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Effects of Plan Specificity and Eveningness-Morningness Orientation on Health

Goal Pursuit

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Abstract

Extant research has identified several boundary conditions for the beneficial effects of planning in goal pursuit. The present research examines how consumers with morningness- (early birds) or eveningness-orientation (night owls) benefit differentially from health goal planning. Specifically, three studies in an eating context show that early birds respond better to specific diet plans, while night owls respond better to general diet plans. Therefore, a match between plan specificity and one's eveningness-morningness orientation promotes self-efficacy in carrying out the plans and the consequent health

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goal-directed motivation and behaviors. The fourth study in an exercise context further reveals that individual differences in body mass index moderate the combined effect of plan specificity and eveningness-morningness orientation on health goal pursuit. Together, our findings provide practical implications by demonstrating how planning-based interventions can motivate different consumer segments in health goal pursuit.

Keywords: early birds; health goal pursuit; eveningness-morningness orientation; night owls; planning; plan specificity; self-efficacy

1 | INTRODUCTION

The global wellness market reached a retail value of US\$4.5 trillion in 2018 (Global Wellness Institute, 2018). Consumers purchase products that aid their mental, physical, and emotional health (Weinswig, 2017) and use planning apps to track their health goals, balance their diets, and organize their physical activities (Hill, 2018). Usage reach of health, fitness, and nutrition apps, such as Fitness Buddy and MyFitnessPal, have reached about 34 percent of online users in the United States (Statista, 2021).

Planning helps goal pursuit by translating abstract goals into specific, organized, concrete actions so that people can follow regimens and resist temptations (Hayes-Roth & Hayes-Roth, 1979). Indeed, planning has been found to aid health, financial, and academic goal pursuits (Gollwitzer & Sheeran, 2006; Kirschenbaum, Humphrey, & Malett, 1981) and reduce impulse consumption (Upadhye, Sivakumaran, Pradhan, & Lyngdoh, 2021). However, planning has limitations in that its benefits depend on characteristics of goal and mental construal of consumers (Dalton & Spiller, 2012; Townsend & Liu, 2012). We examine another factor: individual eveningness-morningness orientation (circadian rhythms that govern internal biological clocks). We

propose that the effectiveness of planning in promoting health goal pursuit will depend on whether planners have a morningness orientation (we refer to them as morning-types or MTs hereafter) or an eveningness orientation (referred to evening-types or ETs hereafter).

A healthy lifestyle significantly affects individual and social wellbeing. Public health organizations support the healthy eating index (HEI), which advocates the consumption of essential nutrients while adhering to daily calorie limits (Guenther et al., 2013). Thus, marketers promote various diet planning devices and apps to help consumers guide healthy eating (Hill, 2018). Most diet planning apps, such as Eat This Much and PlateJoy, feature customized daily plans detailing each meal's recipes, corresponding specific caloric and nutritional values. In contrast, planning apps, such as Lost It, provide general suggestions for daily calorie budgets. Would the level of plan specificity influence motivations to pursue healthful eating goals?

Drawing on the chronobiology literature suggesting that MTs (ETs) tend to think analytically (holistically) and have low (high) ambiguity-tolerance (Adan et al., 2012; Fabbri, Antonietti, Giorgetti, Tonetti, & Natale, 2007), we posit that MTs (ETs) will be more receptive to specific (general) plans. Therefore, when a planner's eveningness-morningness orientation is matched with plan specificity, self-efficacy perception to follow the diet plans will be enhanced, leading to elevated goal-directed motivation and behaviors.

Our research is particularly relevant to today's increased emphasis on personalized services and product offerings. Many planning apps provide personalized diet plans by featuring lifestyle questionnaires to identify fitness goals, dietary

preferences, and schedules. Managers of fitness apps could benefit from our research into the effects of individual eveningness-morningness differences by learning how to customize plans in ways that will merit the additional investments. Furthermore, consumers are now connected across multiple mobile and smart devices, allowing big data analytics to capture biological basics such as sleep and wake cycles. By demonstrating that eveningness-morningness orientations determine the effects of health goal planning, we provide practical implications for designing and promoting intervention techniques that encourage plans that guide health-related behaviors.

From a theoretical perspective, our research bridges planning and chronobiology research to provide insights into physiological factors that influence planning effectiveness on health goals. We show that individual eveningness-morningness determines whether specific or nonspecific plans are more effective in motivating health goal pursuit. We also extend the implementation intention literature (Gollwitzer, 1999; Gollwitzer & Sheeran, 2006) by demonstrating that implementation intentions, or if-then plans, do not always elevate self-efficacy; correspondence between plan specificity and the planner's eveningness-morningness orientation shapes the perception of self-efficacy.

2 | CONCEPTUAL DEVELOPMENT

2.1 | Effects of Planning

Planning, “the predetermination of a course of action aimed at achieving some goal” (Hayes-Roth & Hayes-Roth, 1979, p. 275), helps increase goal-directed intentions and behaviors. The theory of implemental mindsets suggests that goal seekers should specify “if-then” plans detailing when, where, and how they will act to meet their goals (e.g., breakfast: 7 am: 1 cup of bran cereal with 1 cup of skim milk and 1/2 cup of blueberries)

(Gollwitzer, 1999; Gollwitzer & Sheeran, 2006). Such predetermined plans help consumers form salient mental associations between opportunities and intended responses (Levav & Fitzsimons, 2006), increase the accessibility of specific goal-directed implementation intentions (Levav & Fitzsimons, 2006; Webb & Sheeran, 2008), and create “instant habits” that facilitate goal achievement (Aarts & Dijksterhuis, 2000). For example, a dieter who decides to curb soda intake might specify adding fruit or natural flavors to water for a more palatable way to counter temptation.

However, research has identified several boundary conditions for the beneficial effects of planning. Although concrete planning increases planners’ self-control when close to goal achievement, concrete planning also highlights the required specific actions and leads to demotivation and emotional distress when planners are a long way from goal achievement (Townsend & Liu, 2012). Similarly, multi-goal planning impairs commitment by highlighting the difficulty of managing and executing multiple goals (Dalton & Spiller, 2012). Moreover, when concrete thinkers form implementation intentions, they become inflexible to devise viable, out-of-plan means for achieving goals (Bayuk, Janiszewski, & LeBoeuf, 2010).

Systematic reviews of implementation intentions find substantial heterogeneity in effect sizes across studies, particularly in long-term follow-up measures of behavioral outcomes (e.g., Adriaanse et al., 2011; Hagger & Luszczynska, 2014). Therefore, more work is needed to identify moderating variables inhibiting planning benefits, such as goal domains and individual differences (Gollwitzer & Sheeran, 2006; Hagger & Luszczynska, 2014). Our research identifies an individual difference factor that significantly affects human biological and psychological functioning: eveningness-morningness orientation.

We investigate how plan specificity differentially influences health goal pursuit among consumers with a morningness versus an eveningness orientation.

2.2 | Plan Specificity: Specific versus General Plans

Planning requires mental simulations of actions to reach goals, but the plans may vary in specificity levels. Specific plans contain concrete components. For example, individuals forming concrete diet plans may predetermine the exact calories they consume with each meal and snack. In contrast, individuals creating general diet plans will consider the approximate total number of calories consumed each day. Plan specificity affects motivations. Concrete plans are found to be associated with increased self-regulatory motivations and behaviors (Gollwitzer, 1999). Several health domain studies show that concrete and specific plans aid smoking abstinence (van Osch, Lechner, Reubsaet, & Vries, 2010) and increase physical activities to prevent weight gain (Ziegelmann, Lippke, & Schwarzer, 2006).

However, concrete plans sometimes fail to guide self-regulation. Particularly, concrete diet plans demotivate individuals in poor goal standing (Townsend & Liu, 2012) and motivate only those striving to lose a significant amount of weight (Dombrowski, Endevelt, Steinberg, & Benyamini, 2016). Furthermore, detailed plans hinder flexibility facing unexpected delays or obstacles in goal pursuit (Baumeister, Vohs, & Oettingen, 2016). For example, students pursuing academic goals tend to perform better when following moderately specific study plans. In contrast, students perform worse when following highly specific study plans because there is no accommodation for unexpected developments (Kirschenbaum et al., 1981). Together, the extant literature suggests that the effectiveness of plan specificity depends on individuals and situations. Extending the

research, we propose that consumer eveningness-morningness orientation affects whether specific or general plans are effective.

