerically much larger than $5. Individuals who do not attend to the periodicity or the time frame would mistakenly think that the former investment amount requires more commitment. This disproportionate attention to numbers (versus units) is termed as the numerosity heuristic (Pelham et al., 1994) in the literature and has been documented across a variety of contexts (Bagchi & Davis, 2016).

Though the effect of temporal framing on consumer judgments is very robust, research shows that it can be accentuated or mitigated both by features of the consumption context as well as the way consumers make decisions. For instance, Gourville (1999) showed that comparing an aggregate cost with a small ongoing expense attenuates the effect of

temporal framing. More recent research found that the temporal framing effect weakens for consumers who are less affectively involved in a purchase decision (Atlas & Bartels, 2018). In a political setting, Pedersen (2019) found that people on right (versus left) of the political spectrum in the Netherlands perceived the size of unemployment benefits to be larger when it was framed in aggregate (versus periodic) terms. Building on this stream of research, we aim to show that consumers' regulatory goals – a factor central to a wide range of consumer decisions (Higgins, Nakkawita, & Cornwell, 2020) - may also exert a consequential impact on whether they would be susceptible to the temporal framing effect.

Much research has shown that consumers' regulatory goals influence the way they process information (e.g., Higgins, 1997; Zhu & Meyers-Levy, 2007). Consumers who focus more on prevention (versus promotion) goals tend to be more vigilant (versus eager) when processing information (Förster, Higgins, & Bianco, 2003), and are more (versus less) likely to take contextual information into account (Förster et al., 2003; Förster & Higgins, 2005). Drawing from these findings, we propose that given their propensity to make quick judgments, promotion-focused consumers would be more likely to neglect the background information, such as the periodicity and the time period, when evaluating temporal frames, and base their judgment on the salient numeric information. This would render them more susceptible to the temporal framing effect. Conversely, the more vigilant processing style evoked by prevention goals would lead consumers to focus not only on the numeric information but also on the less salient background information, thereby attenuating the temporal framing effect.

Our research contributes to the literature on multiple fronts. First, we contribute to the temporal framing literature by introducing a critical moderator – regulatory goals. Until now, the regulatory focus literature has evolved fairly independently from the literature on numerosity heuristic and temporal framing. To the best of our knowledge, this research

presents a first step in connecting these disparate streams of research. Second, we deepen the understanding of how people process temporally framed attributes. We show that the information processing style elicited by the different regulatory goals can affect the extent of attention consumers pay to the contextual information when processing temporal frames. Finally, we contribute to the regulatory focus literature by examining its impact on a substantively important context – temporal framing of attributes. Managerially, our findings can guide practitioners and policymakers by highlighting how the framing of numeric attributes should match the target audience's goals.

Theoretical Framework

Temporal framing

Temporal framing refers to the presentation of expected benefits and costs over varying lengths of time (Gourville, 2003). For instance, a subscription to Spotify may be presented as "$9.90 per month" or "$118.80 per year." An advertisement for weight loss may promise a loss of "1 kg per week" or "4 kgs per month." Objectively, whether an attribute is framed as "$9.90 per month" or "$118.80 per year" should not shift consumer choice, as the underlying cost or benefit remains the same. Nonetheless, in reality, how an attribute (e.g., price, calories, or lottery amount) is framed has been shown to exert a consequential influence on consumers' perception and purchasing intention (Johnson et al., 2012).

In the early years, research on temporal framing had focused primarily on how consumers process recurring costs (e.g., Gourville, 1998, 1999). In a classic paper, Gourville (1998) showed participants a donation appeal framed either in a periodic, daily frame ("$1 a day") or an aggregate, annual frame ("$350 a year"). The author found that participants' likelihood of donation was higher when they viewed the donation appeal in a periodic (versus

an aggregate) frame. Gourville (2003) further showed that a cost framed in daily terms was preferred to one framed in monthly terms, which in turn, was preferable to one framed in yearly terms. Building on Gourville (1998, 2003), Atlas and Bartels (2018) demonstrated the generalizability of this effect in other pricing contexts, such as car rentals. Periodic frames work well not only for costs but also for setting aside money for savings. Hershfield et al. (2020) found that the sign-up rate to an app-based recurring savings deposit program quadrupled when the amount to be saved was presented in daily ($5 per day) as opposed to monthly ($150 per month) terms.

Temporal framing has also been shown to be effective for recurring benefits. Burson et al. (2009) found that expressing benefits in aggregate terms exacerbates the perceptual differences between product options. For instance, consumers perceived a greater difference between two movie rental packages when the packages were presented in aggregate terms (468 movies vs. 364 movies per year) versus periodic terms (9 movies vs. 7 movies per week). Similarly, Goldstein et al. (2016) found people were more likely to think an annuity plan was adequate for retirement savings (and hence, they were less likely to save) when the annuity amount was presented in aggregate terms (e.g., $100,000 paid in equal monthly payouts over their retirement lifetime) versus periodic terms (e.g., a monthly amount of $500 per month over their retirement lifetime). Thus, the temporal framing effect appears to be robust across different contexts.

Beyond identifying the temporal framing effect, another pertinent question is - what leads to the prevalence of this effect? Much research has suggested that temporal framing effect arises from people's susceptibility to the numerosity heuristic (Pelham et al., 1994).

Numerosity heuristic and consumer behavior

The numerosity heuristic underlies various phenomena in consumer decision making.

An extensive stream of research suggests that when making numeric judgments, people often rely on the sheer numerousness of an expression while neglecting other relevant contextual information (Adaval, 2013; Bagchi & Davis, 2016). For instance, people may feel that the energy content in a bar of *Twix* is higher when it is expressed in kilojoules (kJ) as compared to when it is expressed in kilocalories (Cal, 1 Cal = 4.2 kJ; Pandelaere, Briers, & Lembregts, 2011). Neglecting units has also been shown to make US consumers perceive an expense to be higher when it is expressed in a more numerous currency, such as Malaysian Ringgits (US$ 1 = approximately 4 Malaysian Ringgits), instead of a less numerous currency, such as Bahraini Dinars (US$ 1 = approximately .4 Bahraini Dinars; Raghubir & Srivastava, 2002; Wertenbroch, Soman, & Chattopadhyay, 2007). Similarly, when judging ratios, consumers might neglect denominators and evaluate the ratio based on how large the numerator is (*ratio bias* or *denominator neglect effect*; Reyna & Brainerd, 2008). They might judge a risk to be larger when expressed with a larger numerator (1,286 cases per 10,000 people) compared with a smaller numerator (24.14 cases per 100 people; Yamagishi, 1997). Research shows that people prefer a lottery that gives them a 9 out of 100 chance of winning compared with one that gives them a 1 out of 10 chance of winning (Pacini & Epstein, 1999).

Why would people overly rely on the largeness of numbers in their judgments? Brain scans suggest that there are dedicated regions in the brain akin to other primary senses, such as touch or smell, that process numerosity information (Harvey, Klein, Petridou, & Dumoulin, 2013). Thus, number perception may be fundamental to human cognition. People also learn through socialization that larger numbers are commonly used to describe larger quantities, and they overgeneralize this rule, even in cases where the rule should not apply (Bagchi & Davis, 2016). In ratio judgments, research shows that though both the numerator and denominator are numbers, people find it easier to judge whole numbers rather than ratios. This leads to an overreliance on the numerator when evaluating ratios (Alonso & Fernandez-

Berrocal, 2003; Reyna & Brainerd, 2008).

Such biases also carry over to the situation when consumers process temporally framed attributes. Research shows that when consumers encounter a temporally framed attribute, they tend to overly focus on the number with which the attribute is expressed while neglecting important contextual information such as the periodicity or time frame (Gourville, 1998; Hershfield et al., 2020). As aggregate (versus periodic) frames use larger numbers to describe the attribute, consumers are more likely to mistakenly judge the underlying quantity to be larger when they view an aggregate-framed attribute. Thus, benefits appear more attractive whereas prices appear costlier when framed in aggregate terms.

