

DOES THE DIVERSITY OF SAVORING STRATEGIES  
INCREASE HAPPINESS?  
AN EXPERIMENTAL STUDY OF  
DESIGN-MEDIATED WELL-BEING

A Thesis

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## ABSTRACT

When we look forward to enjoyable events or share positive experiences with others we can prolong and amplify our positive emotions. These and other savoring strategies can increase our well-being. Yet, it remains unclear whether practicing a variety of savoring strategies adds its own happiness-boosting effect. In this 1 x 3 randomized controlled study,  $N = 71$  participants received either an 8-day, original, interactive poster to facilitate high- or low savoring diversity, or they journaled in the control condition. Multiple linear regression models give varied results for emotional and cognitive well-being outcomes while qualitative data provide insights into the intervention's effectiveness at promoting positive experiences. Results suggest that assigning savoring diversity may have only a modest effect on well-being at the dosage used for this intervention. The study's evidence-based approach to intervention design may provide useful insights for practitioners of positive design and related disciplines.

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## BIOGRAPHICAL SKETCH

Jeremy D. Faulk is a behavioral researcher and design innovator with training in environmental psychology, applied ergonomics, and design evaluation.

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To my family, who taught me how to savor life.



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## LIST OF ABBREVIATIONS

*BIT* – Behavioral intervention technology

*FS* – Flourishing scale

*HAP* – Hedonic adaptation prevention

*PERMA* – Positive emotion; engagement; relationships; meaning; accomplishments

*PMTT* – Positive mental time travel

*PPI* – Positive psychology intervention

*PSS* – Perceived stress scale

*REM* – Ripple effects mapping

*SBI* – Savoring beliefs inventory

*SCI* – Savoring configuration inventory

*SPANE-B* – Scale of positive and negative experiences (balanced pos. and neg.)

*SPANE-N* – Scale of positive and negative experiences (negative subscale)

*SPANE-P* – Scale of positive and negative experiences (positive subscale)

*SWLS* – Satisfaction with life scale

*TENS-Life* – Technology effects on need satisfaction in life scale

## PREFACE

This project is part of a larger conversation about practicing creative adaptation to one's surroundings. The conversation can be followed at [www.trustthethread.com](http://www.trustthethread.com).

## CHAPTER 1

### INTRODUCTION

“I will live in the Past, the Present, and the Future. The Spirits of all Three shall strive within me. I will not shut out the lessons that they teach.”

— Charles Dickens, *A Christmas Carol*

#### ***Research Topic and Aim***

Over the past three decades, a growing number of psychologists and designers have explored ways to disseminate scholarly research through designed interventions in order to improve mental health (Hassenzahl, et al., 2010; Desmet & Pohlmeier, 2013; Parks, 2015). The arts and sciences have formed a particularly strong partnership in the development of positive psychology interventions (PPIs) aimed at reducing mental suffering and promoting flourishing through positive activities (see Schueller & Parks, 2014; Parks and Biswas-Diener, 2013 for reviews). A subset of PPIs called behavioral intervention technologies (BITs) has yielded innovative products and experiences that promote happiness and well-being through design (see Scheuller, 2014; Scheuller, Muñoz, & Mohr, 2013 for reviews). The current study emerges from this aptly-named sub-discipline, called positive design (see Desmet & Pohlmeier, 2013 for a review).

Scholarly interest in emotion self-regulation has grown rapidly since the turn of the century (see Gross, 2015 for a review). Unsurprisingly, this scholarly attention has inspired practitioners of positive design to explore new ways to facilitate users’ emotional self-regulation (e.g., Yoon, Li, and Hao, 2020; Quidbach, Berry,

Hansenne, & Mikolajczak, 2009). As pointed out by Schueller and Parks (2014), one especially powerful means of positive emotion regulation is savoring (Bryant & Verhoff, 2007). Savoring strategies are a category of activities that prolong and amplify positive emotions (or dampen them) by orienting our attention towards enjoyable experiences before, during, and after they occur. In this way, savoring strategies are like the “spirits” of our life experiences that can be carried with us, as Ebenezer Scrooge learns in Charles Dickens’ classic redemption tale: *A Christmas Carol*.

There are many ways to savor life, including – but not limited to – building anticipation, sharing positive experiences with others, increasing awareness of the moment, and showing gratitude to oneself (Bryant & Verhoff, 2007). Theory and empirical evidence suggest that happy individuals may naturally practice a wide variety of savoring strategies (Quoidbach, Berry, Hansenne, & Mikolajczak, 2010), however the standard approach of BIT development for savoring has been to offer interventions that support only one savoring strategy at a time (e.g., Pohlmeier, 2014; Yoon, Li, and Hao, 2020). Thus, an opportunity remains to uncover whether a single BIT can support a range of savoring strategies (Faulk et al., 2020). In addition, the evidence that diversifying one’s savoring strategies can increase happiness has been cross-sectional up to this point (Quoidbach, 2010). Because Quoidbach and colleagues’ pivotal study has become the rallying point for the potential impact of savoring diversity on well-being (e.g., Chadwick, Jose, and Bryant, 2020; Bryant, Chadwick, & Kluwe, 2011), further investigation would help positive psychologists to better understand the nature of this potentially impactful moderator to well-being.

### ***Research Question***

Does the diversity of savoring practices predict users' subjective well-being? To test this question, the author created a tangible BIT to promote savoring and then selectively diversified a number of savoring affordances inherent to the design across two experimental groups and one control group. Employing a randomized, controlled methodology, the current study is intended to contribute to the basic literature on savoring by providing a causal investigation into the potential importance of savoring diversity to one's subjective well-being.

### ***Design-Driven Approach***

In order to address the research question, the author used a *research-through-design* approach (Frayling, 1993; Zimmerman, Forlizzi, & Evenson, 2007), developing an original BIT that would theoretically facilitate a range of savoring strategies while acting as a research artifact to enable an empirical study of savoring diversity. There are three methodological advantages to the research-through-design approach in this case. The first advantage is the ability to randomly assign participants to groups, a possibility that has been lacking in prior research on savoring diversity (e.g., Quoidbach et al., 2010) and savoring research in general (e.g., Jose, Bryant & Macaskill, 2020). Second, although it is more challenging to tease apart causal constructs, happiness interventions that are released into the real world have been suggested to carry greater ecological validity than lab studies examining the same subject (see Smith, Harrison, Kurtz, Bryant, 2014). And third, a research-through-design approach allowed the author to gear the intervention's design directly towards answering the study's research question rather than trying to merge any number of prior research artifacts to fulfil that function.

In addition to the methodological benefits of using a research-through-design approach, there is also the benefit of continued iterative testing of a new potential BIT.

Others have noted the disappointingly small number of basic research findings that make their way into applied treatments for positive emotion regulation (see Dunn, 2017 for a review). As Dunn cautions, “It is critical for the positive emotion regulation field not to lose sight of the need for practical application of its findings” (p. 474). The relatively small number of applied research success stories is no surprise when considering that the process of testing new behavioral interventions is long and arduous, often requiring many iterations before acceptance into clinical practice. In light of this practical consideration, a research-through-design approach presents a potentially formidable opportunity for moving forward basic research questions while also iterating in-development PPIs. Indeed, the customized research artifact developed for this study represents the second iteration of an intervention continued from a prior exploratory trial (Faulk et al., 2020). In summary, a research-through-design approach permitted the author to test not only the primary research question, but also to continue iterative testing of an in-development intervention. Therefore, a secondary research question emerges: How can design enable users to engage in the practice of diverse savoring activities, thereby increasing their well-being?

### ***Structure of this Paper***

The paper consists of four main parts: (1) theoretical background, (2) implementation of the design concept, (3) carrying out the empirical study, and (4) study results and integration. To begin, Chapter 2 will detail the theoretical background of this project from the viewpoint of its research contributions. Next, Chapter 3 will delve into the design considerations established by the author during the intervention’s development. Chapter 4 will outline how the intervention was created. This will include process descriptions for how each element of the BIT relates to the goal of the intervention. Appendices will be used to illustrate points visually.

Next, Chapter 5 will explain the methods of the main study, and, finally, Chapter 6 will show the results of the empirical study, with Chapter 7 continuing into general discussion. Let us move on to the next chapter within which we will discuss the theoretical background of the current study.



## CHAPTER 2

### THEORETICAL BACKGROUND

#### ***What is Well-Being?***

In the field of positive psychology, subjective well-being is often considered to be informed by two overarching concepts: (1) cognitively-appraised well-being (i.e., life satisfaction), and (2) emotionally-appraised well-being (i.e., affective health) (Diener, Suh, Lucas, & Smith, 1999; Seligman, 2002). A number of theories endeavor to refine these two overarching concepts into their fundamental building blocks. For example, the widely referenced PERMA model of well-being (Seligman, 2011) proposes five experiential elements that contribute to a person's sustained happiness: Positive emotions, Engagement, Relationships, Meaning, and Achievement. The current study relates primarily to the first building block in the PERMA model (i.e., positive emotions) while also referencing other building blocks of well-being to incorporate a wider view of the human experience.

#### ***Positive Emotion Regulation***

The study of emotion regulation, as a whole, is centered under the theoretical umbrella of emotional intelligence (Salovey et al., 2008; Hay and Diehl, 2011). Within this domain, the practice of *positive emotion regulation* has been proposed as an important mechanism to achieving sustainable happiness (see Lyubomirsky, King, & Diener, 2005; Gross, 2015). Yet much of the research on positive emotion has focused on pleasure, fun, desire, and other ephemeral constructs. Flourishing, on the other hand, is a more enduring concept, which can both lead to positive affect and be preceded by it (Seligman, 2011). Indeed, positive affect has been observed to predict success in the domains of marriage, friendship, income, work performance, and health

(see Lyubomirsky, King, & Diener, 2005 for a review). In practicing positive emotion regulation, one asks, “Which emotions will be favorable to my well-being?” and, depending upon one’s answer, one can adjust their behavior accordingly. In general, when we are able to successfully upregulate our positive emotions, we are happier (e.g., Fredrickson & Branigan, 2005). But *how* does practicing positive emotion regulation increase our well-being?