2.3 | Matching Effects of Plan Specificity and Eveningness-Morningness Orientation

Circadian rhythms affect the human biological clocks that determine individual eveningness-morningness orientations and the associated psychological behaviors regarding sleep-wake patterns and subjective alertness (Adan et al., 2012). Individuals differ in their eveningness-morningness orientations on a low-high morningness continuum (Loureiro & Garcia-Marques, 2015; Natale & Cicogna, 2002). MTs, or early birds, usually go to bed and wake up early and achieve peak mental and physical performance early in the day. ETs, or night owls, go to bed and wake up late and are most alert during late hours (Adan et al., 2012).

Eveningness-morningness orientations are related to personality traits that cause different approaches to understand and structure the world. MTs tend to be conscientious, goal-oriented, well-prepared, organized, attentive to details, and have a low tolerance for ambiguity (Díaz-Morales, 2007; Fabbri et al., 2007). In contrast, ETs tend to act impulsively (Muro, Gomà-i-Freixanet, Adan, & Cladellas, 2011; Stolarski, Ledzinska, & Matthews, 2013), take risks, and be creative (Díaz-Morales, 2007; Giampietro & Cavallera, 2007). ETs' minds tend to wander (Carciofo, Du, Song, & Zhang, 2014), so they dislike repetitive experiences (Muro, Gomà-i-Freixanet, & Adan, 2012) and show high tolerance for ambiguity (Fabbri et al., 2007).

How people interact with their environment further determines their thinking styles, viewing the world either holistically with connected components as a whole or analytically with isolated elements separately (Zhou et al., 2012). Indeed, insights from

previous studies suggest that eveningness-morningness orientation is associated with holistic-analytic styles of thinking (Adan et al., 2012; Díaz-Morales, 2007; Fabbri et al., 2007). MTs gather knowledge based on pragmatic data, tangible, and direct experiences, form new understanding based on what is known, and consider social norms and rules. As a result, MTs tend to process information using analytic strategies, following logical and sequential reasoning. In contrast, ETs build new schema by understanding their environment through gestalt inference or abstraction from symbolic and unknown data. Therefore, ETs tend to engage in holistic thoughts and affective thinking, relying on subjective feelings and emotions.

Past research documented the distinct analytic versus holistic cognitive styles and differences in information processing about ambiguous situations between MTs and ETs. However, only limited research has directly examined how the cognitive distinction based on one's eveningness-morningness orientation affects consumers' implementation plans to meet health goals. Furthermore, extant research primarily relies on correlational methods to demonstrate the association between eveningness-morningness orientations and individual cognitive styles. Bridging the planning and chronology research streams (Table 1), we examine how MTs and ETs respond differently to health plans matching or mismatching with their cognitive styles and its downstream effects on health goal pursuit.

— Insert Table 1 about here —

Planning requires mental simulations of actions to reach goals, and plans may vary in specificity levels. Based on their distinct cognitive styles, we propose that MTs are likely to prefer specific plans that provide step-by-step guidance, while ETs likely prefer general plans that offer flexibility to allow multiple versions of the future.

Therefore, matching plans with planners' eveningness-morningness orientations will enhance health-goal consistent motivations and behaviors. Formally, we hypothesize:

H1: Matches between plan specificity and eveningness-morningness orientation (specific planning for MTs, general planning for ETs) will promote higher motivation and behaviors for health goals; mismatches will not.

2.4 | The Mediating Role of Self-Efficacy

Following the preceding discussion, we suggest that a match with specific (general) plans and morningness (eveningness) orientation of planners will lead to perceptions of ease of acting upon the plans or self-efficacy. Self-efficacy, defined as one's belief in the ability to "mobilize the motivation, cognitive resources, and courses of action needed to meet given situational demands" (Wood & Bandura, 1989, p. 408), is an essential determinant of health persuasion (Han, Duhachek, & Agrawal, 2016; Keller, 2006; Sheeran et al., 2016). Before people can be persuaded to follow recommendations, they must believe or be convinced that they have self-efficacy. High self-efficacy leads to goal clarity and is positively associated with actual planning activity (Hoffmann & Plotkina, 2021).

Previous research suggests that framing messages to match message recipients' cognitive orientations, as an individual difference or activated by a situational prime, helps evoke self-efficacy and induce the desired behavior (White, MacDonnell, & Dahl, 2011). For example, when low-level construal health messaging is matched with problem-focused coping strategies, message recipients perceive greater self-efficacy and feel more confident that they can perform the suggested actions (Han et al., 2016).

Consequently, we predict that MTs and ETs, because of their different cognitive styles, will experience different levels of self-efficacy in response to health planning

recommendations that vary in plan specificity. When plan specificity matches the cognitive styles of MTs versus ETs, they will feel greater perceived self-efficacy, resulting in increased plan adherence, motivation, and behavior concerning health goal pursuit. Formally,

H2: Self-efficacy perceptions will mediate the matching effect between plan specificity and morningness-eveningness orientation on health goal pursuit.

Figure 1 provides an overview of our conceptual model and the operationalization of the focal constructs.

— Insert Figure 1 about here —

3 | PILOT STUDY 1: EFFECTIVENESS OF SPECIFIC PLANS

To explore how planning effects depend on eveningness-morningness orientations, we undertook a longitudinal study. We recorded food consumption among students enrolled in the same class during the exam preparation week. Considering the availability of study participants and sample size needed for statistical power, we focused on one type of planning. We primed participants to be aware that healthy eating is associated with enhanced brainpower to activate a healthful eating goal. We then introduced a specific diet planning intervention, measured self-efficacy, and observed post-planning daily eating patterns over five days.

3.1 | Participants and Methods

Eighty undergraduate students (60% females, $M_{\text{age}} = 21.26$, age-range = 18-26) at a Korean university participated in a 5-day study in exchange for course credit and a chance to win a bookstore gift certificate valued at USD 1 or 5 approximately. The study

was conducted in two phases during the week before the midterm. Appendix A shows the details of the measurement and research stimuli.

3.1.1 | Phase 1

Phase one was implemented from April 13-15 (Friday-Sunday) in 2018. Participants completed the study online at times of their choice. We measured eveningness-morningness orientation using the five-item short-form of the Eveningness-morningness Questionnaire (rMEQ scale; Loureiro & Garcia-Marques, 2015). We obtained the rMEQ scores ($M = 11.96$, $SD = 2.61$) by summing the items. We followed previous research using the scores to assess morningness-eveningness orientation on a continuum (Natale & Cicogna, 2002). A higher (lower) score suggested a greater morningness (eveningness) orientation. Next, to activate the healthful eating goal, we showed participants a fictitious *New York Times* article titled “Eating a Healthy Diet Boosts Your Brainpower.” Our participants were preparing for upcoming midterm exams, so we presumed the article to be relevant and highlight the importance of a healthy diet. After reading the article, participants reported the importance of maintaining a healthy diet and boosting brainpower.

Next, following previous research (Townsend & Liu, 2012), we introduced a specific planning intervention by asking participants to consider their eating carefully. We asked them to plan out all specific foods and drinks for three meals (breakfast, lunch, and dinner) for Monday-Friday of the coming week. Then, participants indicated their motivations to pursue healthy eating goals and their self-efficacy (i.e., perceived confidence and ability) in following the plan. As a proxy measure of goal-directed behavioral intentions, participants saw a pop-up email newsletter subscription sign-up

that contained tips for healthy eating and sleep and reported their intentions to sign-up. Finally, participants indicated the importance of obtaining a high GPA and provided their demographics.

3.1.2 | Phase 2

For phase two, we sent five follow-up surveys, one for each day (April 16-20, Monday-Friday). Each survey included the weekly eating plans that the participants constructed at phase one. Participants reported and rated their actual food consumption for breakfast, lunch, and dinner meals on three dimensions: healthful, nutritious, and unhealthful, and answered three questions measuring plan adherence. Fifty-eight participants completed all five follow-up surveys (60.3% females, $M_{\text{age}} = 21.16$, follow-up survey response rate = 72.5%). The attrition rate did not vary with eveningness-morningness orientation ($b = .06$, $se = .08$, $t = .80$, $p = .43$).