Although the numerosity effect has been widely documented across various contexts, recent research shows that the effect may be moderated by contextual as well as consumer-centric factors (see Bagchi & Davis [2016] and Bourdin & Vetschera [2018] for recent reviews). In terms of contextual factors, research shows that consumers' susceptibility to the numerosity heuristic can be affected by how information is presented to them. For instance, studies show that factors such as the type of product (Siddiqui, Monga, & Buechel, 2018), presence of comparative information (Gourville, 1999), reminders of alternative units (Pandelaere et al., 2011), whether the focal unit is seen as the default or not (Lembregts & Pandelaere, 2013), and ease of calculation (Bagchi & Li, 2011), can affect whether people exhibit the numerosity effect.

Consumer-level differences can also influence consumers' susceptibility to the numerosity heuristic. Monga and Bagchi (2012) found that compared to consumers who process information at an abstract level, those who process information at a concrete level are more prone to focus on numbers rather than units when making judgments. Atlas and Bartels (2018) showed that consumers who are less affectively involved in a consumption scenario become more scope sensitive, increasing consumers' likelihood of attending to the

background information. Thus, messages or visual cues that can make consumers less affectively involved in the context can reduce the effect of temporal framing. Other consumer-centric factors identified in the literature include numerical skills (Cadario, Parguel, & Benoit-Moreau, 2016) and consumers' propensity to vividly visualize information (imagery processing; Schlosser, 2018).

An overarching finding in this area of research is that the numerosity effect attenuates if consumers' attention is drawn specifically to the background information that they often neglect. For instance, making unit information salient by using larger font sizes for the units (relative to the numbers) can attenuate the numerosity effect (Shen & Urminsky, 2013). Background information can also be made more salient by changing the way information is presented. Bagchi and Davis (2012) showed that switching the information presentation order can attenuate the numerosity effect (e.g., $285.90 for 580 hours versus 580 hours for $285.90). More recently, Schley, Lembregts, and Peters (2017) found that numerosity effect attenuated when alternatives were shown sequentially (vs. simultaneously). In these studies, contextual cues were used to draw consumers' attention to the background information.

Building on this stream of literature, we argue that holding contextual cues constant, some consumers may generally pay attention to background information than others. Specifically, we propose that consumers' regulatory goals – a factor that influences a wide range of consumption behavior – may influence how they evaluate temporally framed attributes. Goals are central to all decision making (Bagozzi & Dholakia, 1999), and prior research has shown that individuals' goals may influence how they process information (Förster et al., 2003; Zhu & Meyers-Levy, 2007). In particular, research has shown that consumers' goals may influence the extent to which they adopt heuristics when processing information (Chen & Chaiken, 1999; Higgins & Cornwell, 2016). Yet, to the best of our knowledge, no existing literature has examined how consumers' salient regulatory goals may

make them more or less susceptible to the numerosity heuristic and temporal framing effects. This research proposes that consumers' regulatory goals may also moderate the effect of temporal framing.

Regulatory goals and information processing strategies

Regulatory focus theory (Higgins, 1997, 1998) distinguishes between two fundamental self-regulation systems – prevention focus and promotion focus. Individuals with a strong promotion focus have a strong sense of their ideals and aspirations (i.e., ideal self) and aspire to advance towards those ideals. On the other hand, prevention-focused individuals place great emphasis on their duties and obligations (i.e., ought self). They have a strong need for security and are concerned about the possibility of negative outcomes (Higgins, 1997). Although people can be chronically either prevention focused or promotion focused at a given moment, either focus can be made temporarily accessible (Higgins, 2000).

Regulatory goals operate at different levels of hierarchy (Scholer & Higgins, 2008, 2013). At a broader level, regulatory goals capture the different concerns people have while pursuing goals, as mentioned above. At a lower level, these concerns affect the strategies and tactics people use while pursuing goals (Scholer, Cornwell, & Higgins, 2019). Promotion-focused concerns manifest in an eager goal pursuit strategy, where the emphasis is on approaching a desired end state. Prevention-focused concerns, on the other hand, lead to a vigilant strategy that focuses on moving away from an undesired end state (Crowe & Higgins, 1997; Liberman, Molden, Idson, & Higgins, 2001). These strategies, in turn, affect the kind of behavior people use while pursuing goals, such as how they process information (Förster & Higgins, 2005), whether they prefer the status quo (Cornwell & Higgins, 2013), and whether they seek or avoid risks (Zou, Scholer, & Higgins, 2020).

One important behavioral consequence of regulatory focus, and one that is important

to our theorizing, is the way it influences consumers' information processing styles (Förster et al., 2003; Higgins & Cornwell, 2016). Promotion-related eagerness makes people sensitive to errors of omission. It makes them more willing to take action to attain or avoid missing out on a possible positive outcome (Crowe & Higgins, 1997; Liberman et al., 2001; Molden & Higgins, 2004). Thus, promotion-focused individuals trade off accuracy for speed. On the other hand, prevention-related vigilance makes people more sensitive to errors of commission, i.e., achieving correct rejections and ensuring against false hits (Crowe & Higgins, 1997; Liberman et al., 2001; Molden & Higgins, 2004). This makes them trade off speed for accuracy. Note that an eager and vigilant processing style is not simply about the depth of processing – i.e., thinking more or less carefully about an issue – it refers to the different ways consumers approach an issue or information, and is orthogonal to the depth of processing (Förster et al., 2003; Zou et al., 2020). A consumer adopting a vigilant processing style may process information as deeply as one who adopts an eager processing style, but may focus on different aspects of the information, for instance, the contextual information. Importantly, these processing style differences come about because promotion and prevention concerns lead individuals to focus on different end goals, as reviewed above.

Several studies have provided robust evidence supporting these processing differences. A study by Förster et al. (2003) primed participants with promotion and prevention goals and provided them with a four-minute proofreading task. They found that compared to promotion-focused participants, prevention-focused participants identified more errors in the text they read. Parallel to the above finding, Crowe and Higgins (1997) found that in a recognition memory task, prevention-focused participants were more likely to indicate that a target item did not occur in a previously presented list. The researchers suggested this indicated their desire to avoid false detection, a sign that they were aiming to be more careful in the task.

Prevention- (versus promotion-) focused individuals' reliance on vigilance and accuracy also has important implications in consumer contexts. For instance, when choosing among multi-attribute options, prevention- (versus promotion-) focused participants were more likely to compare the options on specific attributes, a decision strategy favored by those who aim to increase accuracy (Mourali & Pons, 2009). Similarly, prevention- (versus promotion-) focused participants are also more likely to choose a compromise option, as it is seen as a relatively safer choice to make (Mourali, Böckenholt , & Laroche, 2007). Building on these findings, we argue that such regulatory goals-induced eager and vigilant information processing strategies would also influence how consumers respond to temporally framed attributes.

Regulatory goals as a consequential moderator

Promotion-related eagerness and the speed-oriented information processing style it induces (Förster et al., 2003; Higgins & Cornwell, 2016), we argue, would make people especially susceptible to temporal frames. Given their focus on speed during decision making, promotion-focused consumers, on encountering temporally framed attributes, would pay greater attention to the numeric information and less attention to other components of the frame, such as periodicity or the total length of a contract. They would do so as such foreground information is more salient and easier to process than the other contextual information included in the frame. For example, when they see an annual contract priced at $20 per month versus $240 per year, we argue that they would be more likely to focus on the most salient part of the information, which is the amount ($20 versus $240), and not pay enough attention to the periodicity (per month vs. per year) or the length of the contract (annual). This argument is consistent with prior research on numerosity heuristic which argues that numbers are more salient than contextual information (Bagchi & Davis, 2016),

and also that in denominator neglect, which shows that even when there are two numbers in a ratio, people tend to focus only on the number in the foreground (i.e., the numerator; Reyna & Brainerd, 2008). Thus, promotion-focused individuals are more susceptible to temporally framing effects.