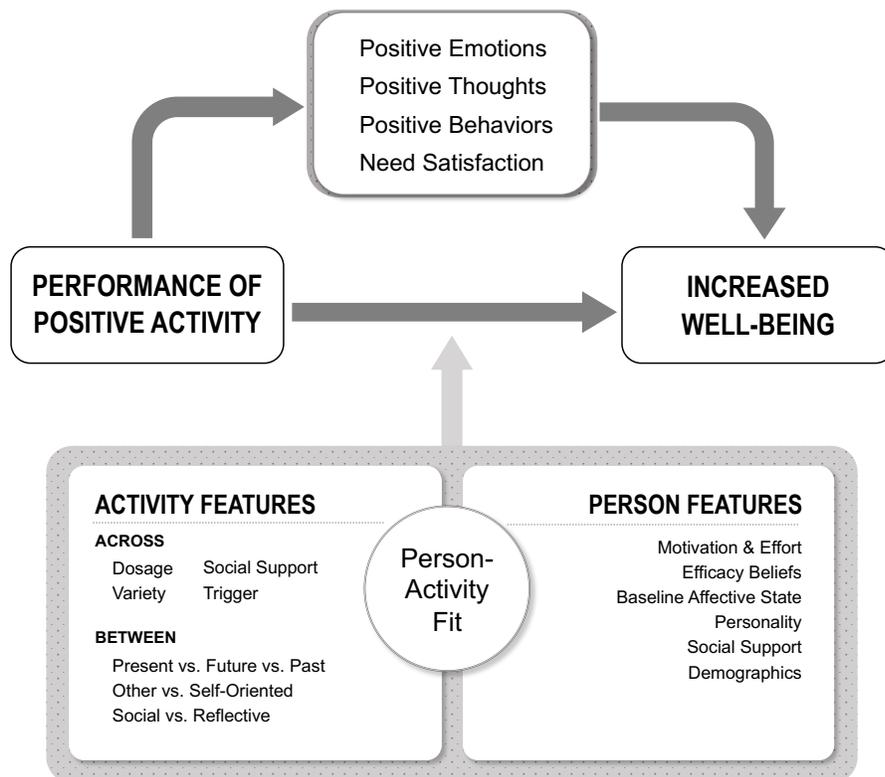
### ***How Do Positive Emotions Increase Well-Being?***

According to the *broaden-and-build* paradigm (Fredrickson, 2001), cultivating positive affect creates a “pool of mental resources” that simultaneously increases the likelihood of future positive experiences while also making one resilient to the effects of negative emotional experiences. A number of cross-disciplinary studies support this theory. For example, when we feel happy, our view of possibilities in life, and our ability to act on them, often becomes broader (Fredrickson & Branigan, 2005). Researchers have also found that positive emotions can help to shift one’s attention towards seeking additional possibilities for enjoyable experiences, thus promoting further gains in affective health in an “upward spiral” of positive emotions (*ibid*). In addition, health psychologists have discovered that positive emotions can help us to buffer against the impact of aversive emotional experiences (e.g., Tugade & Fredrickson, 2004). Positive emotions can also help buffer against aversive physical health outcomes (Tugade, Fredrickson, & Barrett, 2004; Kok et al., 2013). The reduction of perceived stress is a particularly robust outcome that can result from increased positive emotions (e.g., Smith, Thompson, Hall, Allen, & Wetherell, 2018). Thus, in support of the broaden-and-build theory, it has been found that positive emotions not only increase our affective well-being by promoting positive thoughts and actions (Lyubomirsky et al., 2005; Fredrickson & Joiner, 2002), they can also

work to increase one’s life satisfaction by building resilience towards mental and physical stressors (Cohn, Fredrickson, Brown, Mikels, & Conway, 2009).

***Regulating Positive Emotions through Action***

While poor emotion regulation has been linked to dampened happiness (Kahriz, Bower, Glover, & Vogt, 2019), it has been proposed that individuals can adopt behavioral strategies that can increase their happiness over time (Lyubomirsky, 2008). Lyubomirsky and colleagues (2005) have suggested that up to 40% of one’s happiness can be informed by intentional activity, however, not all researchers agree with this assessment. Brown & Rohrer (2019) offer a much more conservative estimation of the potential influence that intentional activities might have on one’s happiness, suggesting that one’s life circumstances and genetic set point are likely to



*Figure 1.* Positive-Activity Model (Lyubomirsky & Layous, 2013), which proposes an explanation for how the characteristics of positive activities mix with those of the individual to moderate well-being.

play a much larger role in informing one's happiness than is generally assumed in the field of positive psychology. Still, the impact of positive activities is widely acknowledged through empirical study, and positive psychology journals continue to seek more rigorous methods of assessment to infer causality (Heintzelman & Kushlev, 2020).

Returning to positive emotions, while the frequency of positive emotions may predict well-being, there is much room to explore what specific factors contribute to effective positive emotional regulation. According to the *positive-activity model* (Lyubomirsky & Layous, 2013; see Figure 1), certain *actions*<sup>1</sup> can help us, and those around us, to upregulate our positive emotions. As a key point in this matter, the positive-activity model proposes that the characteristics of our happiness-increasing actions *must* theoretically combine with the characteristics of our unique situations and personalities to create a measure of “person-activity fit.” A good person-activity fit has been found to predict the effectiveness of PPIs (e.g., Sin et al, 2011) and therefore, an effective understanding of person-activity fit can empower both individuals and practitioners of positive design alike to facilitate practices for sustainable well-being (Layous & Lyubomirsky, 2014).

Next, let us discuss what across-activity features can lead to an increase in well-being. For example, what dosage of positive activities does one need to experience to impact one's overall well-being? While an exact dosage is impossible to predict, research suggests that a higher frequency of positive events appears to more accurately predict well-being than fewer events with greater intensity (Diener, Larsen, Levine, & Emmons, 1985; Diener, Sandvik, & Pavot, 2009). Regarding the level of variety, research has shown that happy people tend to naturally practice a range of

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<sup>1</sup> In this case, “actions” may refer to behaviors as well as actively engaging in mental processes.

strategies to upregulate their positive emotions (e.g., Quoidbach et al., 2010) and that this “regulatory diversity” may better sustain well-being than individuals who implement only one happiness-increasing intervention at a time (e.g., Parks et al., 2012). Following this line of thinking, it becomes beneficial to understand how we might increase both the frequency and diversity of positively-appraised events in our lives in order to self-regulate our positive emotions.

### ***Savoring Strategies as Happiness-Increasing Activities***

One important way for us to self-regulate our positive emotions is to practice savoring (Bryant, 2003; Bryant et al., 2008). Savoring describes activities that amplify, prolong, or dampen positive emotions (Bryant & Verhoff, 2007). In their landmark publication *Savoring: A New Model of Positive Experience*, authors Bryant and Verhoff (*ibid*) list ten savoring strategies:

- **Memory Building** – engaging in the present moment while intentionally looking forward to its future recall (i.e., taking a mental photograph).
- **Self-Congratulation** – pausing to give oneself praise for achievements and milestones.
- **Sensory-Perceptual Sharpening** – giving an abundance of attention to one’s sensory experience (e.g., intensely enjoying the flavor of a delicious meal).
- **Comparing** – engaging in a downward situational comparison to boost one’s estimation of the current situation.
- **Absorption** – becoming totally engrossed in an activity to the point of losing oneself in it (i.e., flow; Nakamura & Csikszentmihalyi, 2002).
- **Behavioral Expression** – showing positive facial expressions and embodied cognition that is consistent with one’s emotional state, or one’s desired emotional state (e.g., smiling, placing a hand on one’s heart, cheering).

- **Temporal Awareness** – bringing one’s attention to the fleetingness of time, wishing the present moment could last longer but knowing that it will end (i.e., reminding oneself to enjoy the moment now).
- **Counting Blessings** – engaging in a cognitive appraisal of everything good in one’s life, in a specific situation, or in a relationship (i.e., giving thanks).
- **Kill-Joy Thinking** – dampening, or “putting the brakes” on one’s positive emotions, sometimes for sensible social reasons (e.g., squashing laughter at a funeral) and sometimes out of poor emotion regulation practices (e.g., negative rumination).

These and other savoring strategies<sup>2</sup> have been observed to act as both mediators and moderators to one’s emotional well-being. For example, in a 30-day-long diary exercise with 101 participants, the practice of savoring was found to both mediate and moderate the impact of daily positive events on measures of happiness (Jose, Lim, and Bryant, 2012). Furthermore, amplifying savoring actions have been found to predict the frequency of everyday positive life events over a three-month timespan (Jose, Bryant, & Mcaskill, 2020). These findings suggest that the amplifying and prolonging nature of savoring practices on positive emotions can greatly explain the degree to which positive events will impact our well-being.

Researchers in positive psychology have suggested that practicing a variety of savoring strategies – instead of just one or two – may have its own unique effect on emotional well-being (see Lyubomirsky et al., 2005 for a review). In order to address this question directly, Quoidbach et al. (2010) conducted a correlational investigation of savoring strategies and found that happy individuals appear engage in the process of *regulatory diversity* (i.e., practicing multiple savoring strategies instead of focusing on

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<sup>2</sup> The authors Bryant and Verhoff (2007, p. 41) conject that there are many more ways of savoring than the ten they identify in their original publication.

just a few). They found that regulatory diversity moderated the relationship between savoring and happiness. The researchers attribute this finding in part to an increased flexibility of opportunity, with multiple behavioral pathways to upregulate their positive emotions. In another study by Sheldon and colleagues (2012), participants in a 10-week intervention who engaged in a variety of gratitude activities showed greater happiness gains than those who repeated the same activities again and again. As explanation, Sheldon and colleagues' hedonic adaptation prevention (HAP) model proposes that variety is the "spice of happiness" (p. 901). Indeed, research on happiness-increasing activities has found that some happy individuals regularly enact up to 8 activities at any given time to improve their well-being (Parks, Della Porta, Pierce, Zilca, & Lyubomirsky, 2012). Consistent with the above findings, the positive-activity model proposed by Lyubomirsky and Layous (2013; see Figure 1), diversifying one's practice of savoring strategies is theorized to moderate the relationship between positive activities and subjective well-being, however, the author is unaware of any randomized controlled studies that address the impact of savoring diversity on well-being.

### ***Designing Interventions for Positive Emotion Regulation***

Many people do not know how to achieve sustainable happiness (Lyubomirsky, 2008). Yet, action-based PPIs have been found to moderately increase well-being and reduce depressive symptoms in a number of populations (see Sin & Lyubomirsky, 2009; Scheuller & Parks, 2014). In their review of successful PPIs, Nelson and Lyubomirsky (2014) write: "Successful activities are those that increase positive emotions and fulfil psychological needs, are practiced with optimal timing to minimize boredom, and, finally, infuse variety into one's life and daily pursuits." (p. 280). PPIs have historically taken the form of one-on-one interactions with a counselor or therapist, but there is a strong movement for self-help interventions, such as books

and multimodal interactive designs (see Parks, 2015 for a review), as these can potentially reach a wider audience than one-on-one interactions. Yet self-help books may have a limited audience because some individuals do not enjoy reading (Wilson & Cash, 2000). In addition, self-help books are, typically, not very engaging. Therefore, within the realm of self-help PPIs, one alternative to the book format is the behavioral intervention technology (BIT). BITs offer an experiential value to the happiness-increasing information, not through its passive absorption (e.g., book), but through its activity-focused approach. Through design, one has the opportunity to engage the user to act. When interaction designs are done well, they can be very effective. Yet designing an effective BIT is more challenging than it may seem.

The majority of BITs rely upon automation and use screen displays (e.g., Howells, Ivtzan, & Eiroa-Orosa, 2016), leading some researchers to note the potential benefits of developing tangible BITs that are decidedly *not* screen-based. However, products of this nature are quite uncommon. In one such design by Desmet and Sääksjärvi (2016), tangible plastic keychain coins were used to deliver instructions for positive activities over a 6-week intervention period. The intervention was called *Tiny Tasks*. The positive behaviors facilitated by *Tiny Tasks* led to an increase in users' satisfaction with life. Of additional noteworthiness is the fact that the happiness-effect was most pronounced in the experimental group who received tangible coins intended for keychains instead of the same tasks written on paper. Clearly, the tangibility, interactive quality, and the aesthetic design of the BIT had something to do with the effectiveness of this intervention.

In regard to positive design for savoring, Pohlmeier (2014) proposed that the facilitation of savoring strategies could be included as a design goal during the development of positive emotion regulation BITs, yet this exploratory research-through-design project looked only at facilitating one savoring strategy per BIT.

Furthermore, Pohlmeier's observations were exploratory in nature in that they recorded users' qualitative experiences only immediately after the moment of interaction. Therefore, an opening remains to develop a self-help BIT for positive emotion regulation that facilitates multiple savoring strategies. Such a facilitation is one sub-goal of the current study.