3.2 | Results

3.2.1 | Manipulation checks

We conducted a regression analysis with the healthy diet importance rating as the dependent variable and the rMEQ score as the independent variable. Eveningness-morningness orientation had a nonsignificant effect ($b = .04$, $se = .05$, $t = .73$, $p = .47$). The mean healthy diet importance rating ($M = 5.66$) was significantly different from the midpoint of the scale ($t(79) = 13.22$, $p = .00$). Another regression analysis on importance of boosting brainpower also revealed a nonsignificant effect of eveningness-morningness orientation ($b = -.01$, $se = .05$, $t = -.14$, $p = .89$), and had the mean rating ($M = 5.31$) significantly different from the midpoint of the scale ($t(79) = 9.56$, $p = .00$). Together, the results suggest successful priming: after reading the article, participants considered

maintaining a healthy diet and boosting brainpower important, regardless of their eveningness-morningness orientations.

3.2.2 | Phase one: Health goal motivation, behavioral intention, and self-efficacy belief

We averaged the two items measuring healthy diet motivation ($r = .42, p = .00$) to create a goal-motivation index. We conducted a regression analysis with the goal-motivation index as the dependent variable and the rMEQ score as the independent variable. A significant positive eveningness-morningness orientation effect emerged ($b = .12, se = .05, t = 2.34, p = .02$). Another regression analysis with newsletter subscription sign-up intention also showed a significant eveningness-morningness effect ($b = .18, se = .07, t = 2.71, p = .01$). Together, the results suggest that MTs were more motivated to stick to the specific diet plan and have stronger intentions to engage in goal-consistent behaviors than ETs.

We averaged the two items measuring self-efficacy beliefs ($r = .76, p = .00$) to create a self-efficacy index and regressed the index on rMEQ scores. A significant eveningness-morningness effect emerged ($b = .13, se = .06, t = 2.11, p = .04$): the more morningness-oriented, the stronger the self-efficacy beliefs in adhering to the specific diet plan. Next, we tested the mediation role of self-efficacy using the SPSS bootstrapping macro by Hayes (2013, PROCESS Model 4) with 5,000 bootstrap samples. Consistent with our hypothesis, self-efficacy mediated the eveningness-morningness orientation effect on goal-motivation (effect = .07, $se = .03, CI_{95} [.01, .13]$).

We performed another regression to examine the mediating role of GPA importance and found no supporting evidence that perceived academic goal importance underlies the proposed effect. We reported the detailed results in Appendix A.

3.2.3 | Phase two: Eating plan adherence and actual eating behaviors

Using responses from the 58 participants who completed all five follow-up surveys, we reverse-scored the healthful and nutritious items and computed an aggregate index of healthful-diet by averaging the unhealthful items and the two reverse-scored items ($\alpha = .95$). The higher the index, the more healthful foods were consumed during the five-day study period. In addition, we averaged the three items measuring plan adherence ($\alpha = .95$) and found its positive correlation with the healthful-diet index ($r = .43, p = .001$).

Next, we performed a regression analysis with the healthful-diet index as the dependent variable and rMEQ scores as the independent variable. We found that higher morningness-orientation was associated with a more healthful diet ($b = .08, se = .04, t = 2.08, p = .04$). Another regression analysis with eating plan adherence as the dependent variable also revealed a significant eveningness-morningness effect ($b = .12, se = .05, t = 2.54, p = .01$): higher morningness-orientation were associated with greater adherence to the eating plan. We depicted the daily healthful food consumption and plan adherence across participants' eveningness-morningness orientation in Figures 2 and 3.

— Insert Figures 2-3 about here —

3.3 | Discussion

Pilot Study 1 provides initial evidence that MTs, rather than ETs, report greater self-efficacy for adhering to plans and thus are more motivated to pursue health goals after specific planning. Furthermore, we demonstrate that the effect of specific diet plans on

health goal-directed motivation translated into healthful eating behaviors by monitoring post-planning actual eating for five days.

4 | PILOT STUDY 2: NATURE OF SELF-GENERATED PLANS

In Pilot Study 1, all participants were instructed to plan in a specific manner. It is unclear whether eveningness-morningness orientation shapes the way individuals plan. Therefore, we designed Pilot Study 2 to examine the relationship between eveningness-morningness orientation and the generality/specificity of a diet plan. We predicted that MTs (ETs) would create more specific (general) diet plans.

4.1 | Participants and Methods

In exchange for a small monetary reward (USD .30), 201 American adults from Amazon Mechanical Turk (MTurk) participated. We eliminated three participants who failed an attention check (Appendix B), leaving 198 participants for the final analysis (60.1% females, $M_{\text{age}} = 41.41$, age-range = 19-83). First, we activated health goal importance by having participants endorse two statements regarding the importance of health goals (for a similar approach, see Labroo & Patrick, 2009; Appendix B). Then, we asked participants to construct a diet plan for a regular day and evaluated the extent to which their diet plans were concrete, specific, and general (a reverse item). Finally, they completed the five-item rMEQ scale, reported their height, weight, and demographics. We used the height and weight information to calculate and control for body mass index (BMI) because BMI is associated with eating behaviors (French et al., 2014) and perceived self-regulatory success (Nguyen & Polivy, 2014).

4.2 | Results

The three items measuring diet plan specificity showed unexpectedly low reliability ($\alpha = .12$) because the reverse item was not significantly correlated with the concreteness item ($r = -.09, p = .23$). Therefore, we formed a plan specificity index¹ by averaging the concreteness and specificity items ($r = .53, p = .00$). A regression analysis with the specificity index as the dependent variable and rMEQ scores as the independent variable revealed that eveningness-morningness orientation had a significant positive effect ($b = .04, se = .02, t = 2.01, p = .05$), suggesting that participants higher in morningness-orientation formed more concrete and specific diet plans. The eveningness-morningness effect remained significant ($p = .04$) when controlling for BMI. In addition, regression analysis with plan specificity as the dependent variable, mean-centered rMEQ scores, mean-centered BMI, and their interaction term as the independent variables revealed only a significant main effect of eveningness-morningness orientation ($b = .04, se = .02, t = 1.98, p = .05$). Neither the main effect of BMI nor the moderating effect of BMI was significant ($ps' > .5$).

4.3 | Discussion

Pilot Study 2 supports our contention that eveningness-morningness orientation shapes the nature of plans. Higher morningness-orientation (eveningness-orientation) is associated with higher (lower) plan specificity. However, it is still unclear from the two pilot studies whether specific plans are ineffective for ETs because plan specificity counters against their cognitive styles or because ETs dislike planning. Thus, in Study 1, we directly manipulated levels of plan specificity to test the matching/mismatching

effects of eveningness-morningness orientation and plan specificity on healthful eating behavior.

5 | STUDY 1: PLAN SPECIFICITY MATCHING

We ran the study in a field setting by manipulating plan specificity and observing actual food consumption in a campus food court. We designed this study based on the light/low caloric = healthy intuition (Li, Heuvinck, & Pandelaere, 2021). We expected people to control their caloric consumption after the health goal activation. Specifically, participants who were instructed to plan their diet that matched (vs. mismatched) with their eveningness-morningness orientations should exhibit more health-goal consistent behaviors and consume fewer calories.

5.1 | Participants and Methods

For two days in April 2019, we approached 203 random American consumers as they entered a university campus food court during the lunch hours of 11:30 am to 1:30 pm to complete a short two-part survey in return for a small token. Three participants did not complete the survey and were excluded, leaving 200 for the analysis (45% females, $M_{age} = 31.72$, age-range: 18-62).

For the first part, we activated health goal importance using the same task as Pilot Study 2. Next, participants were randomly assigned to either the specific or general planning condition. Following previous research (Townsend & Liu, 2012), participants in the specific planning condition planned the number of calories to consume for each of the six eating slots (breakfast, mid-morning, lunch, mid-afternoon, dinner, and after-dinner) on a regular day. Participants in the general planning condition planned the total number of calories for a typical day, choosing from six options of a calorie range (Appendix C).

Then they responded to the self-efficacy measures (as in Pilot Study 1) and indicated how concretely the diet plan informed their daily food intake as a manipulation check of plan specificity.