Prevention-related vigilance and its associated accuracy-oriented information processing strategy make people more likely to trade speed for accuracy (Förster et al., 2003; Higgins & Cornwell, 2016). They are cautious about making the wrong decision; therefore, when they view a temporally framed attribute, we argue that they would be more likely to notice both the numerical information and the other information provided. For example, when they view the contract described above, they would be more likely to consider the periodicity as well as the length of the contract before reaching a conclusion. Our prediction is consistent with prior research on partitioned pricing, which has found that prevention-focused consumers are less susceptible to anchoring and adjustment errors when evaluating partitioned pricing (e.g., a product that costs $15 plus a delivery fee of $2; Lee, Choi, & Li, 2014). Lee et al. (2014) argued that prevention- (versus promotion-) focused consumers are more likely to pay equal attention to both the base price and the surcharges, and are therefore less likely to anchor their judgments on just the base price. This would suggest that activating a prevention goal may be a good way of helping reduce consumers' susceptibility to temporal frames.

In sum, we propose that the salience of different regulatory goals may impact the effectiveness of temporal frames on consumers' attitudes and behavior. Specifically, we argue that promotion-focused consumers will perceive a product attribute to be larger when it is described in aggregate (versus periodic) terms, as they adopt an eager information processing strategy. This makes them more susceptible to temporal frames. On the other hand, the effect of temporal frames will be attenuated for prevention-focused individuals, as

they are more likely to adopt a vigilant information processing strategy, and thus, are more likely to pay attention to both the numerical and contextual information. See Figure 1 for a conceptual model.

Overview of Studies

We tested our predictions in five studies. Study 1 analyzed the effect of participants' regulatory focus on the evaluation of a temporally framed benefit. Studies 2 and 3 replicated the effect in the context of a temporally framed price and a temporally framed loss, respectively. Study 4 tested whether the interactive effect of regulatory focus and frame translate into actual behavior. Finally, by using a causal chain design (Spencer, Zanna, & Fong, 2005), Study 5 examined whether the differences in eager versus vigilant information processing strategies underlie the phenomenon. Across all studies, responses from all participants were included in the analyses, unless specifically stated otherwise. All experimental stimuli and measures are available in the Methodological Details Appendix (MDA).

Study 1: Temporally Framed Gains

Method

Objective and participants. This study aims to provide an initial test of our hypothesis. To this end, we presented participants with a lottery reward framed either in periodic or aggregate terms. We expect promotion-focused participants to evaluate the reward more positively when it is framed in aggregate (vs. periodic) terms, whereas the effect of temporal framing will be attenuated for prevention-focused participants. One hundred and two undergraduate students (M_{age} = 21.05 years, SD = 1.67; 50 males, 51 females, 1 unreported) from a large public university in Singapore completed the study in a lab for

partial course credit. We adopted a 2 (Regulatory focus: Promotion vs. Prevention) X 2 (Frame: Periodic vs. Aggregate) full factorial design. Participants were randomly assigned to each condition.

*Procedure***.** First, participants were asked to complete an anagram task designed to evoke different regulatory goals. The task was adopted from Jain, Lindsey, Agrawal, and Maheswaran (2007). For the task, we informed participants that they would be participating in a brand name quiz. They were asked to solve ten anagrams that contained ten popular brand names that were scrambled (details of stimuli are shown in the MDA). In the promotion (prevention) focus condition, participants were told that for every correctly (incorrectly) unscrambled brand name, they would gain (lose) 2 points. Their goal was to gain as many points (lose as few points) as possible by maximizing (minimizing) the number of names they get right (wrong). Next, following Jain et al. (2007), as a manipulation check, we asked participants to indicate the extent to which they were focusing on (1) scoring more points and (2) not losing any points in the brand name quiz (1 = *a very small extent*, 8 = *a very large extent*).

Next, in an ostensibly unrelated task presented as a separate study, we asked participants to imagine that they were working in a company, and their annual salary was $40,000. This instruction, adopted from Gourville (1998), was used to minimize any perceptual differences in personal wealth, which may affect participants' subsequent responses. Next, we told participants that they had just won a prize in their company's annual raffle. However, unlike a traditional lottery where the winning amount is paid in a lump sum, the reward for this lottery will be paid out in equal monthly payouts over a specified time. In the periodic (aggregate) condition, we told participants that the reward was "$160 a month ($4,500 total) in equal monthly payouts over a period of 2 years and 4 months" (see MDA). Note that although $4,500 over 28 months translates to $160.70 every month, which is

slightly more than the $160 in the periodic condition, we used a round number ($160) in the periodic frame to not arouse participants' suspicion about our hypothesis. This follows the manipulation used in Gourville (1998). After reading the scenario, we asked participants to respond to two items measured on an eight-point scale, assessing how adequate and attractive they felt the prize was (r = .88; 1 = *not adequate/attractive at all*, 8 = *very adequate/ attractive*). After completing the questions, participants provided their demographic details and were debriefed.

Results.

Manipulation check. To test whether the regulatory focus prime was successful, participants' responses to the question assessing the extent to which they were focusing on not losing points was subtracted from their responses to the question assessing the extent they were focusing on gaining more points in the unscrambling task. A one way ANOVA showed that compared to participants primed with prevention focus, those primed with promotion focus indicated a greater focus on scoring more points in the brand name quiz ($M_{\text{promotion}}$ = 1.06, SD = 2.24; $M_{\text{prevention}}$ = -.20, SD = 2.73; $F(1, 97) = 6.22$, $p = .01$, $\eta_p^2 = .06$). Three participants who did not respond to the manipulation check items were not included in the above analysis. However, responses from these participants were included in the analyses reported below. Excluding these participants from the analysis below did not change the pattern of results.

Attractiveness of reward. A two-way ANOVA on participants' evaluation of the reward amount revealed a significant effect of frame ($F(1, 98) = 5.50$, $p = .02$, $\eta_p^2 = .05$), a non-significant effect of regulatory focus ($F(1, 98) = .24$, $p = .62$, $\eta_p^2 = .00$), and a significant interaction between frame and regulatory focus ($F(1, 98) = 4.75$, $p = .03$, $\eta_p^2 = .05$). As shown in Figure 2, planned contrast analyses showed that participants primed with promotion focus evaluated the reward more positively when it was framed in aggregate terms ($M_{\text{aggregate}}$ =

6.00, *SD* = 1.63) compared to when it was framed in periodic terms ($M_{periodic}$ = 4.37, *SD* = 1.66; *F(*1, 98) = 10.04, *p* =.002). However, the effect of frame was attenuated for participants primed with prevention focus ($M_{aggregate}$ = 5.39, *SD* = 2.13; $M_{periodic}$ = 5.34, *SD* = 1.74; *F(*1, 98) = .01, *p* = .91). This supported our hypothesis.

Discussion. The results of this study provide initial evidence for our predictions that the effect of temporal framing will attenuate for consumers with a salient prevention focus. The analysis shows that promotion-focused participants perceived the lottery reward more positively when it was framed in aggregate terms compared with when it was framed in periodic terms, a pattern consistent with prior research (Burson et al., 2009; Goldstein et al., 2016). However, the effect of frame diminished for prevention-focused participants, and they exhibited no significant difference in the evaluation of the reward based on frame. Study 2 aimed to replicate the effect in a pricing context.

Study 2: Temporally Framed Price

Method

Objective and participants. Initial research on temporal framing focused primarily on periodic pricing, such as subscription prices (Gourville, 1998, 1999, 2003). Consistent with the literature, in this study, we presented participants with a health club membership plan, with the prices framed either in periodic or aggregate terms. Prior research conducted in the context of health clubs and weight loss programs has often used only female participants (e.g., Myrseth, Fishbach, & Trope, 2009). Following this practice, we recruited 182 female participants (M_{age} = 28.68 years, *SD* = 4.98) from Amazon Mechanical Turk (US). The study adopted a 2 (Regulatory focus: Promotion versus Prevention) X 2 (Frame: Periodic versus Aggregate) full factorial design. Participants were randomly assigned to each condition.

Procedure. To show that the effect was not restricted to a specific priming

methodology, this study opted to prime regulatory focus using a different method compared to Study 1. We adapted the strategy task used by Li et al. (2011), where we asked participants in the promotion (prevention) focus condition to think and list one goal (outcome) that they strongly wanted to achieve (avoid). Next, we asked them to list four to six strategies that they would use to make sure that they achieve (avoid) this goal (outcome). As a manipulation check, we adapted a measure from Li et al. (2011) and asked participants to indicate whether their current thoughts reflected their "dreams" or "fears" (see MDA). This allowed us to determine whether they were focusing on a positive or negative outcome (Li et al., 2011).