One problem with self-help BITs is that they are typically quite prescriptive regarding what behaviors to perform (e.g., go for a walk outside). However, prescribing behaviors may reduce the basic psychological need for autonomy, and thus – per the positive-activity model (see Figure 1) –may interfere with the mediation between positive action and well-being outcomes. Thus, there remains an opening for a positive emotion regulation BIT that engages users to perform highly individualized actions that fit seamlessly into their interests and values – thereby increasing person-activity fit – while also being as non-prescriptive as possible – thereby not interfering with mediation between action performance and well-being. Such a design concept was recently tested during an exploratory precursor to the current project and produced promising results (Faulk et al., 2020). Indeed, others have noted that open-endedness in behavioral design can still lead to users performing categories of actions as intended by the designer (Boon, Rozendaal, & Stappers, 2018). The current project represents a novel application of this concept into the realm of behavioral change for well-being. Through an evidence-based approach, the current study hopes to extend the scientific literature on savoring diversity while also improving upon the preceding iteration of this BIT design.



## CHAPTER 3

### CONSIDERATIONS FOR THE INTERVENTION'S DEVELOPMENT

There were four principle design considerations during the development of this BIT: (1) *Which – and how many – savoring strategies should be included to ensure regulatory diversity of positive emotions?* (2) *How long should the intervention last?* (3) *How will the user interaction design maintain users' engagement?* (4) *In what medium should the intervention exist?* These questions are divided into chapter subsections below.

#### ***Question 1: Identifying Which, and How Many Savoring Strategies to Include***

Choosing savoring strategies for the intervention was partly a matter of considering the appropriateness of the strategy for users' translation into self-identified activities, and partly a matter of determining which strategies were expected to have the greatest impact on users' subjective well-being. In deciding which savoring strategies to include, it was important to articulate the aim of the intervention. One consideration was whether or not the intervention should encourage users to initiate new experiences, or to include strategies that focused on savoring past events. While engaging in reflective exercises such as gratitude journaling has been found to improve happiness (Ryan & Deci, 2001), the breadth of actions that one can conceive during reflection is fundamentally limited in comparison to other savoring strategies. Therefore, to give users more of a sense of empowerment to act, the savoring strategy of *reminiscing* (i.e., a form of positive mental time travel; PMTT) was omitted. The articulated goal thus became to include savoring strategies that would primarily inspire fresh experiences to be savored and, additionally, help users not only to savor, but also to engage in their daily lives with more creative agency.

Past research has found that *capitalizing* positively predicts life satisfaction (Quoidbach et al., 2010) with the hypothesized mechanism being the basic psychological need for relatedness (Baumeister & Leary, 1995). Indeed, the positive-activities model (Lyubomirsky & Layous, 2013; see Figure 1) places basic psychological need satisfaction as a mediating factor between the activity and well-being outcomes. Yet Quoidbach and colleagues' (2010) study revealed the unexpected result that capitalizing did not correlate with subjective measures of positive affect. This discrepancy merits further investigation, and thus *capitalizing* was included as a savoring strategy in this study.

*Being present* was included due to the known benefits of mindfulness exercises (Brown & Ryan, 2003) and flow (Nakamura & Csikszentmihalyi, 2002). Being present has been found to independently predict positive emotions and subjective well-being separately from dispositional mindfulness (Kiken, Lundberg, & Fredrickson, 2017). Being present is also expected to easily merge into new experiences when encouraged, fitting well into the overall scheme of the current study's original behavioral intervention.

The savoring strategy of *self-congratulation* (i.e., taking pride in one's accomplishments) was chosen because of its ease of incorporation into the college experience. Many undergraduate students overlook opportunities for self-congratulation during the milestones of their studies due to perfectionism (Bryant & Yarnold, 2014). Slowing down to appreciate how hard one has worked to achieve a goal should, theoretically, lead to increases in feelings of subjective well-being for young adults. Indeed, such a boost to well-being has already been found in adolescent populations who practice self-congratulation (Chadwick, Jose, & Bryant, 2020) as well as university students (Wood, Heimpel, & Michela, 2003).

Finally, *anticipating* – a subcategory of PMTT – was included because of its empirically-observed inclination to increase happiness when practiced regularly over short periods of time (Quoidbach, Wood, & Hansenne, 2009). As a further reason to include *anticipating*, the intervention’s goal of finding actions to take during one’s daily life should naturally lend itself to opportunities for anticipation. For this reason, it was decided that the savoring strategy of anticipating would appear in *both* the low savoring diversity- and the high savoring diversity experimental groups.

### ***Question 2: Duration of the Intervention***

It was decided that the intervention would last for eight days. There were two goals in deciding upon the duration of the intervention. On the one hand, it is prudent to consider what would be reasonable stretch of time for a full-time worker or student to engage in without getting bored. On the other hand, the intervention must still be protracted at a dosage that will effectively generate an upward spiral of positive emotions. Such a balance has been struck during rather short periods of time, for example, one week with a daily dosage level of one interaction (Gander, Proyer, & Ruch, 2016; Seligman & Peterson, 2004). Considering that seven days is an uneven number, and that the dosage of each savoring strategy would ideally be doubled over the course of the intervention period, eight days was decided upon for the duration of the intervention, with a dosage of one interaction daily. Facilitating four savoring strategies twice each over the course of the eight-day intervention period would ensure an even distribution of savoring strategy dosage.

### ***Question 3: How to Maintain User Engagement***

As suggested by Desmet and Pohlmeier (2013), designed solutions to happiness, “may offer the means to enable, optimize, and facilitate well-being-promoting thoughts and behavior, but to foster flourishing they will have to require the

engagement of the user” (p. 12). In other words, maintaining engagement is key to an effective BIT. There were four major design goals intended to help maintain user engagement. First, the user experience was decided to be interactive and to promote a sense of curiosity. Designing to capture users’ interest has been found to motivate users to engage with designed elements in the context of interactive museum exhibits (Skydsgaard, Møller, & King, 2016), products (Yoon, Desmet, & van der Helm, 2012), augmented reality experiences (Aart, Bartneck, Hu, Rauterberg, & Salem, 2010), and digital interfaces (Attfield, Kazai, Lalmas, & Piwowarski, 2011). Using this approach for the current intervention, an interactive way of revealing the prompts may engage participants’ curiosity to a greater degree than, for example, receiving an emailed or timed reminder.

Second, the interaction was planned to facilitate a variety of activities instead of asking users to repeat the same activity again and again. As Parks, Schueller, and Tasimi (2012) found in their behavioral intervention study, participants were less likely to gain consistent happiness benefits from repeating the same actions. Even those behavioral interventions that encourage a variety of activities typically follow a prescriptive model, telling users what actions they should take (e.g., Desmet & Sääksjärvi, 2016). Related research has found that participants who were randomly assigned to perform positive activities experienced fewer gains in well-being than those who were assigned to perform activities that fit with their preferences (Schueller, 2011). Therefore, the next design goal was intended to build upon the user’s ability to customize the actions facilitated by the BIT.

Third, the interaction was planned provide a sense of autonomy regarding what actions should be taken. A sense of autonomy is intimately tied to user motivation (Peters, Calvo, & Ryan, 2018). Furthermore, research suggests that providing users the ability to personalize their interactions with products will reliably increase a sense of

ownership and choice, which can benefit a user's sense of autonomy (Ryan & Rigby, 2018). Thus, for the current project's BIT, it was decided that the intervention would not prescribe activities to users but would, instead, offer ambiguous prompts (e.g., "bring light") intended to motivate the user to search for their *own* opportunities for interpretation and positive action. The approach of using non-prescriptive prompts to promote positive, user-generated activities was carried forward from a preceding BIT iteration (Faulk et al, 2020). Much like the suggestions provided by audience members during improvisational theater, the prompts are intended to engage the user's creativity when interpreting the prompt through an intentional action. The ability to customize one's responses may help to increase the user's person-activity fit, as per the positive activity model (see Lyubomirsky and Layous, 2013 for a review) by making the positive action more suitable to the person's lifestyle, interests, and resources.

Fourth, the design was planned to encourage interaction by having qualities that increase the product's prominence in the user's mind. In other words, it should overcome the "out of sight, out of mind" problem, which has been found to affect consumers' behavioral habits (e.g., Mittelman, Gonçalves, Andrade, 2019). Furthermore, it requires some amount of mental effort to both remember and carry out positive activities during one's daily life (Lyubomirsky et al., 2005), and thus, it becomes important to consider ways in which the user may be reminded to engage with the intervention. Others have solved this problem by making the product highly visible during users' everyday lives (Desmet & Sääksjärvi, 2016). In addition, the design should be aesthetically pleasing, a factor that may be critical to the success of interactive products (Tractinsky, Katz, & Ikar, 2000).

#### ***Question 4: Medium of the Intervention***

While most BITs are screen-based (see Parks, 2015 for review), some researchers have noted the benefits of developing BITs that are not screen-based (e.g., Yoon et al., 2020). Just as self-help books do not suit every person, nor do digital interventions connect with every user's sensibilities. In one study by Desmet & Sääksjärvi (2016), tangible plastic coins were used to encourage happiness-increasing tasks among users over a 6-week intervention period, leading to a significant increase in user-reported happiness on the satisfaction with life scale (SWLS). Following this line of tangible design for positive emotion regulation, the current study endeavors to design for upregulating positive emotions by facilitating savoring practices through a tangible, non-digital BIT.

After exploring many potential forms, the idea for a scratch-off poster became the favored form of the intervention for two main reasons: (1) it can be placed in a prominent place, offering a visible reminder for continued engagement with the product over a short period of time, and (2) it offers an interesting way of interacting with the prompts.

The next chapter will describe the steps taken to create the BIT.



## CHAPTER 4

### CREATING THE INTERVENTION: *REVEALING MOMENTS*

#### *A Brief Description of the Intervention*

*Revealing Moments* is an interactive, self-help BIT intended to promote happiness-enhancing activities as identified by users during their everyday lives. Written prompts are a central component of this BIT. The written prompts appear beneath scratch-off areas on an 11 x 17-inch poster with instructions to find some action to take in their daily lives that will fulfil the prompt (see Figure 2). This poster