Participants completed the second part of the survey after they purchased their lunch. We recorded the type and size of the foods and drinks purchased. We calculated the total calories consumed (the focal dependent variable) by consulting calorie counts listed on the vendor's posted menu. Finally, participants reported their height, weight, demographics, and eveningness-morningness orientations.

Given that the study involved a field setting with time constraints, we used the one-item dichotomous measure of eveningness-morningness orientation whereby participants self-identified as either MT or ET. Previous research has demonstrated that one self-reported measure is as accurate as of the five-item rMEQ scale (Loureiro & Garcia-Marques, 2015). Our pretest also validated the one-item measure's accuracy (for detailed results, Appendix C). There were 105 (95) participants who self-identified as a MT (ET).

5.2 | Results

5.2.1 | Manipulation checks

A 2 (eveningness-morningness orientation: MT, ET) \times 2 (planning: specific, general) ANOVA on the measure of plan concreteness showed that planning had a significant main effect ($F(1,196) = 14.27, p = .00$). Participants in the specific planning condition ($M = 5.02, SD = 1.52$) perceived their diet plans to be more concrete than did those in the general planning condition ($M = 4.16, SD = 1.70$). Neither the eveningness-morningness

main effect ($F(1,196) = .002, p = .97$) nor the interaction effect ($F(1,196) = .33, p = .57$) were significant.

A two-way ANOVA on the health goal index (average of the two items measuring weight maintenance importance; $r = .70, p = .00$) showed that eveningness-morningness orientation ($F(1, 196) = .08, p = .78$) and planning ($F(1, 196) = 2.04, p = .16$) had a nonsignificant main effect and interaction effect ($F(1, 196) = 1.36, p = .25$). The findings suggest that participants consider health goals to be equally important ($M = 6.48, SD = .77$), regardless of eveningness-morningness orientations or planning conditions.

5.2.2 | Calorie consumption

A two-way ANOVA on calorie consumption revealed nonsignificant main effects of eveningness-morningness orientation ($F(1, 196) = .86, p = .36$) and planning ($F(1, 196) = .02, p = .90$). As expected, a significant interaction emerged ($F(1, 196) = 18.23, p = .00$). Specifically, MTs consumed fewer calories when they engaged in specific ($M = 730.67, SD = 262.39$) rather than general planning ($M = 901.04, SD = 297.81; F(1, 196) = 9.04, p = .003$; Cohen's $d = .61$). In contrast, ETs consumed fewer calories when they made general ($M = 763.62, SD = 297.75$) rather than specific meal plans ($M = 944.29, SD = 303.18; F(1, 196) = 9.20, p = .003$; Cohen's $d = .60$) (Figure 4). Together, the findings support that matching eveningness-morningness orientation with plan specificity promotes low-calorie consumptions.

5.2.3 | Moderated mediation via self-efficacy

A two-way ANOVA on self-efficacy index (average of the two self-efficacy items; $r = .92, p = .00$) revealed nonsignificant main effects of eveningness-morningness orientation

($F(1, 196) = .35, p = .55$) and planning ($F(1,196) = 12, p = .73$). The interaction effect was significant ($F(1, 196) = 9.70, p = .002$). MTs reported higher self-efficacy when they made specific ($M = 4.80, SD = 1.66$) rather than general meal plans ($M = 4.09, SD = 1.98$; $F(1, 196) = 4.04, p = .046$; Cohen's $d = .39$). In contrast, ETs reported higher self-efficacy when making general ($M = 4.73, SD = 1.82$) rather than making specific plans ($M = 3.84, SD = 1.79$; $F(1, 196) = 5.70, p = .018$; Cohen's $d = .49$) (Figure 5). The findings suggest that a match between eveningness-morningness orientation and plan specificity enhances self-efficacy regarding adherence to diet plans.

— Insert Figures 4 and 5 about here —

To test whether eveningness-morningness orientation moderates the indirect effect of plan specificity on calorie consumption via self-efficacy, we used the SPSS bootstrapping macro by Hayes (2013, PROCESS Model 7) with 5,000 bootstrap samples. As predicted, the index of moderated mediation was significant (index = -61.83, $se = 24.88, CI_{95} [-115.49, -18.41]$). Specifically, the conditional indirect effect of plan specificity (specific = 1, general = -1) on calorie consumption through self-efficacy was negative and significant for the MTs (effect = -27.50, $se = 15.41, CI_{95} [-60.42, -1.01]$), but the indirect effect was positive and significant for the ETs (effect = 34.33, $se = 16.43, CI_{95} [5.19, 69.71]$).

5.2.4 | Alternative explanation

Correlational analyses suggested that BMI was not correlated with calorie consumption ($p = .66$) or self-efficacy ($p = .50$). Consistent with past research, we found that older people tend to be MTs ($r = .15, p = .03$). We conducted a two-way ANCOVA, including age and BMI as covariates, and found a similar pattern of main effects and interaction as

when the covariates were omitted (Appendix C).

5.3 | Discussion

Directly manipulating plan specificity and observing an actual food order in a field setting, we find support for the proposed matching effect of eveningness-morningness orientation and plan specificity. That is, matches promoted lower-calorie lunch choices, even after controlling for BMI and age. Consistent with Pilot Study 1, perceived self-efficacy for following diet plans underlies the matching effect.

6 | STUDY 2: PLAN SPECIFICITY MATCHING REPLICATION

Study 2 was designed to explore the proposed effects in an alternative context—planning an exercise routine. We chose the context because healthful eating and regular exercise are vital for physical and mental health (Hill, Wyatt, Reed, & Peters, 2003).

6.1 | Participants and methods

We recruited 310 American adults through MTurk and provided monetary compensation (USD .35). Six participants were excluded for not following the planning instruction (i.e., left the planning box blank or provided non-sense responses), leaving 304 participants for the analyses (55.6% females, $M_{\text{age}} = 41.79$, age-range = 20-75).

Participants first responded to the rMEQ scale and the same endorsement procedure as Pilot Studies. Next, participants were randomly assigned to the general or specific planning condition, which involved constructing a three-hour weekly workout plan. Specifically, participants were instructed to list the workout activities (general planning) or outline the workout specifics (what workout activities were, when they occurred, and their duration) using a planning table (specific planning) (Appendix D). Then, as a manipulation check, participants rated concreteness of the workout plan.

Participants also indicated their exercise and weight management goal motivation and self-efficacy in following the plan (Appendix D). Finally, participants reported their weight and height and demographics.

6.2 | Results

6.2.1 | Manipulation check

A regression with the self-rated plan-concreteness as the dependent variable, and mean-centered rMEQ scores, plan specificity (0 = general, 1 = specific), and their interaction term as the independent variables revealed a marginally significant effect of planning ($b = .30$, $se = .17$, $t = 1.81$, $p = .07$). Participants in the specific planning condition outlined more concrete plans than those in the general planning condition, suggesting a successful manipulation of plan specificity. The eveningness-morningness main effect was significant ($b = .11$, $se = .02$, $t = 4.57$, $p = .00$), such that higher morningness-orientation was associated with greater plan concreteness. The two-way interaction was nonsignificant ($p = .14$).

6.2.2 | Main findings

We regressed the motivation index (average of the three motivation items, $\alpha = .82$) on plan specificity, rMEQ-scores, and interaction. The results revealed only a significant main effect of eveningness-morningness orientation ($b = .10$, $se = .02$, $t = 4.62$, $p = .00$), such that higher morningness-orientation were associated with greater workout motivation. The main effect of planning and the two-way interaction were nonsignificant ($ps' > .60$).

We performed an ad-hoc regression analysis with BMI, plan specificity, rMEQ scores, and their interaction terms as independent variables. The results showed a

significant main effect of eveningness-morningness orientation ($b = .09$, $se = .02$, $t = 4.31$, $p = .00$) and BMI ($b = -.06$, $se = .02$, $t = -3.83$, $p = .0002$). Participants with a higher morningness-orientation and ones lower in BMI were more motivated to exercise, regardless of the planning intervention. The planning \times BMI interaction was significant ($b = .07$, $se = .03$, $t = 2.55$, $p = .01$). Importantly, there was a significant three-way interaction ($b = -.02$, $se = .01$, $t = -3.01$, $p = .003$). Specifically, among the low BMI group (- 1SD from the mean), MTs (+ 1SD from the mean) were equally motivated when planning generally or specifically ($p = .98$), whereas ETs (- 1SD from the mean) were more motivated when planning generally rather than specifically (effect = $-.102$, $se = .32$, $t = -3.17$, $p = .002$). In contrast, among the high BMI group (+ 1SD from the mean), MTs were equally motivated when planning generally or specifically ($p = .45$), whereas specific planning motivated ETs more than did general planning (effect = $.83$, $se = .29$, $t = 2.83$, $p = .005$) (Figure 6).