Next, in an ostensibly unrelated task, participants were asked to imagine that they were planning to join a health club and that a particular plan caught their attention. The benefits of this plan included a personalized diet plan and access to special classes on yoga, dance cardio, and Pilates. Participants in the aggregate (periodic) condition read that the membership cost was "Only $1,560 ($65 a month) for a 2 year membership of our health club" (see MDA). To ensure that only the framing of the price and not the actual payment frequency varied across the two conditions, we also indicated that the membership fees would be due every six months. We asked participants to indicate on a 7-point scale (1 = *Very unlikely/unwilling*, 7 = *Very likely/willing*; $r = .88$) how likely and willing they were to join the health club membership plan.

Results

Manipulation check. A Chi-square test revealed that compared to participants primed with a prevention focus, those primed with promotion focus were more likely to think of their dreams (versus fears; *Promotion focus* = 90.33%, *Prevention focus* = 52.81%, $\chi^2 (1) = 31.73$, $p < .001$). Thus, the regulatory goals manipulation was successful.

Willingness to join. We conducted a two-way ANCOVA with participants' intention to join as the dependent variable, regulatory goals and price framing as the independent

variables, and participants' income as the covariate. Participants' income level would have an important influence on thoughts about parting with their money. Thus, in this and all other studies involving monetary costs or losses, we included participants' income as a covariate in the analyses. It is important to note that not adding this covariate did not change the pattern of results reported in any of the studies.

Analysis revealed a significant effect of frame ($F(1,177) = 22.97$, $p < .001$, $\eta_p^2 = .11$), a non-significant effect of regulatory focus ($F(1,177) = .34$, $p = .56$, $\eta_p^2 = .00$), and a significant interaction effect of regulatory focus and frame ($F(1,177) = 4.15$, $p = .04$, $\eta_p^2 = .02$). The effect of participants' income level was marginally significant ($F(1,177) = 3.08$, $p = .08$, $\eta_p^2 = .02$). As shown in Figure 3, planned contrast analyses within the two regulatory focus conditions revealed that promotion focused participants indicated a greater intention to join the membership plan when they viewed the price in periodic frame ($M_{periodic} = 3.81$, $SD = 2.07$) as opposed to when they viewed it in the aggregate frame ($M_{aggregate} = 2.04$, $SD = 1.40$, $F(1,177) = 23.55$, $p < .001$). This difference was attenuated in the prevention focus condition ($M_{aggregate} = 2.71$, $SD = 1.81$, $M_{periodic} = 3.50$, $SD = 2.00$, $F(1,177) = 3.65$, $p = .06$).

Discussion. These results replicated the findings of Study 1 and provided further evidence for our hypothesis that the temporal framing effect will attenuate when consumers are prevention-focused. As in Study 1, we found that promotion-focused participants who viewed the price of the health club plan in periodic terms were more likely to join the health club compared with those who viewed the price in aggregate terms. This effect was attenuated for prevention-focused participants. Thus, our hypothesized effect found support not only for temporally framed gains (in Study 1) but also for temporally framed prices.

Study 3: Temporally framed losses

Method

Objective and participants. Studies 1 and 2 provide converging evidence supporting our argument that prevention-focused consumers exhibit weaker temporal framing effects. However, since the aggregate framed benefit in Study 1 (which may be seen as providing a larger reward) and the periodic price in Study 2 (which may be seen as having a lower cost and, therefore, providing a greater value) can be construed as positive outcomes, one may argue that we observe these effects because promotion (versus prevention) focused individuals are more motivated by gains and positive outcomes (Higgins, 1997; Higgins & Cornwell, 2016). To test against this alternative explanation, Study 3 examined the effect of the aggregate and periodic frame in a loss context. If the effect is indeed driven by promotion-focused individuals being more attracted to positive outcomes, our predicted effect should reverse in the context of losses. Prior research has shown that compared with promotion-focused individuals, prevention-focused individuals are more concerned with the presence of negative outcomes (Higgins, 1997; Higgins & Cornwell, 2016). Thus, an aggregated loss, which appears larger, should be more aversive to prevention-focused individuals compared to the same loss framed in periodic terms and thus predict an attenuation effect for promotion-focused individuals in the loss context. On the other hand, if the effect is driven by the fact that prevention-focused individuals are more vigilant, we should replicate the findings obtained in Studies 1 and 2 and find an attenuation effect among prevention focus individuals. Thus, Study 3 aimed to test these two competing hypotheses.

We recruited 299 participants from Mturk (US) for the study. In 2018, reports emerged on the usage of bots and commercial data centers by entities on Mturk that could potentially compromise the quality of responses (see Dennis, Goodson, & Pearson, 2018; Kennedy, Clifford, Burleigh, Waggoner, & Jewell, 2018; Turkprime, 2018). Thus, in all studies conducted after 2018, we excluded participants who failed an attention check question used in prior research (Savani, Stephens, & Markus, 2017). The MDA contains the full

wording of this question. In this study, 13 participants failed attention check, and the remaining 286 participants were included in the analysis (M_{age} = 39.33 years, SD = 12.97; 143 males, 143 females). Participants were randomly assigned to one of the conditions of a 2 (Regulatory focus: Promotion versus Prevention) X 2 (Frame: Periodic versus Aggregate) full factorial design.

Procedure. Procedure for this study mirrored that of Study 2. We first asked participants to complete the same regulatory focus manipulation task. As a manipulation check, we asked participants whether they were thinking of their dreams (Yes/No) or their fears (Yes/No). Next, in an ostensibly unrelated study, we presented participants with a scenario. In the scenario, participants were asked to imagine that they had recently quit their job and joined a new company. When they visited the finance department of their existing firm to settle their accounts, the finance staff informed them that they had to pay back some money they owed to the company. The sum could be repaid in equal monthly installments. In the aggregate condition, participants were told that they could pay "$1,800 over the next 2 years in equal monthly installments." In the periodic condition, participants were told that they could pay "$75 per month over the next 2 years." Note that the amount participants needed to pay each month was exactly the same across both conditions. The only variation was the way the amount was framed. Next, we asked participants to indicate to what extent they would feel (1) unhappy and (2) disappointed about repaying the money to their company (assessed on a 7-point scale ranging from 1=*not at all* to 7=*extremely*). The average of the two items (r = .75) constituted our dependent measure. After completing the study, participants provided their demographic information. All stimuli and measures are reported in the MDA.

Results

Manipulation check. A Chi-square test showed that participants in the promotion

focus condition thought more about their dreams compared to those in the prevention focus condition. (*Promotion focus* = 86.90%, *Prevention focus* = 45.39%; χ^2 (1) = 55.23, $p < .001$). On the other hand, participants in the prevention focus condition thought more about their fears compared to those in the promotion focus condition (*Promotion focus* = 23.45%, *Prevention focus* = 46.81%; χ^2 (1) = 17.15, $p < .001$). This indicated that our regulatory focus manipulation was successful.

Feeling about repayment. We ran a two-way ANCOVA on participants' feelings about repaying the money. As in Study 2, participants' income was included as a covariate because in a repayment situation, an individual's income may influence one's response. Analysis revealed non-significant effects of regulatory focus ($F(1, 280) = .01$, $p = .92$, $\eta_p^2 = .00$) and frame ($F(1, 280) = 2.15$, $p = .14$, $\eta_p^2 = .01$) and a marginally significant effect of participants' annual household income ($F(1,280) = 2.84$, $p = .09$, $\eta_p^2 = .01$). More importantly, the interaction effect between regulatory focus and frame was significant ($F(1,280) = 3.75$, $p = .05$, $\eta_p^2 = .01$). As shown in Figure 4, planned contrasts revealed that participants in the promotion focus condition expressed greater disappointment when they viewed the amount in an aggregate frame ($M_{aggregate} = 5.41$, $SD = 1.45$) compared with when they viewed the amount in a periodic frame ($M_{periodic} = 4.70$, $SD = 1.82$; $F(1, 280) = 5.83$, $p = .02$). However, the effect of frame weakened for participants in the prevention focus condition ($M_{aggregate} = 5.03$, $SD = 1.79$, $M_{periodic} = 5.12$, $SD = 1.57$; $F(1, 280) = 0.11$, $p = .74$). Thus, findings from this study replicated those obtained in Studies 1 and 2.