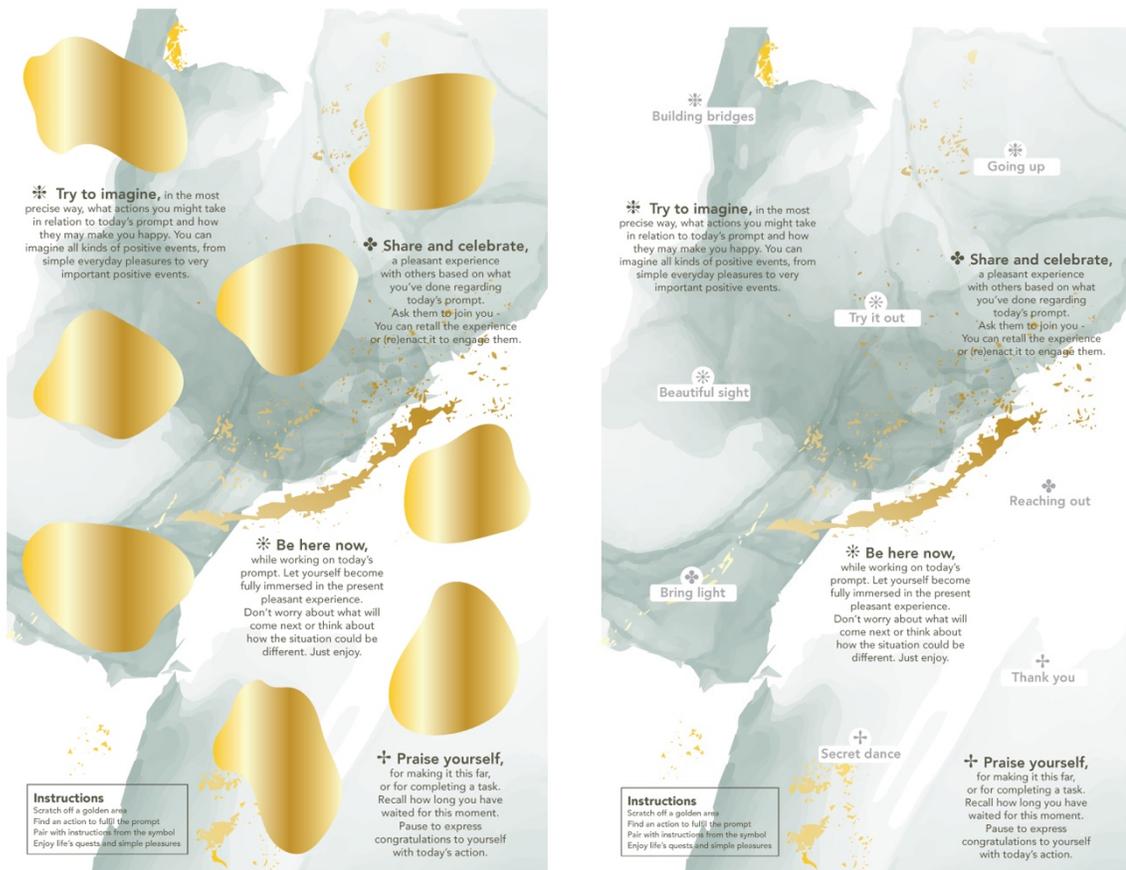


Figure 2. *Revealing Moments* 11 x 17-inch scratch-off poster images before (left) and after (right) interaction.

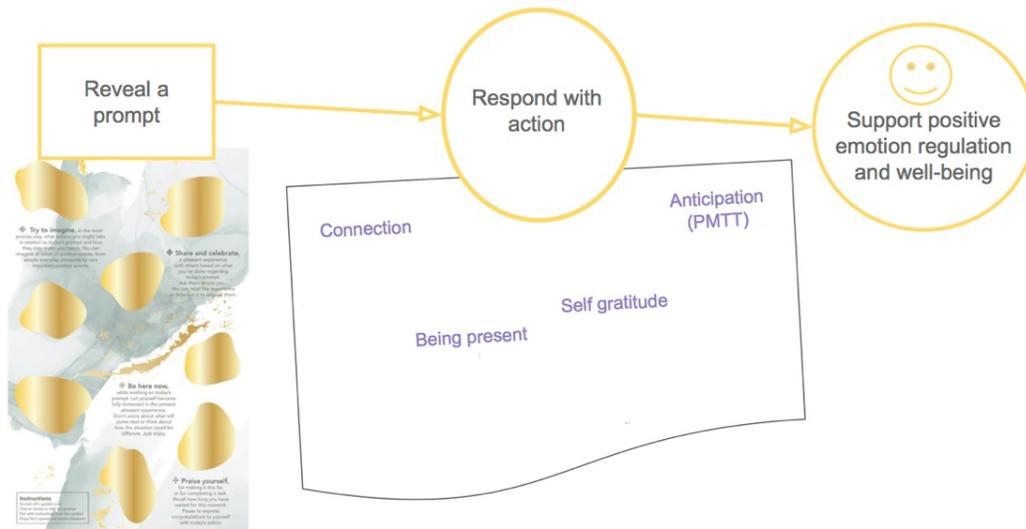


Figure 3. A flow diagram explaining how the intervention *Revealing Moments* is hypothesized to work.

was refined over four phases to provide an uplifting and flexible jumping off point for creative action during one’s daily life, while also providing opportunities to pair user-selected actions with specific savoring strategies. Savoring behaviors are incorporated into the user experience in the form of paired instructions (text blocks) that appear on the poster. Thus, users practice savoring in a variety of ways over time. In other words, the theoretical knowledge about positive emotion regulation is embedded into the user’s interaction with the product (see Figure 3).

The remainder of this chapter will detail the phases followed for developing the intervention:

1. Word prompt ideation
2. Judging the prompts on key dimensions
3. Sorting the prompts into savoring strategies
4. Final selection of the prompts
5. Designing the product itself and its user interaction

### ***Phase 1: Word Prompt Generation***

An initial list of 42 potential prompts was originated during a preceding exploratory study for this intervention (see Faulk et al., 2020). To expand the variety of potential prompts, the author hosted a 45-minute group brainstorming workshop with 6 (3 female; 3 male) artists. The group's creative proficiencies included poetry, transformative experience design, architecture, music, and dance. The workshop was geared towards capitalizing on the group's collective creativity by making the group brainstorming process a participatory one. To begin, the author briefly explained the purpose of the design intervention, highlighting the features of a suitable prompt: that it should be concise, open-ended, and non-prescriptive. Then, the author asked the group to brainstorm ideas for possible prompts for the intervention. The group generated 41 prompts with eight prompts being eliminated due to redundancy. When combined with the author's original list, a total of 75 prompts were available for further evaluation (see Appendix A).

### ***Phase 2: Judging the Prompts on Key Dimensions***

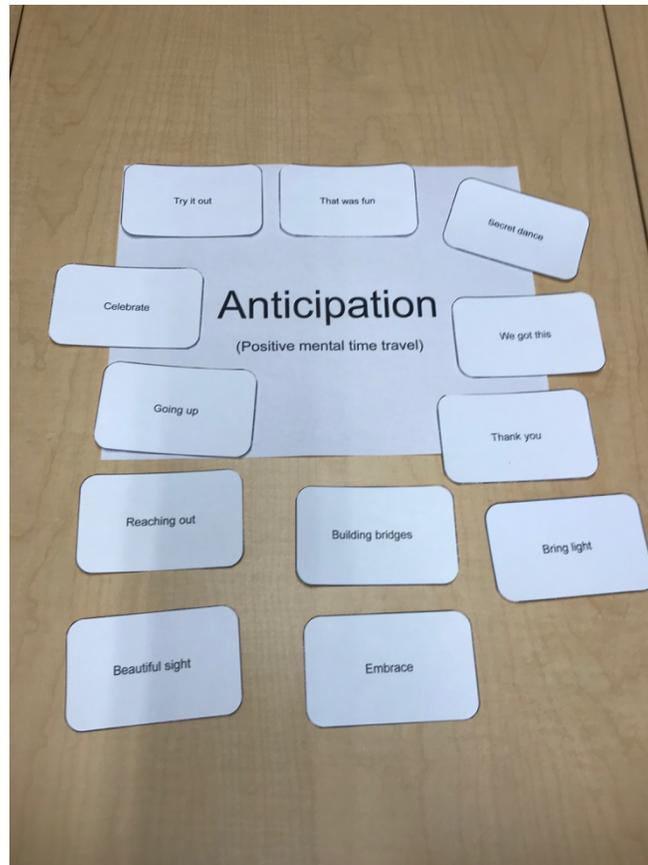
During the second phase, the 75 prompt candidates faced judgement from a general audience to assess the degree to which they promoted positive emotions for users, while also judging the degree of difficulty to translate through action. In order to judge the prompt candidates, a convenience sample of 27 judges (20 female, median age 35) completed an anonymous online survey via Qualtrics. Each prompt candidate was rated on two 7-point Likert scale of agreement with one question regarding the prompt's subjective "difficulty" to interpret, (i.e., I find it DIFFICULT to imagine an action that would fulfill this prompt), and one question regarding its potential promotion of positive feelings (i.e., POSITIVE feelings arise because of this prompt). These questions were repeated for each of the 75 prompts (i.e., 150 questions in total). The order of questions was intentionally such that judges' difficulty ratings would not

be influenced by their subsequent positivity ratings. The resulting averages in each dimension can be found in Appendix A. These subjective ratings served to narrow the prompt candidates to the least difficult, most positive options. Once the prompts' overall averages were calculated, the 45 most "difficult" candidates were eliminated. Using positivity ratings as a secondary filter, a list of 20 prompts emerged for further evaluation. On a 7-point scale of low-to-high agreement, the list of 20 semifinalist prompt candidates showed an average difficulty rating of 2.23 (SD = 0.43) and an average positivity rating of 4.81 (SD = 0.53; see Appendix B).

### ***Phase 3: Sorting the Prompts into Savoring Strategies***

For the fourth phase, the author developed a second workshop to pair the prompts with the targeted savoring strategies. Four practitioners (2 female, 2 male) in the field of positive design participated in a one-hour workshop during which the 20 prompt candidates, printed on index cards, were placed into a grid formation on a table. Alongside were placards denoting different savoring strategies. The facilitator briefly explained the definition of each savoring strategy and described the overall goal of the prompts. There were four sorting sessions, one for each of the targeted savoring strategies. Participants were asked during each session to select any prompts for which they could imagine a positive action they might take during their everyday lives. The action they imagined could be big or small. Participants also had the option to choose zero prompts. After a couple of minutes of card selection had passed, the facilitator asked participants to explain why they chose each one. They gave answers such as:

I chose 'try it out' [for *anticipation*] because you need to know *what* you will try to anticipate it. It should be something good, and that's why you want to try it; it's positive."



**Figure 4.** An example photograph showing the selected prompts for the savoring strategy of *anticipation* during the savoring strategy sorting workshop.

Another participant said:

“I chose ‘that was fun’ [for *anticipation*] because if it’s something you’re excited about – and also a little nervous about – you might think, ‘once this happens, I’m going to look back and find that it was a positive experience.’”

When the participants had finished explaining their reasons for choosing each card, the cards were photographed (see Figure 4) and then reset for the next session.

#### ***Phase 4: Final Selection of the Prompts***

The next phase involved the final selection of word prompts for use in the intervention. Because the author had previously decided that *anticipation* would appear in each of the experimental groups, only those 12 prompts which had been

selected for *both* anticipation *and* another savoring strategy met the qualifications for continued assessment (see Appendix B). Three of the prompts were eliminated at this point because they recurred across three or more sorting sessions.<sup>3</sup> From the nine prompts that remained, the average positivity scores guided the selection of the final eight prompts, with two prompts for each of the four savoring strategies. In the end, the final eight prompts showed mean ratings of 2.40 (SD = 0.51) and 4.87 (SD = 0.45) respectively on the 7-point difficulty and positivity measures.

### ***Phase 5: Designing the User Interaction***

The next goal was to design the user interaction. The written elements of the interaction were developed first. There were two goals in writing the instructions: (1) keep them brief, and (2) avoid unnecessary explanation about the purpose of the product. Research suggests that the goal of pursuing happiness can actually make happiness more difficult to find (Mauss, Tamir, Anderson, & Savino, 2011), therefore it was important to, wherever possible, avoid explicitly stating the purpose of the product. Instead, the instructions attempt to frame the experience as a series of “quests,” with limited explanation as to their purpose (see instructions in Figure 2). The language of a “quest” was a step towards the gamification of this intervention, an interaction factor that has been recommended to increase user engagement (e.g., Desmet & Sääksjärvi, 2016).

Next was the development of savoring strategy text instructions that pair with each of the prompts. The instructional text for the four savoring strategies was developed by referencing the text descriptions of different savoring strategies as outlined by Seligman (2002). Adaptations to the original text were made to suit the format of the current BIT.