— Insert Figure 6 about here —

We performed another regression to test whether BMI, plan specificity, and rMEQ scores predicted self-efficacy. Consistently, we found a significant main effect of eveningness-morningness ($b = .11$, $se = .02$, $t = 4.81$, $p = .00$) and BMI ($b = -.05$, $se = .02$, $t = -3.11$, $p = .002$). The three-way interaction was nonsignificant ($p = .13$), but the interaction pattern largely mirrored the one of motivation (see Appendix D for details).

6.3 | Discussion

Examining the interaction effect between plan specificity and eveningness-morningness orientation in the exercise-planning context, we found that individual BMI moderated the interaction effect on goal motivation. Similar to our earlier finding in the healthful eating

context, we observed a consistent pattern of plan-specificity \times eveningness-morningness interaction among ETs—those with low BMI were more motivated when engaging in general rather than specific planning. Interestingly, the pattern was reversed among those with high BMI, such that ETs with high BMI were more motivated when engaging in specific rather than general planning.

The findings across studies showed that individual BMI moderated the joint effect of plan specificity and eveningness-morningness orientation in an exercise context but not in a diet control context. This might be explained by the differences between low-BMI and high-BMI individuals in their perceived ability to achieve weight control through dieting versus exercising. Indeed, Study 1 showed that BMI was not associated with self-efficacy in implementing diet plans, but in Study 2, BMI predicted self-efficacy in following workout plans. It is possible that compared to low-BMI individuals, high-BMI individuals are more likely to find their weight makes exercise difficult and not enjoyable.

7 | GENERAL DISCUSSION

People frequently construct diet and exercise regimens, and the marketplace responds to consumers' planning needs by providing various planning tools or programs. Are such planning programs equally attractive to everyone, and do they always lead to successful goal pursuit? How can governmental institutions such as the National Heart, Lung, and Blood Institute (NHLBI) promote weekly heart-healthy meal plans to improve national health habits?

Across four studies (including one longitudinal and one field study), we show the importance of consumer eveningness-morningness orientations in determining the effects

of specific or general plans for meeting health goals. In the context of diet control, we demonstrate that specific (general) plans are more likely to reap planning benefits for MTs (ETs). We find convergent evidence that consumers show health goal-directed motivation and behaviors when one's eveningness-morningness orientation is matched rather than mismatched with plan specificity. Furthermore, self-efficacy in adhering to the plan underlies the matching effects: MTs (ETs) believe they can stick to specific (general) plans and are more likely to attain their goals. We find consistent results across Korean and American study samples, even when controlling for age and BMI. In addition, we test the matching effect on goal motivation in an exercise context and identify BMI as a moderator. We replicate that ETs are less motivated when engaging in specific rather than general planning among individuals low in BMI. However, specific planning is more motivating than general planning for individuals high in BMI.

7.1 | Theoretical Contributions

We extend planning research that often focuses on situational factors and goal characteristics as boundary conditions of planning (Adriaanse et al., 2011; Bayuk et al., 2010; Dalton & Spiller, 2011; Townsend & Liu, 2012). We explore how eveningness-morningness orientation—an individual physiological variable—influences the effects of planning on motivation and goal-directed behaviors. Physiological variables are known antecedents of consumer behavior. For example, individual eveningness-morningness differences shape physiological arousal leading to diurnal variation in variety-seeking (Gullo, Berger, Etkin, & Bollinger, 2019)) and sleep deprivation increases variety-seeking (Huang, Liang, Weinberg, & Gorn, 2019). Joining that nascent research, we shed

light on the importance of matching planners (MTs or ETs) with planning interventions (specific or general) to optimize planning benefits.

Our research also contributes to the self-regulation literature. Consumers often make food choices that involve a trade-off between taste and health benefits and are susceptible to self-regulation failures by succumbing to instant indulgence that could sacrifice long-term health. Therefore, growing research has focused on understanding how consumers cope with self-regulation challenges. On the one hand, consumers strategically exaggerate the severity of their life problems to create reasons to justify their unhealthy food choices (Tezer & Sobol, 2021). On the other hand, consumers form behavioral commitments to health goals by developing implementation plans to prevent self-regulation failures (David & Haws, 2016). Consumers are known to differ in their preferred approaches to health goal planning (David & Haws, 2016), yet we know little about how their biological states influence their responses to planning recommendations. Planning encourages organization and facilitates goal achievement, but not all types of planning aid self-regulation equally. Our findings suggest that MTs, known to be more well organized and higher in conscientiousness and self-control (Díaz-Morales, 2007; Digdon & Howell, 2008; Schubert & Randler, 2008), will benefit from recommendations of specific diet plans. In contrast, general diet planning interventions empower and promote the self-regulation of ETs. The finding is significant because ETs have relatively unhealthy habits and lifestyles (Adan et al., 2012).

We answer calls for integrating the concept of implementation intentions with theories of motivation to examine whether implementation plans elevate self-efficacy (Gollwitzer & Sheeran, 2006). Consumers must believe they can implement goals and

must be motivated to do so. Forming implementation intentions, however, involves mental representation that may be of varying specificity. Plans could be concrete, with specific details about when, where, and how to perform goal-directed actions. Or plans could be relatively abstract, general, and flexible. We show that MTs (ETs) have greater self-efficacy regarding implementing specific (general) diet plans to pursue health goals.

7.2 | Managerial and Policy Implications

Marketers and policymakers might use our research findings for designing and deploying more preventive and therapeutic approaches to motivate healthful living. Although public health promotion programs encourage mindful eating, many consumers ignore the advice. We suggest that persuasive appeals should consider individual eveningness-morningness orientation and match it with plan specificity to promote preventive health strategies. As shown in our field study and previous research (Loureiro & Garcia-Marques, 2015), consumers' morningness-eveningness orientations can be accurately assessed by asking a simple one-item question. By making the healthy living experience relevant to the consumers (early bird or night owls), marketers can provide personalized plans that are easy, attainable, and enjoyable.

Healthcare providers often find it challenging to persuade overweight patients to adopt and maintain crucial wellness strategies through healthy lifestyles. Indeed, healthful diets and physical activity are equally important for controlling obesity (Hill et al., 2003). Our research indicates that a tailored weight management planning program may encourage overweight people to pursue weight-management goals. For example, ETs with low BMI may need general and flexible exercise plans. However, for ETs with high BMI, step-by-step and specific workout guidance might be more effective.

7.3 | Limitations and Future Research

This research has some limitations that future research could address. First, our studies measure eveningness-morningness orientation using the rMEQ scale. Future research could test ways to operationalize eveningness-morningness orientation across different scenarios and contexts (e.g., working on day shifts versus night shifts). Likewise, we measured self-efficacy in our studies. Future research could directly manipulate self-efficacy using a self-efficacy assurance (e.g., “You can do it!”) and observe how it affects the motivation of MTs and ETs in adhering to different diet and exercise plans. Furthermore, across our studies, we considered aggregate healthiness or caloric levels. It would be nice to test our proposed effect using various healthful and unhealthful foods, including calorie intake quantity and quality. Although we tested our proposition across two health-goal contexts (eating and exercise), future research can further test the generalizability of our findings in different goal contexts like finance (e.g., would MTs be more motivated to stick to their saving plans if detailed action plans are specified?), career planning (e.g., would ETs exhibit better job performance with a more general, flexible working schedule?), tour planning (e.g., would ETs enjoy a vacation more with a less-detailed tour schedule?), and dating (e.g., would MTs and ETs opt for different plans for initiating dating relationships?).

Second, one might argue that the administration of rMEQ scale at the beginning before the planning manipulation in Study 2 potentially created demand artifacts. Although we cannot rule out the possibility, it is unlikely to affect the findings. Such administration is not new; prior studies also administered the eveningness-morningness scale at the beginning of the study (Fabbri et al., 2007; Wang & Chartrand, 2015).