Discussion. These results supported our predictions even in the context of a negative outcome. While promotion-focused participants evaluated a loss framed in aggregate (vs. period) terms more negatively, prevention-focused participants did not show the same biased judgment. It is noteworthy that the alternative explanation, suggesting that the effect obtained in Studies 1 and 2 was simply due to promotion-focused individuals' emphasis on positive

outcomes, cannot explain this pattern of the result. Instead, the pattern of results obtained would be more consistent with the information processing account we proposed.

Study 4: Behavioral Outcome

Method

Objectives and participants. This study aimed to examine whether the interactive effect of regulatory goals and temporal frame filters down to influence individuals' behavior. Studies 1-3 measured participants' attitudes rather than actual behavior. This study aimed to show that the framing of an attribute leads to behavioral differences between promotion and prevention focused individuals. To this end, undergraduate students read a job advertisement where the compensation was framed either in aggregate or periodic terms, and we assessed whether they are more likely to apply for the job when the compensation was framed differently. We expected that promotion-focused participants would be more likely to apply for the job if they viewed the compensation in an aggregate frame. However, the frame in which we presented the compensation should have a weaker influence on prevention-focused participants' job applications.

Three hundred and thirty-two undergraduate participants (M_{age} = 21.18 years, SD = 1.64; 136 males, 196 females) from a large public university in Singapore were recruited for this study. Participants were required to log on to an online system with their university username to access the survey link. This made it believable for participants that they were responding to a real job ad and we could get in touch with them in the future. In reality, we did not record the participants' username to maintain anonymity. We debriefed all participants after the study. We randomly assigned participants to either the aggregate or the periodic condition and measured their chronic regulatory focus using items from an established scale (Lockwood, Jordan, & Kunda, 2002).

Procedure. In the cover story, participants were told that we were interested in understanding individuals' personalities. They completed a set of unrelated scales measuring various personality characteristics. The survey included four promotion-focused ($\alpha = .69$) and four prevention-focused ($\alpha = .63$) items from the regulatory focus scale by Lockwood et al. (2002). Following prior research (e.g., Appelt & Higgins, 2010; Uskul, Sherman, & Fitzgibbon, 2009), we subtracted the mean of participants' prevention focus score from their promotion focus score to create a measure of their chronic regulatory focus.

After completing the survey, participants read that we were recruiting students to be our part-time research assistants for the next three months. On the same page, we presented information about the duties of a research assistant (e.g., data collection, literature review). After detailing the duties, we told the participants how much the research assistants could potentially earn. Specifically, in the periodic (aggregate) condition, we mentioned that based on our estimates, the part-time research assistant might earn up to $45 per week (up to $540 in total over the 3 months). As in the previous studies, to ensure that the payment frequency remained consistent across the two conditions, we mentioned that we would credit the research assistant's bank account with the earnings every month. Participants were then asked to indicate whether they were interested in the position (Yes/No). We informed them that if they clicked yes, we would contact them later to provide more details about the position. Participants' decision to sign up for the job provides us with an actual behavioral outcome and not merely an attitudinal measure. Participants were debriefed after the study.

Results.

Job sign up. We conducted a logistic regression on participants' decision to sign up for the job as the dependent variable and their chronic regulatory focus (mean-centered), message frame (aggregate = -.5, periodic = +.5), and the interaction term as the independent variables. We found a non-significant effect of the regulatory focus ($B = .22$, $S.E. = .14$, $Z =$

1.60, $p = .11$) and a significant effect of frame ($B = -.52$, *S.E.* = .24, $Z = -2.20$, $p = .03$). More importantly, we found a significant interaction effect of regulatory focus and frame ($B = -.82$, *S.E.* = .28, $Z = -2.94$, $p = .003$). As shown in Figure 5, spotlight analysis at one standard deviation above and below the mean of the regulatory focus index revealed that a larger percentage of promotion-focused participants (+1SD) indicated interest in the job when they viewed the compensation in the aggregate frame ($M_{aggregate} = 55.90\%$) as compared to when they viewed it in the periodic frame ($M_{periodic} = 26.56\%$, $B = -1.25$, $SE = .34$, $Z = -3.66$, $p < .001$). However, this difference was attenuated for prevention-focused (-1SD) participants ($M_{aggregate} = 28.78\%$, $M_{periodic} = 33.37\%$, $B = .21$, $SE = .34$, $Z = .62$, $p = .53$).

Discussion. The results of this study showed that the effect of regulatory focus on individuals' responses to temporal frames filtered down to influence their actual behavior. Promotion focused participants were more likely to sign up for a part-time research assistant job when the potential salary was presented in aggregate (versus periodic) terms. However, the effect of the frame was attenuated for prevention-focused participants. Building on the findings from Studies 1-3, this study shows that people's salient regulatory focus may affect how they respond to temporal frames in their day to day lives.

Study 5: Process Evidence

Method

The theoretical framework proposed that 1) promotion- (prevention-) focused individuals are more likely to possess an eager (vigilant) information processing style; and 2) people with an eager (vigilant) information processing style would be more susceptible to temporal framing effects (see Figure 1). To test these predictions, we employed a causal chain model advocated by Spencer et al. (2005) that has been widely used in consumer research (e.g., Cabooter, Millet, Weijters, & Pandelaere, 2016; Lee et al., 2014; Lisjak,

Bonezzi, Kim, & Rucker, 2015). In a causal chain model, the mechanism test is divided into two parts. The first part of the model (Study 5a) tested the link between regulatory goals and individuals' information processing strategy. That is, we examined whether promotion (prevention) focused individuals are more likely to adopt an eager (vigilance) processing style. Building on the first part of the model, the second part of the model (Study 5b) tested the link between individuals' information processing strategy and their evaluation of aggregate- and period-framed attributes. Following past research, we operationalized eager (vigilant) processing style as having a greater focus on speed (accuracy) during decision making (Förster et al., 2003). Collectively, both tests provided a complete examination of the underlying mechanism.

Study 5a

Objective and participants. In this part of this study, we aimed to manipulate participants' regulatory goals using the word unscrambling task reported in Study 1 and test whether they indeed shifted people's information processing style (Crowe & Higgins, 1997; Förster et al., 2003). We recruited 309 participants from MTurk (US) and excluded 36 participants who failed attention check questions and 4 participants who did not respond to the questions. The remaining 269 participants (M_{age} = 38.25 years, *SD* = 12.99; 123 males, 145 females, 1 other gender) were used in the analysis. All participants were randomly assigned to either the promotion focus or prevention focus conditions.

Procedure. To manipulate regulatory focus, we used the same manipulation and manipulation check questions detailed in Study 1. As in Study 1, participants were asked to solve ten anagrams containing ten popular brand names that were scrambled. In a slight deviation from Study 1, we changed some of the brand names used in the task to ensure that the brands presented were familiar to the US participants (see MDA). After completing the task, participants were told that different people might use different strategies to complete the

brand name task. When identifying the brand names, some people like to do it quickly, whereas others complete the task carefully. We further told them that there was no "correct" strategy, and both strategies can help people perform well in the task. Next, we asked participants to indicate the strategy they used when completing the brand name task on a 9 points bipolar scale, with the lower anchor labeled as "*I aimed to be quick in the brand name task*" and the upper anchor labeled as "*I aimed to be careful in the brand name task*."

Manipulation check. As in Study 1, to test whether the regulatory focus prime was successful, participants' responses to the extent to which "they were focusing on not losing points" were deducted from their responses to the question assessing the extent to which "they were focusing on gaining more points" in the unscrambling task. ANOVA on the manipulation check measure showed that compared to participants primed with prevention focus, those primed with promotion focus indicated a greater focus on scoring more points in the brand name quiz ($M_{\text{promotion}}$ = 1.66, SD = 2.21; $M_{\text{prevention}}$ = -.69, SD = 2.58; $F(1, 267)$ = 64.72, $p < .001$, $\eta_p^2 = .19$). Thus, the manipulation was deemed successful.