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<sup>3</sup> Prompts that were selected during three or more sorting sessions were eliminated for lacking a discriminating quality in their pairings with discreet savoring strategies.

In order to pair savoring strategy texts with the prompts, a series of symbols were developed. Beneath the scratch-off area appears the prompt and also four, unique, star-like symbols (see Figure 2). The symbol acts as a visual reference to the prompt's systematically-paired savoring strategy, with the instructive text appearing as four short paragraphs on the exposed front of the poster. A supplementary instruction page provides further context for interaction with the poster, giving examples of the kinds of actions one might take after reading a prompt with savoring instructions (see Appendix C). In summary, the user is meant to find an activity that will fulfil the prompt to their own satisfaction while also pairing their activity with the supplementary savoring instructions.

#### ***Phase 6: Creating the Visual Appearance of the Product Itself***

It was decided that use of an abstract visual language would fit appropriately with the open-ended philosophy of this BIT. The size of the scratch-off poster was set at 11 x 17 inches so that it would be visually striking at a distance. With the size of the poster set, the author created several visual iterations of the poster as a test. For the final version of the poster, the author developed a design programming document with 4 design goals and 15 design requirements from which a professional graphic designer originated a series of options.<sup>4</sup> A number of adjustments were made per the author's request, resulting in a style that offered visual interest while achieving the mission statement set forward in the programming document. In addition, a "low savoring diversity" group poster was created to enable the empirical study; details of the second poster will be explained in the next chapter. The posters were printed by an industrial scratch-off company.<sup>5</sup>

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<sup>4</sup> Whether or not to leave the final poster design to a contractor was a tough decision, but, in the end, the author opted to prioritize product quality over "owning" every phase of the intervention's development. The design programming document is available upon request.

<sup>5</sup> Scratch Off Works, LLC., Rocky River, Ohio, U.S.A.



## CHAPTER 5

### THE MAIN STUDY: METHODS

The present study was designed to empirically test whether the level of savoring diversity plays an independent role in increasing happiness. In order to test this research question, the author developed a ten-day experiment with eight days of intervention. All measures were self-report or written response. Multiple regression analysis was used to test primary hypotheses in order to control for theoretically related factors. Below are the details of carrying out the experiment.

#### ***Ethics Statement***

All methods were approved by the Cornell University Institutional Review Board. All participant data remains de-identified in this report. Funding for this project was provided in part by the Department of Design + Environmental Analysis, along with the Meta Design & Technology Lab, led by professor Jay (JungKyoon) Yoon.

#### ***Research Design***

The experiment's study design was a 1 x 3 randomized controlled trial. The between-subjects, active independent variable of *savoring diversity* featured two levels: low savoring diversity vs. high savoring diversity. There were three primary dependent variables, each aimed at capturing different aspects of the target construct, subjective well-being. In addition, written responses, along with a handful of additional variables (e.g., perceived stress, effort, and motivation), were included to check for participant engagement as well as the effectiveness of the interventions. The control group engaged in a journaling exercise, which is a common practice for

experimental studies of PPIs (e.g., Seligman & Peterson, 2004; Sin & Lybomirsky, 2009; Desmet & Sääksjärvi, 2016).

### ***Participants***

A total of  $N = 71$  participants (74.6% females; ages 18-24) were recruited at Cornell University. All participants were undergraduate students who answered an advertisement placed in the institution's social sciences research recruitment platform. The advertisement informed participants that they would complete a series of short, daily activities from home while also completing a set of brief online questionnaires over a 10-day period. Because of mailing limitations, the advertisement advised potential participants that their eligibility would depend upon their residing in the United States.<sup>6</sup> Compensation was offered in the form of online research credits for participating university courses, along with the promise of a chance to win a raffled \$50 gift card if they completed the 10-day study.

### ***Apparatus & Setting***

All materials were mailed to participants at their places of residence. All questionnaires took place online via Qualtrics. Each participant in the two experimental groups received a mailed packet that included their poster intervention along with general instructions that were printed on standard, letter-sized paper (see Appendix C). In addition, the package included a set of daily instructions featuring QR codes that led to the study's online questionnaires (see Appendix D). The journaling group received a mailed, letter-sized envelope that included modified general instructions along with modified daily instructions, but they did not receive a poster.

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<sup>6</sup> Setting the inclusion criterion of "country of residence" was intended to help reduce staggered start times since many students had returned to their countries of origin after the onset of the COVID-19 pandemic.

In total, each participant completed 11 online questionnaires, including an “intake” initial survey to obtain consent along with the participant’s mailing address.

### ***Constructs & Measures***

***Savoring Diversity (Active IV).*** The savoring diversity active independent variable included two levels: low savoring diversity and high savoring diversity. Each level required its own poster to adjust the level of savoring facilitated by the intervention. The low savoring diversity group received a poster that incorporated only one savoring strategy: anticipating (i.e., PMTT) (see Figure 5), while the high savoring diversity group received a poster that incorporated four savoring strategies into its interaction: anticipating, capitalizing, self-congratulation, and being present (see Figure 2) with two interactions per savoring strategy.

***Satisfaction with Life (DV).*** To measure the self-perceived cognitive well-being of participants, the Satisfaction with Life Scale (SWLS; Diener et al., 1985) was used as a dependent measure. The SWLS assesses global life satisfaction with a 5-item questionnaire. Each item is scored using a 7-point Likert scale of disagreement-to-agreement. Total scores range between 5 and 35. The instrument has a robust research history and is still widely used in the field of positive psychology (see Diener, Inglehart, & Tay, 2013, for review). During the initial publication of the SWLS, the two-month test-retest reliability was  $r=0.82$ . Regarding internal consistency, the intercorrelations of all items across two confirmatory studies ranged from between 0.57 to 0.81.

***Flourishing (DV).*** As a second measure of cognitive well-being, the Flourishing Scale (FS; Diener et al., 2010) was included. The FS aims to measure self-perceived psychosocial prosperity across domains such as relationships, purpose,

optimism, and self-esteem. The FS is an 8-item instrument that is scored on 7-point Likert scales from disagreement-to-agreement. Total FS scores can range from 8 to 56. During the scale's development and validation, the initial Cronbach's alpha score was 0.87 with a one-month test-retest reliability of  $r=0.71$ .

***Positive and Negative Affect (DV).*** To assess the participant's self-described emotional well-being, the Scale of Positive and Negative Experiences (SPANE; Diener et al., 2010) was included. The SPANE was developed to measure self-reported feelings of persistent positive and negative affect. The 12-item instrument consists of two subscales, one for general positive affect (6 items) and one for general negative affect (6 items). Participants are presented words such as "happy," "sad," or "afraid" and asked to respond on a 5-point Likert scale (1 = very rarely; 5 = very often or always) to indicate how often they have experienced that emotion over a set amount of time. The SPANE is scored by adding up the total positive (SPANE-P) and total negative (SPANE-N) subscale scores separately, both ranging from 6 to 30. A combined score (SPANE-B) can be generated by subtracting the negative score from the positive score. The range for the SPANE-B is -24 to 24. The one-month test-retest reliability for the balanced SPANE-B scale at the time of original publication was  $r=0.68$ . The Cronbach's alpha for the balanced SPANE-B scale was strong at 0.89.

***Savoring Beliefs (Predictor IV).*** The Savoring Beliefs Inventory (SBI; Bryant, 2003) was utilized to check baseline attitudes towards savoring, a within-subjects factor which has been shown to correlate with savoring practices (e.g., Wood et al., 2003) as well as general measures of subjective well-being (e.g., Hurley & Kwon, 2013). The SBI is a 24-item questionnaire aimed at assessing users' receptivity to the benefits of three savoring subscales: (1) anticipating, (2) savoring the moment, and (3) reminiscing. Measuring three temporal categories of savoring is intended to capture a

sense of the person's ability to savor in general. Each item is scored on a 7-point Likert scale of disagreement-to-agreement. As an example, one item relating to *savoring the moment* (i.e., being present) asks the respondent to share their disagreement/agreement with the statement "I find it hard to hang onto a good feeling." The SBI total score may range from -72 to +72. In the original publication, the 3-week test-retest reliability of SBI was found to be strong at  $r=0.84$ ,  $p=0.0001$ . Additionally, Cronbach's alphas for the total SBI scale showed high internal consistency, ranging from between 0.94 to 0.88.

***Perceived Stress (Predictor IV).*** Stress has been shown to play an important role in happiness (see Schiffrin & Nelson, 2010). The Perceived Stress Scale (PSS-14; Cohen, Kamarck, & Mermelstein, 1983) is a 14-item instrument commonly used in the fields of medicine and psychology (see Lee, 2012 for review). Questions are phrased to capture a person's impression of their own stress level; for example, "In the last week, how often have you felt nervous and 'stressed'?" The Likert scale questions range from 0 (never) to 4 (very often), with 7 positively phrased questions and 7 negatively phrased questions. The total score ranges from 0 to 56, with 0 indicating a lack of any perceived stress. At the time of original publication, test-retest reliability over a two-day period was recorded at  $r=0.85$ . Three separate samples showed Cronbach's alpha coefficients from between 0.84 to 0.86.

***Relatedness Facilitated by the Intervention (DV).*** To address the intervention's potential to help users fulfil their basic psychological need for relatedness (see Baumeister & Leary, 1995 for a review), the relatedness subscale of the Technology Effects on Need Satisfaction in Life Scale (TENS-Life; Peters, Calvo, and Ryan, 2018) was included as part of the study. The TENS-Life is a self-report measure designed to assess whether a product is seen by the user as having a direct

impact on the user's basic psychological needs for autonomy, competence, and relatedness (i.e., three sub-constructs). The 10-item measure involves respondents rating their degree of disagreement/agreement with statements such as "Because of this product, I feel closer to some others" using a 5-point Likert scale (1 = not true at all; 5 = completely true). Pilot Cronbach's alpha scores for the TENS-Life subscales ranged from 0.80 to 0.88. There is no available test-retest score at this time.

***Diversity of Experiences Facilitated by the Intervention (DV).*** As an informal measure to gauge the diversity of user's experiences with the interventions, two additional questions were included in the post-test questionnaire, each with a space for written response. These questions were adapted from a community activism evaluation methodology called Ripple Effects Mapping (REM) (e.g., Washburn, Traywick, Thornton, Vincent & Brown, 2018). The first question reads, "What was the single greatest benefit from engaging with the prompts?" The second question was, "What was the best story that came out of the prompt interactions?" These questions were modified slightly for the journaling group. All participants were made aware that it was acceptable to report no benefit from the intervention.

***Fidelity Checks (IVs).*** Regular measures of enjoyment, motivation, effort, and activity completion were included as checks for participant engagement. A measure of users' motivation to complete the activities was included as user motivation has been observed to impact the effectiveness in happiness-increasing activities (Lyubomirsky, Dickerhoof, Boehm, & Sheldon, 2011). A measure of effort was included because one's personal effort practicing positive activities can impact the effectiveness of the intervention on subjective happiness (Diener & Biswas-Diener, 2008; Cohn & Fredrickson, 2010). The measures used in this study were simple 5-point Likert scales that appeared in the daily, online questionnaires during days 3-to-9 of the study. The

wording was adapted to suit either prompt fulfilment in the experimental groups, or journaling exercise fulfilment in the control group. The question for enjoyment in the experimental groups read, “How enjoyable was it to perform an action for YESTERDAY’S prompt?” (1 = not enjoyable at all; 5 = extremely enjoyable); for this question, participants could also choose a “did not complete” option. The question for motivation in the experimental groups read, “How motivated were you to complete YESTERDAY’S prompt?” (1 = extremely unmotivated; 5 = extremely motivated). The measure for effort in the experimental groups stated, “I did NOT put any effort into fulfilling YESTERDAY’s prompt” (1 = strongly agree; 5 = strongly disagree). And the daily measure for activity completion in the experimental groups stated, “I fulfilled YESTERDAY’S prompt by performing some action” (1 = strongly disagree; 5 = strongly agree).