Furthermore, participants were explicitly informed to complete unrelated tasks, and each task contained a separate task title and cover story to make the tasks seemingly independent. Across four studies, we measured eveningness-morningness orientation in alternative orders and found mostly consistent results.

Third, researchers could further probe the role of BMI in the context of health planning. We find a differential impact of BMI in the exercise versus eating context and propose that differences in how BMI is associated with perceived self-efficacy might explain our findings. We observed the effect in only a single study, so we stress that it should be interpreted cautiously. Whether BMI fundamentally affects people's perceived efficacy and motivation in choosing exercise versus diet planning to meet health goals awaits future research. Furthermore, high-BMI consumers tend to over-consume healthful foods in public and unhealthful foods in private due to stigmatizing experiences (Sinha, 2016). Therefore, it would be interesting to explore how weight stigma affects exercise goal pursuit of MTs versus ETs.

Fourth, our findings that MTs (ETs) are more receptive to specific (general) plans are seemingly inconsistent with Ülkümen and Cheema's (2011) research in the financial domain. They posit that specific (nonspecific) goals lead to more savings when consumers are in abstract (concrete) mindsets. Careful consideration of the conceptual distinction between their construct of goal specificity and our construct of plan specificity helps explain the apparent contradiction. They focused on the level of ambiguity/diffuseness of the desired *outcome* (i.e., savings) of goal pursuit to operationalize goal specificity and found that specific goals motivate abstract thinkers because they focus on goal importance and demotivate concrete thinkers as they consider

goal difficulty. In contrast, we consider the *process* of goal pursuit in terms of specificity levels (e.g., specifying calorie consumption per meal versus considering general calorie range per day), but leave the significance or value of outcomes constant. Future research could further examine whether the focus on outcome versus process moderates the proposed matching effect between eveningness-morningness orientation and plan specificity.

Finally, goals attainability and goal value are known to drive goal commitment. When individuals perceive that they are making low (high) progress in reaching a goal, they must believe that the goal is attainable (important) to maintain their commitment and motivation (Zhang & Huang, 2010). We used a health goal priming task to control for goal importance and found that matching eveningness-morningness orientation and plan specificity boosts self-efficacy regarding plan attainability. Future research might investigate whether the match/mismatch also shapes perceived goal importance. Besides, future research might explore how eveningness-morningness orientation affects the relative consideration of goal importance versus self-efficacy. Would MTs or ETs focus more on self-efficacy or goal importance?

7.4 | Conclusion

In conclusion, our studies demonstrate that individual eveningness-morningness orientation may determine whether specific or general plans to pursue health goals will benefit planners. We show that in the eating context, matching is beneficial, while mismatching is detrimental; MTs will respond well to specific plans, while ETs respond better to general plans.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Table 1: Summary of Key Research Findings on Planning and Chronology

Article	Methodology	Research stream	Theme	Key findings
Kirschenbaum et al., 1981	Experiment	Planning	Level of plan specificity/concreteness	Moderately specific plans, not highly specific plans, lead to better study habits and academic performance.
Townsend & Liu, 2012	Experiment	Planning	Level of plan specificity/concreteness	Planning not always translate into goal directed behaviors for those who are in poor, rather than good, goal standing.
Dombrowski et al., 2016	Experiment	Planning	Level of plan specificity/concreteness	When people are motivated to lose weight, weight loss goal and detailed plan to change diet jointly help achieve weight management.
Gollwitzer, 1999	Conceptual article	Planning	Behavioral intention formation	Implementation intentions facilitate goal directed behaviors.
Aarts & Dijksterhuis, 2000	Experiment	Planning	Behavioral intention formation	When behavior is habitual, behavioral responses are activated automatically due to goal-action links.
Gollwitzer & Sheeran, 2006	Review article	Planning	Behavioral intention formation	Implementation intentions (spelling out when, where, and how of goal striving in advance) automate goal-directed responses.
Levav & Fitzsimons, 2006	Experiment	Planning	Behavioral intention formation	Asking individuals about their intention to engage in a certain behavior increases the likelihood of engaging in that behavior.
Webb & Sheeran, 2008	Experiment	Planning	Behavioral intention formation	Implementation intention effects are not always explained by enhanced deliberation, but rather increase from opportunity-response links.
Bayuk et al., 2010	Experiment	Planning	Behavioral intention formation	Forming an implementation intention reduces the possibility of out-of-plan goal-directed behaviors for people with concrete mindsets.
van Osch et al., 2010	Survey	Planning	Behavioral intention formation	Instrumentality and specificity of implementation intentions increase goal-directed behaviors.
Adriaanse et al., 2011	Review article	Planning	Behavioral intention formation	Implementation intentions are more effective for promoting healthy eating than discouraging unhealthy eating.
Dalton & Spiller, 2012	Experiment	Planning	Behavioral intention formation	Implementation intentions do not help multiple goal executions because execution difficulty undermines goal commitments.
Baumeister et al., 2016	Review article	Planning	Behavioral intention	The authors suggest a theory of pragmatic prospection and propose that people

			formation	think about the future to guide actions toward desirable outcomes and planning, in different forms, is the most common form of prospection.
Ziegelmann et al., 2006	Experiment	Planning	Alternative types of planning (interventions)	Interviewer-assisted (vs. standard-care self-administered) planning intervention leads to more complete plans and longer duration of physical activities for patients.
Hagger & Luszczynska, 2014	Review article	Planning	Alternative types of planning (interventions)	Planning interventions are effective for promoting health behavior, despite of heterogeneity in the effects across studies and relatively few objective behavioral measures.
David & Haws, 2016	Experiment	Planning	Alternative types of planning (interventions)	People adopt different planning strategies for health-related goals. Those low in self-control focus on avoidance items they really like and approach items that are less appealing, while those high in self-control show an opposite pattern of plans.
Upadhye et al., 2021	Experiment	Planning	Alternative types of planning (interventions)	Planning prompt is effective to mitigate impulse buying for individuals with high decisional procrastination and for vice products.
Díaz-Morales, 2007	Survey	Chronology	Cognitive styles/Cognition	Morningness–eveningness orientation relates to the ways in which individuals process information about their environments and themselves and engage in social interactions.
Fabbri et al., 2007	Survey	Chronology	Cognitive styles/Cognition	MTs show a tendency in the left-thinking, while ETs exhibit right-thinking style.
Giampietro & Cavallera, 2007	Survey	Chronology	Cognitive styles/Cognition	Evening-disposition is correlated with the ability to apply divergent thinking strategies to visual content.
Stolarski et al. 2013	Survey	Chronology	Cognitive styles/Cognition	Morningness relates positively to future time perspective, whereas eveningness correlates positively with present-hedonistic perspective.
Carciofo et al., 2014	Survey	Chronology	Cognitive styles/Cognition	Morningness is negatively correlated with mind wondering, daydreaming and attention-related cognitive errors.
Adan et al., 2012	Review article	Chronology	Personality traits	The authors review extant literature regarding (1) psychometric properties and validity of chronotype measures, (2) individual, environmental and genetic factors that influence the chronotype, and (3) chronotype differences in cognitive abilities, personality traits, and the incidence of psychiatric disorders.
Muro et al., 2011	Survey	Chronology	Personality traits	Eveningness-morningness orientation is associated with biologically-based

personality; evening-type women are higher in aggression-hostility, impulsive sensation seeking than morning-type women.

Muro et al., 2012	Survey	Chronology	Affective responses	ET adolescents show a greater desire for varied, new, complex, and intense sensations, and are more ready for more risks than MTs.
Schubert & Randler, 2008	Survey	Chronology	Behavioral responses – Eating	Morningness is in a positive association with dietary restraint and a negative correlation with disinhibition, perceived hunger, and BMI.
Wang & Chartrand, 2015	Survey	Chronology	Behavioral responses - Risk taking	Morningness is negatively related only to financially risky behaviors for American adults.
Escribano & Díaz-Morales, 2016	Survey	Chronology	Behavioral responses – Academic goal pursuit	In the academic context, morning-types show higher learning and performance goals, while evening-types show higher achievement goals.
Gullo et al., 2019	Experiment; Empirical analysis of secondary data	Chronology	Behavioral responses – Variety seeking	Circadian rhythms affect physiological arousal and consequent diurnal variation in variety-seeking.
The Current Research	Experiment, Longitudinal study, Survey	Planning & Chronology	Level of plan specificity/concreteness Cognitive styles/Cognition Behavioral responses – Health goal pursuit	Consumers with morningness-(eveningness-) orientation respond better to specific (general) diet plans. Therefore, a match between plan specificity and one’s eveningness-morningness orientation promotes self-efficacy in carrying out the diet plans and the consequent healthful eating motivation and behaviors. In an exercise context, individual differences in BMI moderate the combined effect of plan specificity and eveningness-morningness orientation on health goal pursuit.