Information processing strategy. We ran an ANOVA on the bi-polar item that measured whether participants were focusing on being quick or being careful when completing the brand name task. The results showed that compared to participants primed with promotion focus, those primed with prevention focus were more likely to be careful (versus quick) when completing the brand name task ($M_{\text{promotion}}$ = 5.70, SD = 2.77; $M_{\text{prevention}}$ = 6.46, SD = 2.37; $F(1,267) = 5.68$, $p = .02$, $\eta_p^2 = .02$). This result supported the link between promotion and prevention goals and eager and vigilant information processing strategies, respectively.

Study 5b

Objective and participants. Following Study 5a, Study 5b aimed to examine whether eager (versus vigilant) information processing strategies lead to differential responses to

aggregate or periodic frames. We recruited 399 participants from MTurk (US) and excluded 31 participants who failed the attention check questions. The remaining 368 participants (M_{age} = 38.20 years, *SD* = 12.42; 204 females, 164 males) were included in the analysis. All participants were randomly assigned to one of the conditions in a 2 (Strategy: Eager versus Vigilant information processing) X 2 (Frame: Aggregate versus Periodic) full factorial design.

Procedure. The cover story told participants that we were interested in their evaluation of subscription plans for some services. Research in the cognitive psychology literature suggests that participants' dominant processing style – either eager or vigilant – during a task can be manipulated by providing specific instructions before the task (Beilock, Bertenthal, McCoy, & Carr, 2004; Hoyndorf & Haider, 2009; Rae, Heathcote, Donkin, Averell, & Brown, 2014; Wood & Jennings, 1976). Thus, in the instructions, participants in the eager condition were told to form their opinion about the subscription offer as quickly as possible. On the other hand, those in the vigilant condition were asked to consider their subscription offer carefully before forming their opinion. After reading the instructions, participants proceeded to indicate their ratings for each subscription plan. In the stimuli, participants were presented with the subscription plans for four different services – a business news website, a music streaming platform, an online movie library, and an entertainment news website – framed either in aggregate or periodic terms (see MDA). For instance, in the aggregate (periodic) condition, the subscription plan for the music streaming website was $96 per year ($8 per month). For each service, we asked participants to indicate how attractive each subscription plan was to them on a 7-points scale (1 = not attractive at all, 7 = extremely attractive). The mean of the attractiveness ratings for the four subscription plans (α = .71 formed our dependent variable. To check whether our processing style manipulation was successful, after participants had rated the four subscription plans, we also asked them to

indicate the strategy they used when considering the plans on a 9-points bipolar scale (1= "*I was trying to be as careful as possible*" versus 9 = "*I was trying to be as quick as possible*").

Manipulation Check. A one way ANOVA on the manipulation check item indicated that compared to participants in the eager condition, those in the vigilant condition indicated that they were trying to be more careful when considering the subscription plans (M_{eager} = 5.74, SD = 2.48; $M_{vigilant}$ = 2.02, SD = 1.60; $F(1,366) = 293.29$, $p < .001$, $\eta_p^2 = .44$). This supported our manipulation.

Attractiveness ratings. Next, we conducted a two-way ANCOVA on the mean attractiveness rating for the four subscription plans. As in the earlier studies, participants' income level was included as a covariate to account for any variation due to perceived affordability. The results revealed no significant effect of information processing strategy ($F(1,359) = .62$, $p = .43$, $\eta_p^2 = .00$), a significant effect of frame ($F(1,359) = 9.61$, $p = .002$, $\eta_p^2 = .03$), and more importantly, a significant interaction effect between information processing strategy and frame ($F(1,359) = 7.79$, $p = .006$, $\eta_p^2 = .02$). The effect of participants' income was also significant ($F(1,359) = 5.86$, $p = .02$, $\eta_p^2 = .02$).

As Figure 6 shows, planned contrasts revealed that participants in the eager condition indicated that the subscription plans were more attractive when the prices were presented in periodic terms ($M_{periodic}$ = 2.81, SD = 1.17) compared to when they were presented in aggregate terms ($M_{aggregate}$ = 2.11, SD = 1.04, $F(1,362) = 17.05$, $p < .001$). This difference was attenuated in the vigilant condition ($M_{periodic}$ = 2.60, SD = 1.15; $M_{aggregate}$ = 2.53, SD = 1.20; $F(1,359) = .05$, $p = .82$).

Discussion.

Together, Studies 5a and 5b supported our conceptual model. Study 5a showed that compared with promotion-focused participants, prevention-focused participants are more likely to emphasize accuracy over speed when completing a task. Building on Study 5a,

Study 5b showed that when individuals are instructed to emphasize accuracy (vs. speed), they are less likely to be influenced by temporal frames when evaluating subscription plans. Thus, the results from these two studies showed that vigilant information processing style is the underlying reason for the diminished effect of temporal frames among prevention-focused consumers.

General Discussion

Summary of findings

Five studies provide converging evidence that consumers' salient regulatory orientation exerts a consequential influence on their perceptions of temporally framed product attributes. Across all studies, we found that promotion-focused participants perceived a benefit to be larger and a cost to be higher when these attributes were framed in aggregate (versus periodic) terms. However, the influence of temporal frames diminished for prevention-focused participants. We observed this phenomenon in the context of a lottery (Study 1), pricing (Study 2), monetary losses (Study 3), and salary offers (Study 4). Further, using a causal chain model, we found that differences in information processing styles underlie the effect of regulatory focus on the perception of temporal frames (Study 5). We show that the prevention-focused participants were relatively less susceptible to temporal frames due to their vigilant information processing style.

Complementing prior research

While our research is, to the best of our knowledge, the first to investigate the effect of regulatory goals on the perception of temporal frames, two studies from prior research merit discussion. First, as mentioned above, Lee et al. (2014) found that promotion-focused consumers are more susceptible to partitioned pricing effects as they are less likely to pay

attention to both the base price and the surcharges. Though the contexts are different, Lee et al.'s (2014) study and ours make similar predictions that promotion-focused individuals would be more susceptible to biases that may arise due to the way information is presented. However, our proposed mechanism differs from that of Lee et al. (2014). In Lee et al. (2014), they proposed that when viewing partitioned prices, people anchor on the base price and adjust upwards for surcharges. However, such a mechanism cannot explain the temporal framing effect. We complement the findings of Lee et al. (2014) by showing that the effectiveness of temporal framing also depends on people's propensity to take into account contextual information.

Second, Monga and Bagchi (2012) found that when people are shown two quantities (e.g., a change from 1 week to 3 weeks vs. 7 days to 21 days), those with a concrete (abstract) mindset exhibited greater numerosity (unitosity) bias. The authors argue that a concrete mindset led participants to focus on the change in numbers (they perceived a change of 7 to 21 to be larger) whereas an abstract mindset led them to focus on the units (they perceived a change in weeks to be larger). At first glance, if we draw from some research showing that prevention (promotion) focus is related to a concrete (abstract) mindset (Lee, Keller, & Sternthal, 2010; Pennington & Roese, 2003), our findings appear contradictory to those of Monga and Bagchi (2012). However, in line with much prior research on numerosity, Monga and Bagchi's (2012) research used comparative contexts to examine perceptual differences between two quantities expressed in less or more granular units. On the other hand, we presented information in a non-comparative setting, a paradigm that has been used typically in temporal framing studies (with the exception of Burson et al., 2009), and one that consumers frequently encounter in their daily lives.

Prior research shows that comparative and non-comparative settings involve different psychological processes (Basu & Savani, 2019; Hsee, 1996; Kardes, 2013). It is possible that

in comparative contexts, prevention-focused consumers' attention may shift away from the background information and towards the second option, thus, attenuating the effect we observed in our studies. In an exploratory study (see full study reported in the MDA as Study S1), we found that, indeed, while our predicted effects emerged in the non-comparative condition, only a main effect of frame emerged in the comparative condition. While it is beyond the scope of this paper to examine this further, future research can explore if comparative versus non-comparative context is a consequential moderator to the temporal framing effect.