In addition to the daily fidelity checks mentioned above, a post-study check was included to estimate how often participants involved others in their activities. The question (“How often did you include other people in the prompt interactions?”) was rated on a 5-point Likert scale ranging from 5 = Always, to 1 = Never. Note that the journaling group’s question asked about journaling exercises instead of prompt interactions.

### ***Procedure***

The experimental study took place over a 10-day period in the late Spring of 2020, with pretest and posttest measures occurring mostly on the 1<sup>st</sup> and 10<sup>th</sup> days, respectively, with some taking longer. The behavioral intervention occurred during the 8 days between the pretest and posttest questionnaires, with 7 check-in questionnaires being administered during the intervention period. Participants who completed the separate intake questionnaire and consented to participation were randomly assigned

to the three groups using a random number generator. Each participant received a mailed packet with a unique numeric code to be employed as their confidential participant ID across all questionnaires. The study began once the participant received their mailed packet and completed the first questionnaire. Participants then were sent regular email reminders to complete their daily actions and online questionnaires. Participants in the experimental groups engaged in activities of their choosing during the 8-day intervention period by scratching off a golden area from their poster and then pairing the revealed, open-ended prompt with additional instructions (i.e., savoring strategies) as indicated by an associated symbol appearing next to the revealed prompt. Participants in the journaling group were asked to write about their daily events and experiences during the intervention period. The study concluded once the posttest questionnaire was finished.

### ***Hypotheses***

The three principal hypotheses for this study correspond to the three measures of subjective well-being used in the pre-post questionnaires. Two secondary hypotheses are included as checks regarding the expected mediating factor of relatedness (i.e., basic psychological need) and the degree to which qualitative data reinforce the intervention's overall effectiveness at facilitating a range of savoring experiences. Below are the hypotheses for the current study:

- H1.* In a multiple linear regression analysis, after controlling for baseline levels of stress and a handful of additional factors, assignment to the High Savoring Diversity Group will predict greater posttest positive emotion on the SPANE-P than will assignment to the Control Group or the Low Savoring Diversity Group.

*H2.* In a multiple linear regression analysis, after controlling for baseline levels of stress and a handful of additional factors, assignment to the High Savoring Diversity Group will predict greater life satisfaction on the posttest SWLS than will assignment to the Control Group or the Low Savoring Diversity Group.

*H3.* In a multiple linear regression analysis, after controlling for baseline levels of stress and a handful of additional factors, assignment to the High Savoring Diversity Group will predict greater flourishing scores on the posttest FS than will those of the Control Group or the Low Savoring Diversity Group.

*H4.* Both the High Savoring Diversity and Low Diversity Groups will indicate greater posttest scores on the TENS-Life *relatedness* subscale than will the Control Group.

*H5.* Written responses will suggest that participants in the High Savoring Diversity Group experienced greater savoring diversity when compared with the Low Savoring Diversity Group or the Control Group.



## CHAPTER 6

### RESULTS

The number of participants who completed all measures on both pre- and posttest questionnaires was  $n = 69$ , however  $N = 71$  participants completed most of the key measures, leading  $N = 71$  to be the number of participants included in the following analyses when possible. To maintain clarity, each table indicates the number participants included in the analysis. Although some participant scores were outlying, it was deemed important by the author to include all scores for participants who completed the full 10-day experiment. This inclusive approach was employed to enable greater ecological validity.

All quantitative analyses were conducted in Stata/MV 16.1. Descriptive statistics are shown in Tables 1 and 2. Hypotheses 1-4 were addressed using multiple linear regression equations developed to control for baseline scores and potentially confounding factors. The variables within the regression models were held constant across hypothesis tests with only the outcome variable and its associated pretest being adjusted to suit the needs of the inquiry. Regarding the regression models, the following general rules were established to maintain consistency in the predictions:

1. Posttest averages serve as the outcome variable in all models.
2. All models control for participants' pretest score on the outcome variable.
3. All models include savoring beliefs (i.e., SBI).
4. All models include pretest perceived stress (i.e., PSS).
5. All models include indicator variables for the two experimental groups with the control group serving as the intercept.

6. No more than seven<sup>7</sup> predictors appear per model.

### ***Preliminary Results***

First, let us examine the participants who joined the study but did not complete all 10 days of the experiment. Although 94 individuals joined the study, only 83 of these completed the pretest questionnaire. Of the 83 who finished the pretest, 12 (14.5%) dropped out before the end of the 10-day experiment, leaving  $N = 71$  as the final number. Dropout analysis revealed that the 12 participants who left the study were evenly split between the three groups (i.e., 4 participants per group). A  $t$ -test revealed that, on average, the 12 participants who left the study had higher baseline levels of perceived stress ( $x = 34.75$ ;  $SD = 9.65$ ) than the baseline for the 71 participants who stayed ( $x = 27.48$ ,  $SD = 8.04$ ;  $p < 0.01$ ). In another  $t$ -test, those participants who left the study also displayed lower baseline cognitive well-being on the SWLS ( $x = 19.67$ ,  $SD = 7.02$ ) when compared with the baseline for those who completed the study ( $x = 23.57$ ,  $SD = 5.85$ ;  $p < 0.05$ ). Those who dropped also showed lower emotional well-being on the SPANE-B ( $x = 0.17$ ,  $SD = 9.66$ ) when compared with those who would go on to complete the experiment ( $x = 6.04$ ,  $SD = 6.65$ ;  $p < 0.01$ ). Interestingly, participants who dropped from the study indicated significantly higher baseline savoring beliefs ( $x = 10.42$ ,  $SD = 7.32$ ) than those who remained ( $x = 5.18$ ,  $SD = 6.34$ ,  $p < .01$ ). Finally, a series of one-way ANOVAs indicated no differences between the three groups of dropped participants on the baseline measures of pretest perceived stress, pretest life satisfaction, pretest flourishing, pretest SPANE subscales, and savoring beliefs ( $p$ -values ranging from .56 to .97).

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<sup>7</sup> Bearing in mind that the study had  $N = 71$  participants, the parameter of seven factors conforms to the commonly practiced “one in ten” convention that suggests approximately  $n = 10$  participants (or events) should be present for each predictor introduced (see Vittinghoff & McCulloch, 2007 for an overview).

Now let us discuss the baseline measurements for those who remained in the study. A series of one-way ANOVAs were conducted to compare the three groups on their baseline and fidelity check measures (see Table 1). Of the baseline key variables, the SPANE-B showed a significant pretest difference between groups ( $p = .048$ ) with the SPANE-N ( $p = .06$ ) and the SPANE-P ( $p = .10$ ) subscales each being marginally significant between groups. The baseline  $p$ -values comparing groups on the dimensions of sex, SWLS, FS, PSS, and SBI were nonsignificant, ranging from .23 to .93 on ANOVAs or chi-square tests, as appropriate. Finally, a chi-square test revealed a significant difference between groups in terms of their timing in completing the experiment relative to the university's final examination period ( $p = .047$ ; see Table 1).

For the reader's reference, a number of supplemental tables and figures are included in the appendix of this manuscript. Unadjusted pre- and posttest means for key variables can be found in Table 2, with corresponding bar graphs appearing in Figure 6. Correlations between key variables and posttest scores can be found in Table 3.

### ***Outcomes for Emotional Well-Being***

To address the question of whether the degree of savoring diversity predicted positive emotions, a multiple linear regression model was constructed using SPANE-P posttest as the dependent variable (see Table 4).

$$\begin{aligned}
 \text{SPANE-P-Posttest} = & B_1 + B_2\text{Low-Savoring-Diversity-Group-Assignment} + \\
 & B_3\text{High-Savoring-Diversity-Group-Assignment} + B_4\text{Pretest-Perceived-Stress} + \\
 & B_5\text{Savoring-Beliefs} + B_6\text{Baseline-SPANE-P-Pretest} + \varepsilon
 \end{aligned}$$

The result of this analysis did not support H1. Group assignment did not predict participant SPANE-P scores ( $p = .46$  high savoring diversity;  $p = .62$  low savoring diversity). The model's partial eta squared breakdown suggests a small effect size for group assignment's explanation of the SPANE-P posttest variance (partial  $\eta^2 = .021$ ).

Results further show that the participant's pretest SPANE-P score ( $p = .000$ ; partial  $\eta^2 = .391$ ) as well as their pretest savoring beliefs on the SBI ( $p = .017$ ; partial  $\eta^2 = .086$ ) both predicted posttest SPANE-P scores. Model-adjusted posttest means can also be seen in graphical form in Figure 7.

Exploratory analysis was conducted to examine the relationship between the posttest SPANE-N and related predictors:

$$\begin{aligned} \text{SPANE-N-Posttest} = & B_1 + B_2\text{Low-Savoring-Diversity-Group-Assignment} + \\ & B_3\text{High-Savoring-Diversity-Group-Assignment} + B_4\text{Pretest-Perceived-Stress} + \\ & B_5\text{Savoring-Beliefs} + B_6\text{Baseline-SPANE-N-Pretest} + \varepsilon \end{aligned}$$

The results showed nonsignificant  $p$ -values for the two group assignment variables ( $p = .10$ , low savoring diversity group;  $p = .33$ , high savoring diversity group). A similar exploratory process was employed to examine posttest SPANE-B scores.

$$\begin{aligned} \text{SPANE-B-Posttest} = & B_1 + B_2\text{Low-Savoring-Diversity-Group-Assignment} + \\ & B_3\text{High-Savoring-Diversity-Group-Assignment} + B_4\text{Pretest-Perceived-Stress} + \\ & B_5\text{Savoring-Beliefs} + B_6\text{Baseline-SPANE-B-Pretest} + \varepsilon \end{aligned}$$

Mirroring the outcomes of both the SPANE-P and SPANE-N subscale models, group assignment did not predict SPANE-B posttest outcomes ( $p = .43$ , low savoring diversity group;  $p = .33$ , high savoring diversity group).

### ***Outcomes for Cognitive Well-Being***

Two measures of cognitive well-being were included as part of this study.

First, we will discuss the SWLS model:

$$\begin{aligned} \text{SWLS-Posttest} = & B_1 + B_2\text{Low-Savoring-Diversity-Group-Assignment} + \\ & B_3\text{High-Savoring-Diversity-Group-Assignment} + B_4\text{Pretest-Perceived-Stress} + \\ & B_5\text{Savoring-Beliefs} + B_6\text{Baseline-SWLS-Pretest} + \varepsilon \end{aligned}$$

In this test of *H2*, group assignment did not act as a significant predictor of SWLS posttest scores (see Table 5). Of the five regressors included in the model, the only significant covariate was the pretest SWLS score ( $p = .000$ ).