Figure 1: Conceptual Model and the Operationalization of the Focal Constructs Across Studies

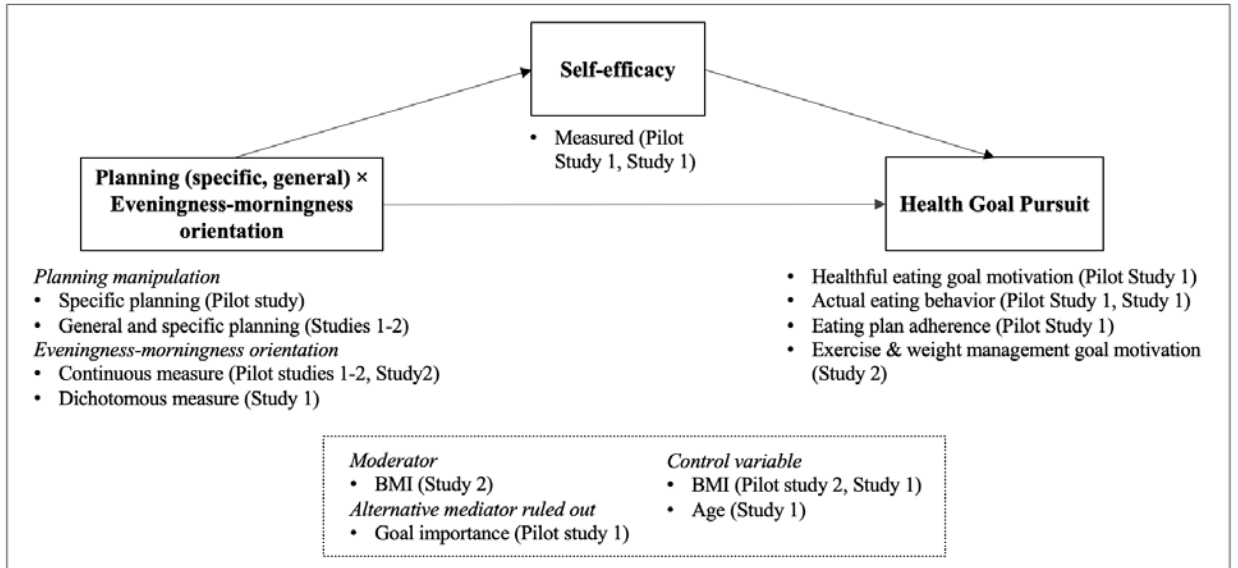
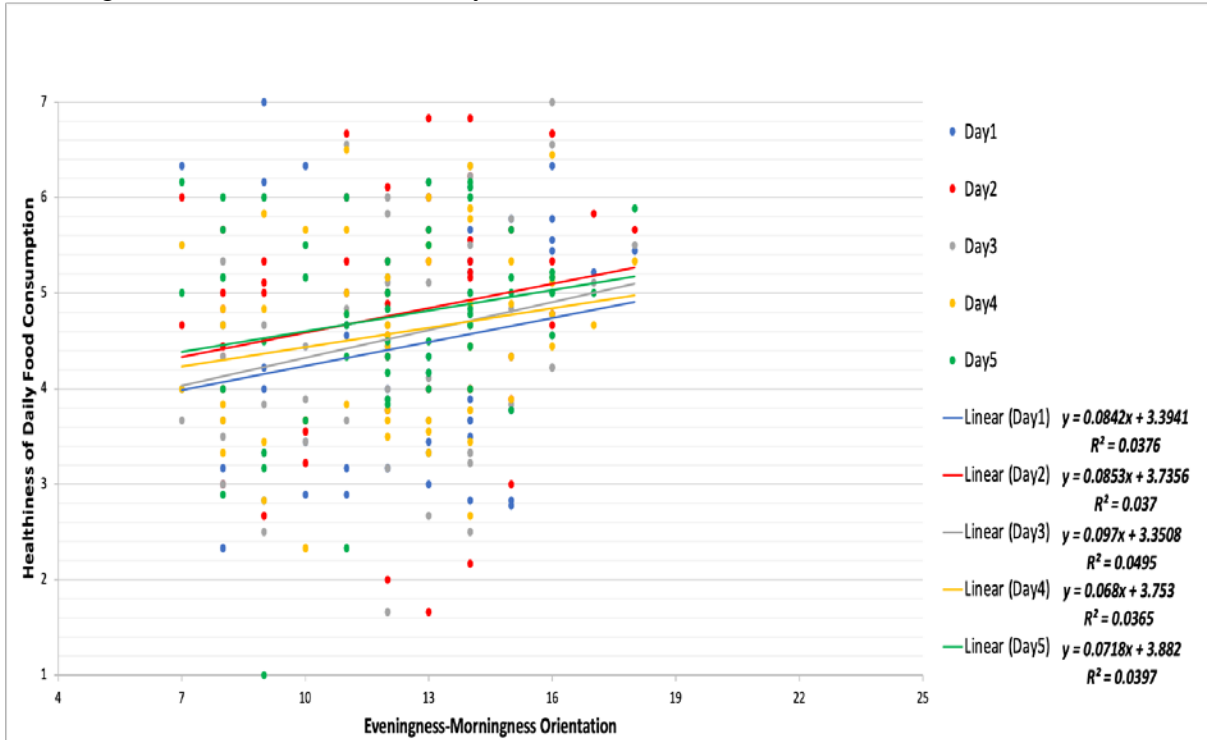
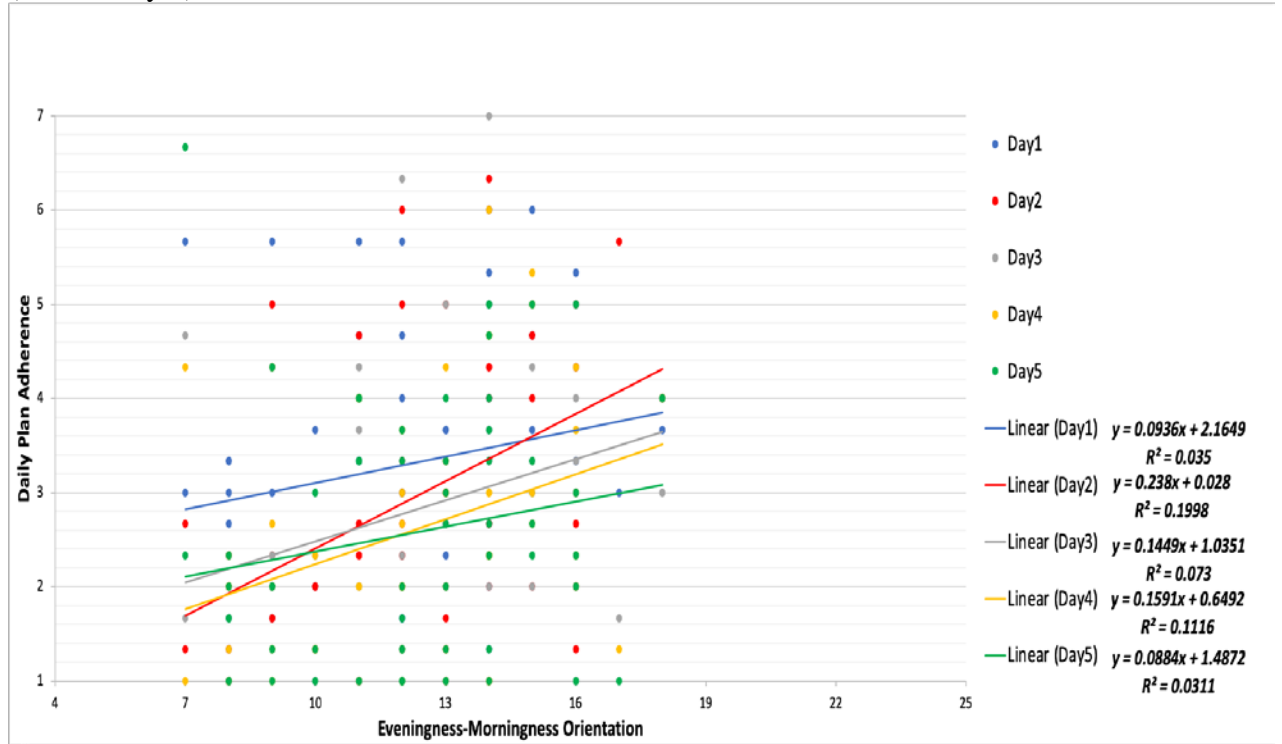


Figure 2: Healthiness of Daily Food Consumption as A Function of Eveningness-Morningness Orientation (Pilot Study 1)



Note: The range of 4-25 on the x-axis reflects the minimum and maximum possible scores of the rMEQ scale.