Theoretical Contributions

Our findings advance theory in multiple ways. First, to the best of our knowledge, the present research is the first to introduce regulatory focus as a critical moderator to the temporal framing effect. Though past research has examined various factors that may influence people's susceptibility to the numerosity heuristic (e.g., Bagchi & Davis, 2016; Bourdin & Vetschera, 2018), existing literature has not examined how individuals' goals may also matter. This is despite much research documenting the impact of regulatory goals on a wide variety of consumption contexts (Higgins et al., 2020). The two streams of research have evolved fairly independently till now and to the best of our knowledge, the present research is the first to integrate these two streams of research and document the effect of regulatory goals on the effectiveness of temporal framing.

Further, by examining the underlying role of information processing styles, the current research also deepens our understanding of how consumers process numeric attributes. Past research has provided evidence that inattention to background information is a key underlying mechanism for the numerosity heuristic effect by manipulating the salience of background information (e.g., Bagchi & Davis, 2012; Shen & Urminsky, 2013). Our findings

build on existing research by showing that the vigilant and eager information processing styles elicited by prevention and promotion goals (Förster et al., 2003) may also affect the extent to which consumers pay attention to background information, and thereby, their susceptibility towards temporal framing. Complementing existing research (e.g., Lee et al., 2014), we show that making prevention goals salient can be another way in which consumers can be nudged to process background information when processing numeric quantities. Thus, prevention goals can be effective against a broad class of decision biases arising from inadequate information processing.

Finally, our findings also contribute to the regulatory focus literature by showing that promotion-focused people may be more prone to certain decision-making biases, especially those that stem from non-detailed information processing. While prior research has examined how strategic inclinations and goals related to the two regulatory foci affect decision making (e.g., Crowe & Higgins, 1997; Zou et al., 2020), this literature has not explored how information processing styles elicited by the regulatory foci affect the use of decision heuristics. In this research, we show that promotion-focused individuals are more prone to temporal framing effects, which may lead such consumers to make consumption decisions that are less than optimal.

Managerial Implications

The findings of our research carry important implications for managers and policymakers. The temporal framing of information is an important tool used in the industry. Retailers, charities, and service providers frequently frame their prices either in aggregate (‘dollars per year’) or periodic (‘dollar a day’) frames. Similarly, many benefits get framed at different levels of aggregation in the health and wellness industry. When marketers frame costs in periodic terms, they aim to reduce consumers’ distress when paying. On the other

hand, when benefits are framed in aggregate terms, the aim is to increase the perceived magnitude of the benefit. The current research suggests that whether this intention of the marketer is realized may depend on the regulatory focus of the consumer. Such strategies may be successful only with promotion-focused consumers.

For instance, the National Health Service of the United Kingdom suggests people should exercise for 150 minutes every week (National Health Service, 2020). Our findings suggest that a more effective way would be to frame the same message as 20 minutes of exercise per day, as UK citizens have generally been found to be more promotion focused (Uskul et al., 2009). As such, they should feel 20 minutes of exercise per day would be more doable than 150 minutes every week. Alternatively, marketers and policymakers may also try to increase the salience of different regulatory goals among consumers to nudge them towards the desired response. Prior research has shown that promotion focus can be induced by message framing (Zhu & Meyers-Levy, 2007) or by certain products (Mourali et al., 2007). Strategically matching the temporal reframing and activated goals in marketing communications may increase the effectiveness of the messages.

At a broader level, awareness of such biases among certain segments of consumers may also help policymakers design more targeted campaigns to educate consumers on how to make better purchase decisions and not be unduly influenced by attribute framing. This is especially true in this new world of fake news and increasingly sophisticated consumer targeting by brands. Understanding how people can be made vigilant against such manipulation by inducing prevention goals may help policymakers devise more effective "education" campaigns to develop a generation of smarter consumers.

Avenues for future research

As in all research, this research has limitations that may open up avenues for future

research. First, it would be interesting to examine how repeated learning may influence the effect. In our studies, participants were exposed to the stimuli only once. However, in many instances in life, people may be exposed to such information repeatedly. For instance, one may need to renew a subscription plan for a magazine or cellphone annually. The extent to which such repeated learning influences the effectiveness of the temporal frame and its interaction with participants' regulatory goals remains unanswered. Prevention-focused consumers who pay more attention to all the information provided may be more susceptible to any change in price plans. Second, although we tested our predictions both in a Western cultural context (US) and an Asian context (Singapore), we did not compare the effect across countries. All our studies were conducted within each country. Future research can compare the cross-cultural effectiveness of temporal framing directly. Prior research suggests that compared with Westerners, Easterners may be more prevention focused (Lee, Aaker, & Gardner, 2000). Does this mean the effect of temporal framing will be attenuated in Eastern countries? The answer may not be as straightforward. For instance, although Easterners might be more prevention focused and therefore more vigilant, a different stream of research documents that Easterners are more likely to process information globally (Kühnen, Hannover, & Schubert, 2001; Kühnen & Oyserman, 2002) consistent with those who hold a dominant promotion focus. Thus, it is not immediately obvious how culture may influence consumers' susceptibility to temporal framing effects. It will be interesting to see whether future research can answer this question.