The second measure of cognitive well-being (i.e., the FS) was also examined using multiple linear regression:

$$FS\text{-}Posttest = B_1 + B_2\text{Low-Savoring-Diversity-Group-Assignment} + B_3\text{High-Savoring-Diversity-Group-Assignment} + B_4\text{Pretest-Perceived-Stress} + B_5\text{Savoring-Beliefs} + B_6\text{Baseline-FS-Pretest} + \varepsilon$$

The results of the above model supported *H3* (see Table 6). The high savoring diversity variable was a significant predictor of posttest FS scores ( $p = .005$ ) with a medium effect size for this variable (partial  $\eta^2 = .119$ ). Visual representation of this difference appears in Figure 7. Another significant covariate was the participant's pretest FS score ( $p = .000$ ). Pairwise Tukey's tests with adjusted means displayed 95% confidence intervals indicating a significant difference between the control group and the high savoring diversity group (Contrast = 3.541,  $SD = 2.100$ ,  $LL = .6538$ ,  $UL = 6.4276$ ). A visual comparison of the three adjusted means can be found in Figure 7. Regarding the individual questions on the FS, one-way ANOVAs indicated that the items with the highest discrimination between groups were, "I am optimistic about my future" ( $p = .17$ ), and "I am competent and capable in the activities that are important to me," ( $p = .32$ ).

### ***Relatedness as Facilitated by the Interventions***

Results for the TENS-Life relatedness subscale supported *H4* (see Table 7). Multiple linear regression analysis highlighted the unique impact of group assignment on the intervention's perceived facilitation of relatedness.

$$\begin{aligned} TENS-Life-Relatedness-Posttest = & B_1 + B_2\text{Low-Savoring-Diversity-Group-} \\ & \text{Assignment} + B_3\text{High-Savoring-Diversity-Group-Assignment} + B_4\text{Pretest-} \\ & \text{Perceived-Stress} + B_5\text{Savoring-Beliefs} + \varepsilon \end{aligned}$$

Both the high- and low savoring diversity groups significantly predicted participants' intervention-facilitated relatedness ratings ( $p < .05$  for both; partial  $\eta^2 = .104$ ).

Participants' savoring beliefs also acted as a marginally significant predictor for relatedness scores on the TENS-Life ( $p = .054$ ; partial  $\eta^2 = .056$ ). The 95% confidence intervals on pairwise Tukey's tests examining the adjusted means denoted a significant difference between the control group and the low savoring diversity group (Contrast = 1.804,  $SD = .738$ ,  $LL = .0345$ ,  $UL = 3.5727$ ). A visual comparison of adjusted means can be found in Figure 7.

### ***Perceived Stress as an Outcome***

The role of perceived stress was studied as an outcome variable in an exploratory regression model (see Table 8).

$$\begin{aligned} Perceived-Stress-Scale-Posttest = & B_1 + B_2\text{Low-Savoring-Diversity-Group-} \\ & \text{Assignment} + B_3\text{High-Savoring-Diversity-Group-Assignment} + B_4\text{Pretest-} \\ & \text{Perceived-Stress} + B_5\text{Savoring-Beliefs} + \varepsilon \end{aligned}$$

The model showed only one significant predictor of posttest perceived stress levels: the pretest perceived stress score ( $p = .000$ ; partial  $\eta^2 = .412$ ). All other predictors were nonsignificant ( $p > .24$ ).

### ***Correlation Matrix***

From Table 3 it can be observed that the well-being measures included in this study are highly intercorrelated. The measures of positive emotion and well-being show a positive relationship while the measures of negative emotion and perceived

stress show a negative relationship to well-being measures. The nature of these relationships supports the construct validity of the measures used in the study.

### ***Indications of Savoring Diversity in the Written Responses***

ATLAS.ti 8 was used for qualitative data management and coding. A process of analytic induction (Taylor & Bogdan, 1998) was used to sort relevant passages into a coding scheme of eight savoring strategies proposed by Bryant and Verhoff (2007; see Tables 9 and 10). The eight savoring strategies included as codes were positive mental time travel (PMTT, i.e., anticipating, being present, and reminiscing); capitalizing; counting blessings; memory building; self-congratulation; and temporal awareness. These eight savoring strategies were chosen from the larger group of ten (Bryant & Verhoff, 2007) because of their discernibility in brief quotes without follow-up analysis.<sup>8</sup>

The author used the above eight codes as an informal manipulation check to determine whether the level of savoring diversity was different between groups. For example:

- “[The poster] made me feel like I had a goal to look forward to during the day.”  
(Participant 38248 – *Anticipating {PMTT}* – High Savoring Diversity Group)
- “I had a really long conversation with my cousin who I used to be close with but hadn’t seen in a while and we’ve been talking almost every day since!”  
(Participant 53527 – *Capitalizing* – Low Savoring Diversity Group)
- “[Journaling] made me realize that my life is pretty good even though it might not seem like that in the moment.”  
(Participant 54505 – *Counting Blessings* – Control Group)

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<sup>8</sup> The three savoring strategies not included in the analysis were sensory perceptual sharpening, behavioral expression, and kill-joy thinking (see Bryant & Verhoff, 2007, pp. 93-98).

A few guidelines were established during the coding process. First, the content of the response was deemed more important than the context of the question, and therefore, all qualitative analysis was managed at the participant level rather than at the question level. Second, passages could receive either no codes, one code, or multiple codes, depending upon their content. Third, a code could only appear once per participant. And lastly, the participant must show indications of having savored during the time of the intervention and not, for example, during the writing of the passage. A table is included to show the coding counts by group (see Table 9). An informal<sup>9</sup> comparison of the qualitative data by group supported *H5*, with the high diversity savoring group having at least one coded passage for each of the eight savoring strategies and the other groups lacking at least one of the eight savoring strategies. Example quotes for each savoring strategy can be found in Table 10.

#### ***Additional Thematic Analysis from the Written Responses***

Thematic analysis of the written responses revealed a number of repeating patterns. Following the methodical phases recommended by Braun & Clarke (2006), a coding scheme was developed to capture emerging patterns within the data. Some of the patterns were theory-driven while others were data-driven. Three, broad, repeated patterns (i.e., themes) were established from these codes. The themes are split by subheading and are summarized in paragraphs with bolded headings in the following paragraphs.

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<sup>9</sup> The code-counting analysis is considered informal because the method of coding was not blinded and because there was only one analyst (the author). Furthermore, the questions were not explicitly geared towards examining discreet savoring strategies, but were instead geared toward understanding the qualitative experiences of participants in each group.

### Journaling Group



Figure 8. Word cloud for the journaling group.

### < Diversity Group



Figure 9. Word cloud for the low savoring diversity group.

### > Diversity Group



Figure 10. Word cloud for the high savoring diversity group.

In addition, three word clouds were created (see Figures 8-10). A “stop list” for omitted words and characters can be found in Appendix E. As indicated by the word clouds, participants in all three groups explained their experiences in terms of their “feelings” and “thoughts” with the two experimental groups using words that suggested social contexts (e.g., “friends” and “people”). A metacognitive reflection about one’s “life” was apparent in all three groups. The word “helped” appears in both the journaling and high savoring diversity groups while the word “fun” was only present in the two experimental groups. Hedonic descriptors such as “good” and “nice” appeared among the top words in all three conditions. Responses to the prompt “secret dance” appeared frequently in both the experimental conditions, as indicated by the word “dance” appearing in both lists and the word “secret” appearing in the word cloud for the low savoring diversity group.

**Unique Stressors as Additional Context.** There were three distinctive, macro-level stressors that occurred for participants during the course of this experiment. First, the rise of the COVID-19 pandemic required that many students abruptly return to their hometowns and, in a related change, classes moved to an online format with all students working remotely. Second, worldwide protests against racial injustice and police brutality began occurring during the second wave of data collection. Lastly, many students were in the lead up to their final examinations during the experiment and, as such, discussions of “time” – and lack thereof – appeared in all three word clouds (see Figures 8-10). The presence of, and sometimes compounding nature of, these acute stressors was reflected in the written responses of all three conditions.

Coping with the unique stressor of final examinations was a recurrent theme in the journaling group (e.g., “I am swarmed with exams and final projects these past days, so the journals were mainly about those,” P 53191; “I also got to vent out some of my frustrations from the stress that was piling up from assignments and tests,” P 54328). Some students admitted that their schoolwork impeded their participation in the experiment (e.g., “On days where I didn’t complete the journal entry, it would often be due to staying up very late (around 2 or 3 am) doing schoolwork and I would just forget,” P 53938). Schoolwork stress sometimes compounded with other acute stressors, adding further tension:

- *“I had a day where I had a frustrating test. I usually get my frustrations out by playing soccer. I can’t do that now because my state is under a stay at home order (more frustration). Journaling actually helped me relax in that situation” (P 43789).*

The pandemic caused psychological tension for many participants in the journaling group (e.g., “Due to COVID, a lot of my life is placed at a standstill and a lot of my life is out of my control,” P 42547). Key relationships were sometimes strained due to the pandemic (e.g., “I get quite annoyed by roommate’s little habits. Maybe more so because of COVID,” P 53305). Social isolation was mentioned as well (e.g., “Because I was writing these journals during quarantine, I would be writing these journals after spending a lot of time to myself,” P 53257). One person confided that they were clinically depressed, which may have affected their answers.

The low diversity savoring group wrote about many similar frustrations and mental burdens as the journaling group. The word “chaotic” appeared for a couple of participants whose intervention period co-occurred with final examinations (e.g., “The greatest benefit from engaging with the prompts was giving me some time to relax during the chaotic finals period,” P 54469). Regarding the pandemic, a handful of participants shared that the intervention provided a positive distraction (e.g., “This poster and study also helped break some of the monotony of daily quarantined school life,” P 38296). However, not all of the feedback for the intervention was upbeat. One person wrote about how some prompts were difficult to carry out because they were stressed.:

- *“I’m sorry that I didn’t do as many of the activities as I wanted to. I found it hard to do things like ‘try it out’ and ‘going up’ when the workload and lack of structure in quarantine makes things feel so chaotic” (P 39304).*

Members of the high diversity savoring group also shared experiences of stress about final examinations in addition to references about the pandemic. Several participants shared stories about how their choices for activities were informed by the pandemic situation:

- *“I’m still living in Collegetown and have limited my interactions to just my roommates and some friends who live in an apartment upstairs. The prompt ‘Going Up’ was nice, and I interpreted it literally by actually going upstairs to see my friends who I hadn’t spent time with in a couple days” (P 50269).*

One person in the high savoring diversity group confessed that the “uncertainty” of current events combined with the stresses of final examinations might affect their questionnaire answers:

- *“I really did like this experiment and I feel a bit bad because I don’t feel the results of this survey will reflect the benefit I got out of it. Lately obviously there have been some big changes and uncertainty about the future as well as finals, which have all been upsetting me. So that may skew your results” (P 41017).*

Another person wrote about how current events may have affected their answers to the questionnaires:

- *“I do want to mention that in light of recent events, like the Black Lives Matter protests, I felt very upset and like everything I was doing was inconsequential. That definitely affected my answers to the questionnaires this past week” (P 49840).*

**Non-Savoring Positive Outcomes.** Thematic content analysis revealed some benefits from the intervention that did not fit into savoring strategies. For example, participants in the journaling group frequently described how journaling helped them to cope with stressors, bringing a “clarity of thought” (P 42814). Words like “stress” and “help” appeared recurrently together (see Figure 8) along with other words like “rationalize” and “vent.” As one person wrote:

- *“Because it's the end of the semester, it was a pretty mixed flow of things I need to do, stress I'm facing, personal feelings, and things I want to do around the house or in my personal life once the semester ends. I felt calmer after it [journaling] was done” (P 49132, brackets added by the author).*

The benefit of routine was mentioned by a couple of students (e.g., “It felt nice to actually have to do something routinely,” P 53257). Echoing this sentiment, one person wrote:

- *“In quarantine, days blend together very easily. These exercises made me recall and document the unique events of each day which gave the days their own identities and prevented them from blending into a blur,” (P 53683).*

Reflection about one’s life was a common theme in the written responses to the journaling intervention (e.g., “I got to see which parts of my life were really at the forefront of my mind,” P 53938). Reflection upon the day’s events was sometimes used as a means to “improve efficiency” *vis á vis* one’s schedule (P 54328). Reflection was also viewed by a couple of participants as a way to shift their view to more positive aspects of their lives (e.g., “It was nice to just reflect on the day and recognize all the good things that are happening despite all the craziness in the world,” P 32308).