Figure 3: Daily Plan Adherence as A Function of Eveningness-Morningness Orientation (Pilot Study 1)



Note: The range of 4-25 on the x-axis reflects the minimum and maximum possible scores of the rMEQ scale.

Figure 4: Effects of Eveningness-Morningness Orientation and Planning Specificity on Actual Calorie Consumption for Meeting Health Goals (Study 1)

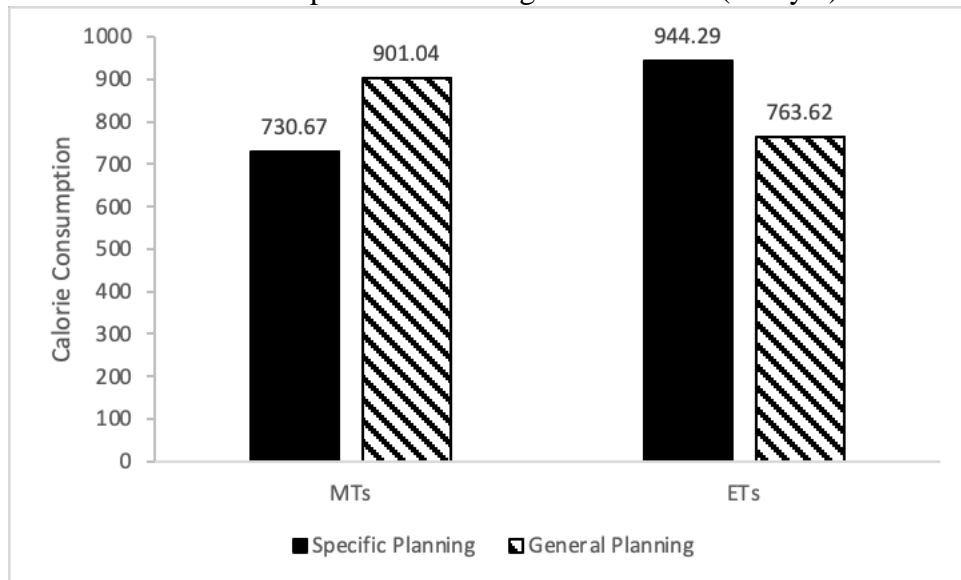


Figure 5: Effects of Eveningness-Morningness Orientation and Planning Specificity on Self-Efficacy for Plan Implementation (Study 1)

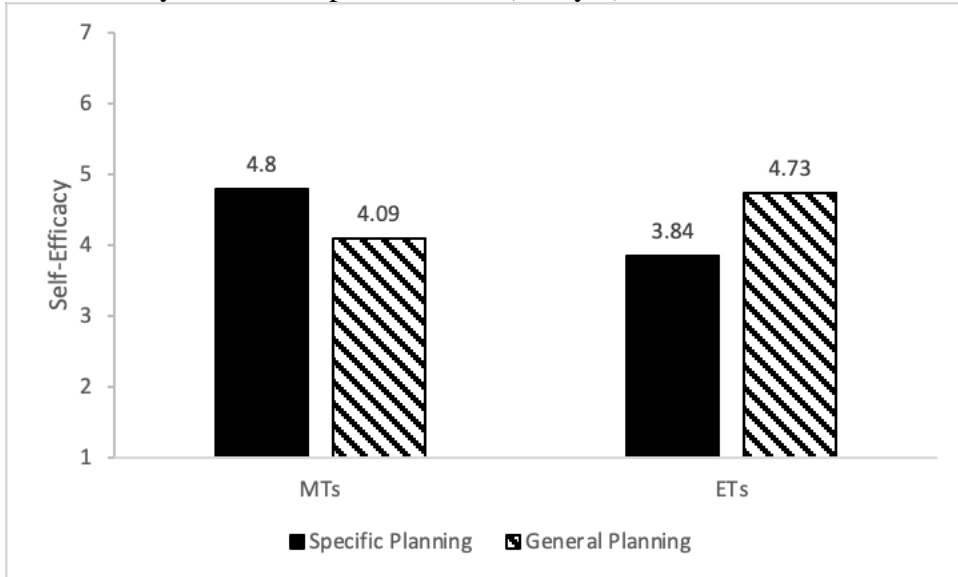
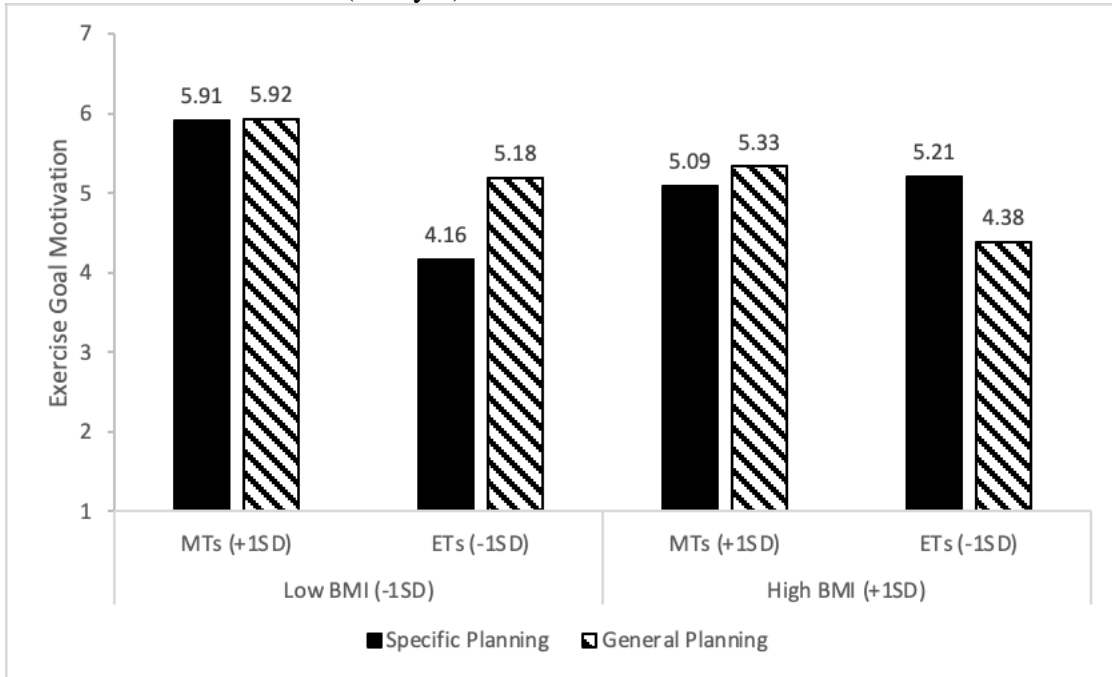


Figure 6: Effects of Eveningness-Morningness Orientation, Plan Specificity, and BMI on Exercise Goal Motivation (Study 2)



ⁱ We calculated another plan specificity index by taking an average of the three items and ran similar regression analyses. The results revealed a consistent significant main effect of circadian orientation ($b = .03, se = .01, t = 1.95, p = .05$) when BMI was included as a covariate. The main effect rendered marginally significant ($b = .03, se = .01, t = 1.92, p = .06$) when BMI was not included as a covariate.