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Figures

Figure 1: Conceptual model

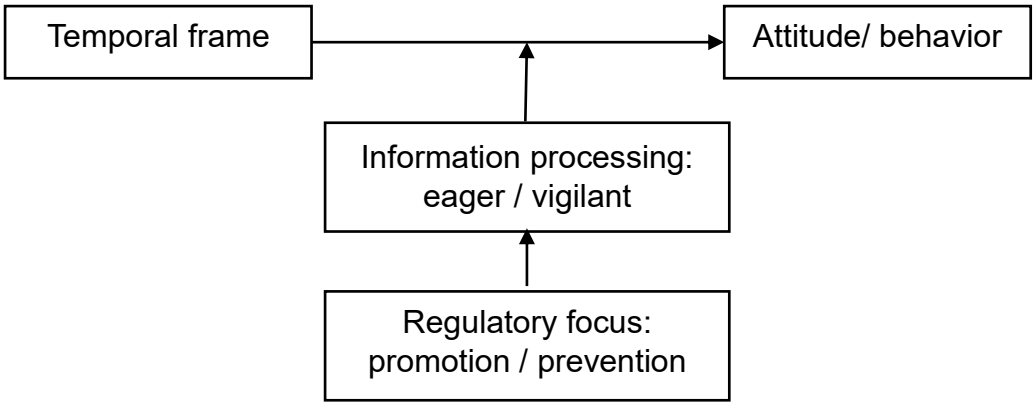

Figure 2: Evaluation of the lottery in Study 1

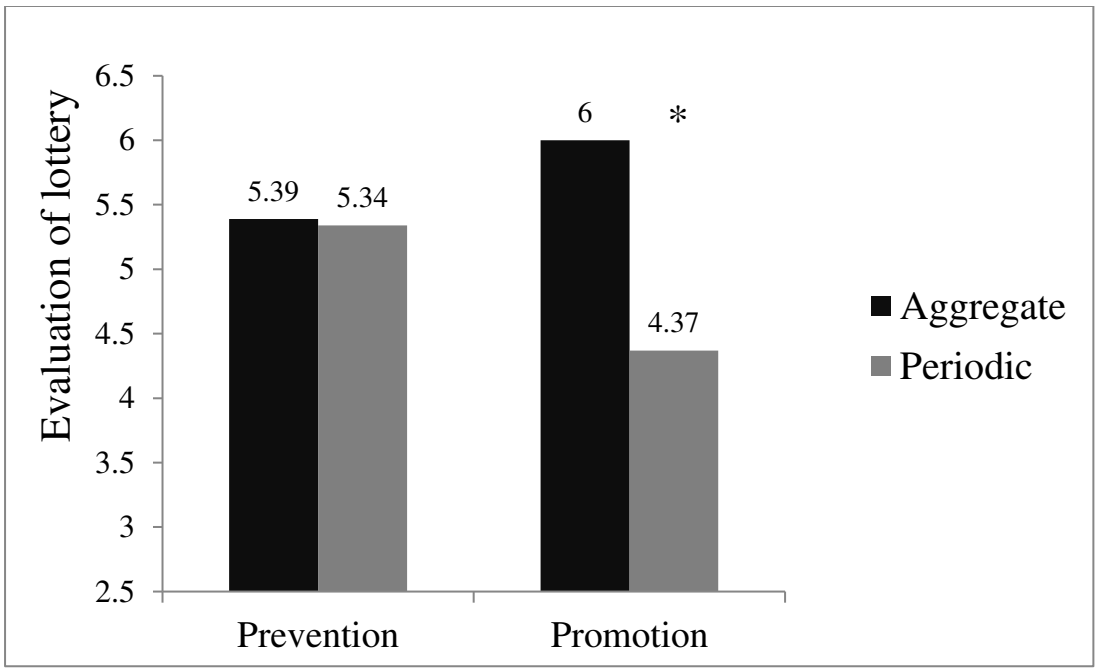

Figure 3: Intention to join the health club in Study 2

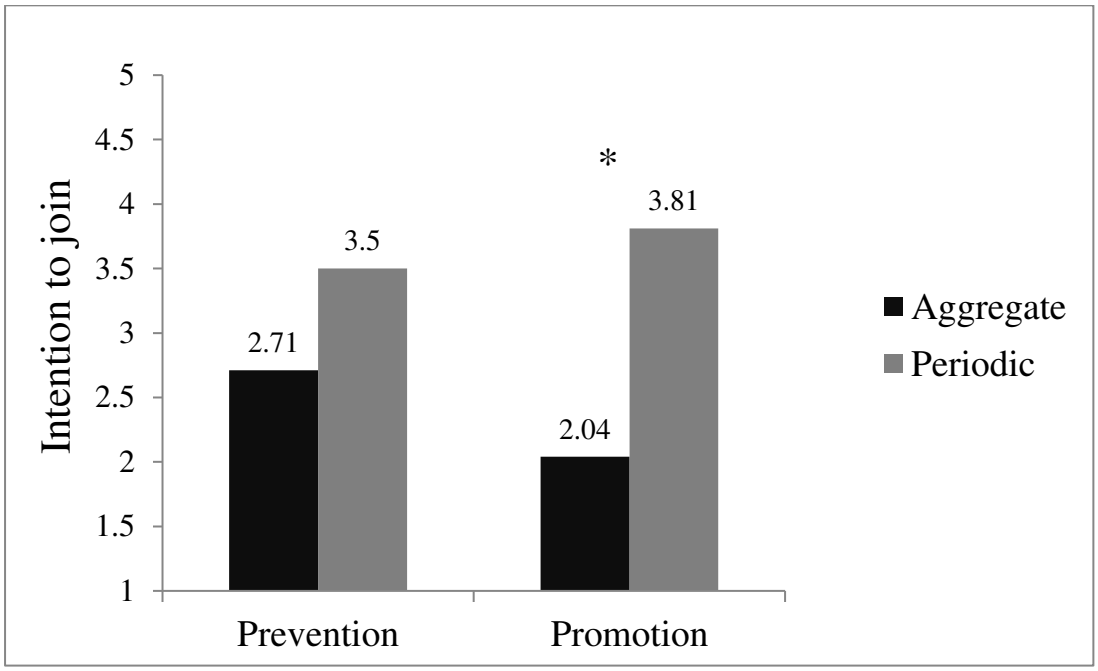

Figure 4: Disappointment experienced in Study 3

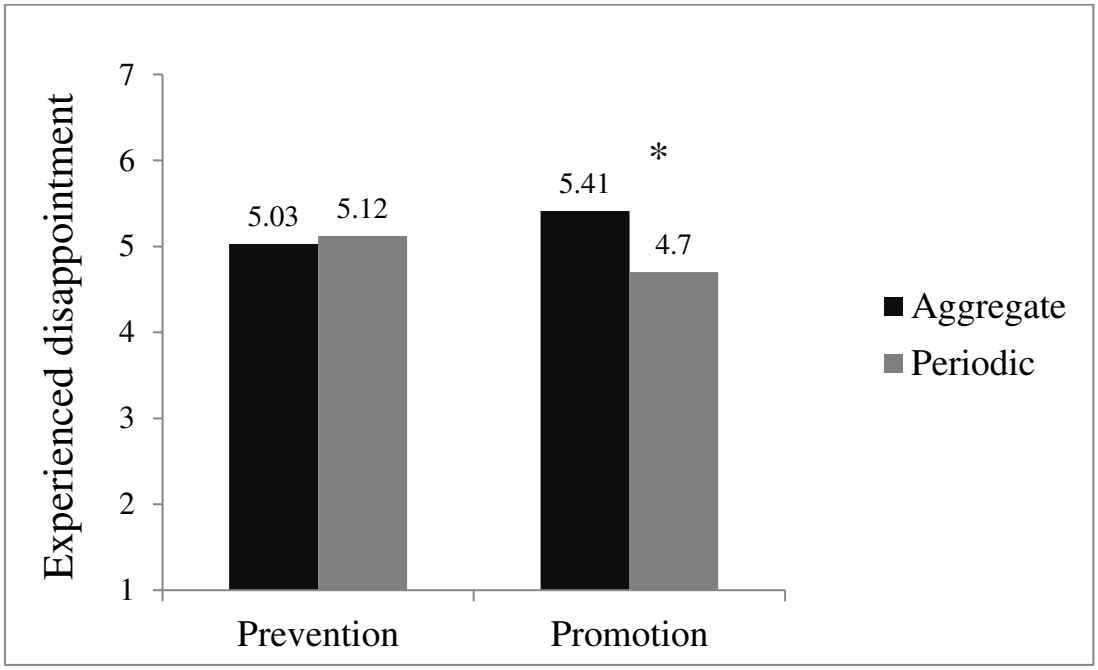

Figure 5: Percentage of participants indicating interest in the job in Study 4

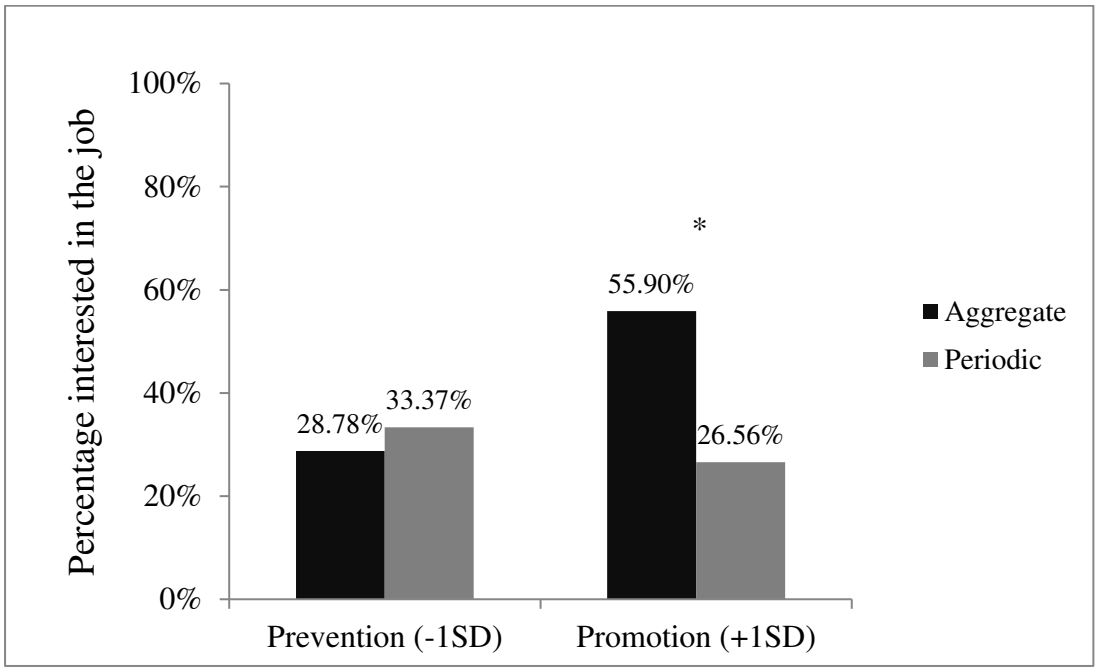

Figure 6: Evaluation of subscription plans in Study 5B