Several participants in the low savoring diversity group described an appreciation for thinking about what would bring them joy. There was also a recurring appreciation for the “little things” that can improve one’s day; for example, “[The greatest benefit was] being reminded that little things can make each day a bit brighter and that happiness is a conscious effort” (P 31276, brackets added by author). Another said, “I think the greatest benefit was the ideas I got of how I can bring happiness and positivity to myself in the future” (P 53560). In addition, a feeling of control over one’s life was apparent in some responses (e.g., “I realized that I can control my life,” P 53269) along with an enjoyment of using one’s creativity to choose actions (e.g., “It

[...] helped me get more in touch with my creative side,” P 53320; “[The prompts] gave me an opportunity to get creative,” P 34600). Another pattern in the low savoring diversity group was the theme of being pushed to try activities that, “I would have been afraid of, or hesitant to do otherwise” (P 53377). Along this line, one participant reached out to a family member with whom they have a challenging relationship:

- *“One of the prompts really tugged at me to send a text to my dad who I have had troubles with within our relationship. Even though it obviously didn't fix all the problems we have going on, I am glad that I was pushed to be honest, and really allowed me to clear my conscious [sic] of things I had been holding in for a while” (P 53290).*

A handful of students in the low savoring diversity condition spent time outdoors as part of their self-chosen activities (e.g., “Went jogging with my mom and saw the sunset,” P 34600; “I went hiking on a nice day and it was good to get outside,” P 53911). A number of participants discussed the benefit of engaging with their social networks and having an increased appreciation for their family and friends (e.g., “I really liked connecting with my friends through it,” P 29515).

A cluster of participants in the high savoring diversity group also shared that the intervention helped them to appreciate the “little things” in life (e.g., “[I] came to appreciate the little things,” P 37033, brackets added by the author). Several shared how the poster gave them opportunities to creatively think about their actions (e.g., “The prompts helped me reconnect with and value my creative side,” P 54331; “It [...] motivated me to maybe do something different or something that I normally wouldn't do during the day,” P 49840, brackets added by the author). A few participants felt that the intervention gave them permission to do something enjoyable in the midst of a packed schedule (e.g., “There was so much room for me to decide how to complete the prompts, I felt like I was given some choice in how to spend my day,” P 54499).

The spontaneity of choosing the action allowed some participants to experience an extra level of enjoyment (e.g., “For Bring Light, I slow danced with my boyfriend spontaneously one night and was very happy,” P 39982); “Sometimes the prompt taught me to engage in practices that I wasn’t expecting,” P 29932). Some participants in the high savoring diversity group described how the intervention helped them to cope with stressful situations (e.g., “It was a nice way to destress especially amid finals!” P 54499; “I was having a depression week anyways and this helped a bit,” P 49804). The joy of involving friends and family in the activities was mentioned frequently (e.g., “I liked that I [was] always able to include people,” P 49840, text in brackets added by the author). One person wrote that the prompts encouraged them to do things they had been putting off (P 49243), a sentiment that was also shared by users in a prior iteration of this intervention (Faulk et al., 2020). Another sentiment repeatedly shared by users of this BIT iteration was an increased awareness about their choices and actions (e.g., “It helped me to think about my actions,” P 42544; “[The greatest benefit was] being more engaged with daily activities,” P 53341, text in brackets added by the author).

A few participants in the high savoring diversity group shared that the prompts provided a source of positive distraction (e.g., “Recently, life has been pretty boring and stressful, so focusing on the prompts was nice,” P 50269). Along the lines of positive distraction, one person described how the poster intervention helped them to feel more grounded: “With all the negativity and chaos going on in the US, introspection is a calming and grounding task” (P 49513). Spending time in nature was also a sub-theme in this group, (e.g., “I was able to get a nice sunset while being outside. It made the day go by in a more lighthearted manner,” P 54154). As was found in the low savoring diversity group, numerous participants in the high savoring diversity group shared stories about how the intervention helped them to connect more

with their friends and family as well as to appreciate them to a greater degree (e.g., “I really learned to value them a lot more after,” P 54337). The social aspect of this intervention is also evident in the word cloud for the high savoring diversity group (see Figure 10).

**Reactions to the Overall Experience.** Many people in the journaling group expressed a desire to continue a writing habit after the experiment concluded (e.g., “I want to try to continue this habit because it made me feel great!” P 32308). One person shared how they had journaled regularly in their youth and appreciated returning to the activity (P 54328). Another person expressed difficulty in maintaining motivation (e.g., “Sometimes it felt like a chore when I wasn't motivated,” P 49132).

Several participants in the low savoring diversity group used words like “creative,” “fun,” and “excited” to describe the activity.

- *“It was fun and something to look forward to every day! I could definitely see this improving people's happiness in the long run, as a type of motivational daily poster thing” (P 53377).*
- *“It was so fun to scratch off the prompts and focus on ~myself~. I really enjoyed the study and coming up with prompts and it was fun to have an activity to focus on self-care for that day. Perfect for quarantine!! And perfect for post finals stress relief and getting life back on track. I definitely could see myself buying this off of Amazon” (P 29515).*

A majority of participants expressed their enjoyment of the experience (e.g., “I really enjoyed this,” P 29515; “I loved this experience and it was well designed and organized,” P 31276; “Keep going [...], I think a lot of people would appreciate taking part,” P 50884). One participant fortuitously received two posters and gave the second one to a friend because, as they shared, “it was an enjoyable experience!” (P 53320)

The physical appearance of the poster was commented upon by a few students (e.g., “I’ll probably keep the poster as decoration,” P 38296). Regarding prompt interpretation, a couple of students wrote about completing actions they had already intended to do:

*“Even though sometimes I found myself using a prompt to complete an action I was already planning to do, I felt benefited in that the prompts caused me to think out why a daily action was good for me, why I could and should draw happiness from it, etc.” (P 53290)*

The overall response to the high savoring diversity intervention was decidedly positive (e.g., “This was a beautiful experience and made me feel more thankful for my life,” P 39982; “I really enjoyed this!!” P 49075; “Super glad I got to be a part of this experience,” P 54337). A few individuals drew attention to their enjoyment of the “game” aspect of the intervention, highlighting the creative aspect of the experience:

- *“It was kinda like a game for me to find an activity that would fulfill the prompts. I also enjoyed using my creativity to construct the reasoning as to why a certain action would count as fulfilling the prompt for that day. It gave me something fun to do in the background of my life” (P 53386).*
- *“I had a lot of fun and it made me think outside of the box to fit each prompt” (P 38248).*
- *“It was amusing to be able to think of different things to do each time” (P 43834)*

Following this pattern, one person explained that they found it “fun” to imagine how others might interpret the prompts (P 54325). Another shared that they sometimes did not focus on their own enjoyment when choosing actions, but instead focused on increasing the happiness of others (P 29932). Two participants shared suggestions to improve the intervention:

- *“The reveal prompt part would be better if it’s [sic] a sticker” (P 54886).*
- *“If I was to start this study over, I would have kept the poster in a separate area from where I usually do my work. I initially thought this would be a prominent spot, but I think it made me less motivated to fulfill the prompts” (P 54331).*



## CHAPTER 7

### DISCUSSION

#### *Summary and Contributions*

The goal of the study was to examine how the diversity of savoring strategies may impact positive emotion regulation and, ultimately, improve one's subjective well-being. To the authors knowledge, this is the first randomized controlled study to examine positive regulatory diversity through savoring. The inclusion of both cognitive and emotional pre-post measures of subjective well-being paint a fairly clear picture of how savoring diversity may impact subjective well-being at the dosage of one savoring strategy per day over an 8-day duration. Overall, the results of the quantitative analysis point to a small effect of savoring diversity on well-being at the savoring dosage chosen for this intervention period. This finding, however, is limited by uncontrollable, confounding factors associated with the COVID-19 pandemic, the details of which are described below.

This study breaks new ground in a few key ways. First, where the approach of prior research on savoring diversity had been exclusively cross-sectional in nature (e.g., Quoidbach et al., 2010), the current study provides the first randomized controlled trial designed to examine the potential impact of savoring regulatory diversity on well-being. As a second contribution, the current study involved designing a bespoke BIT (i.e., research means) to answer the primary research question. The intervention, *Revealing Moments*, involved an 8-day behavioral intervention, giving us a sense of the potential impact that a mid-length intervention can bring to outcomes of well-being when savoring strategies are assigned to users. The design process for *Revealing Moments* offers a glimpse into the research-through-design approach. Such an approach to both research and design may be of interest to

practitioners in the fields of positive psychology and positive design as the intervention was validated using theoretical knowledge as well as user testing at each step. Lastly, the BIT *Revealing Moments* adds its own contribution to the field of positive design in that it enables users to choose their own activities rather than activities being prescribed to them, which is an innovation that has been highlighted in other areas of design for behavioral change (Boon, Rozendaal, & Stappers, 2018). The ambiguous prompt innovation appears to have been successful at maintaining user interest, as was evident in the qualitative data with words like “fun” appearing in word clouds (Figures 8-10) as well as average user motivation trending upwards in the experimental groups when compared with the control group (see Table 1).

### ***Savoring Diversity and Emotional Well-Being***

Model-adjusted means on the SPANE-P subscale did not support the hypothesized outcome, however the trend lines across groups for all three emotional well-being measures indicate some degree of improved affective well-being for the high savoring diversity group when comparing the control group (see Figure 7). As previously discussed, prior research on savoring diversity is limited, leaving little in the way of empirical evidence with which to help interpret these results, however a few theoretical avenues are available.

Firstly, perhaps savoring diversity (generally speaking) can only offer modest gains to emotional well-being. Quoidbach and colleagues (2010) recorded a medium effect size for savoring diversity as a predictor of happiness, however that measure of happiness aggregated both emotional and cognitive well-being into one instrument (see Lyubomirsky & Lepper, 1999). As a result, we can only speculate as to whether cognitive or emotional well-being was more strongly moderated by regulatory diversity. More research is needed regarding positive emotional regulatory diversity as it relates to specific well-being subconstructs.

Secondly, a key difference between the Quoidbach (2010) study and the current study is that the current study employed an intervention-focused, randomized methodology while Quoidbach's study used cross-sectional analysis. This difference may have been key. In this case, within-person differences may be more predictive of savoring effectiveness than activity-based interventions. Indeed, recent research has suggested that positive activities may not have as great of an impact on well-being as previously thought, implying that person-based factors have much stronger predictive power over our baseline happiness than our behaviors (Brown & Rohrer, 2020; White, Uttl, & Holder, 2019). Consistent with this theory is the finding that posttest SPANE-P scores were predicted by pretest savoring belief scores with a medium effect size (see Table 4). This finding also agrees with other literature showing that savoring beliefs can predict emotional well-being (e.g., Hurley & Kwon, 2013).

As a third potential explanation for the lack of posttest positive emotion differences between groups, Quoidbach and colleagues (2010) unexpectedly found no significant correlation between positive affect and *capitalizing*. Seeing that the current study's participants relied heavily upon social interaction to fulfil prompts, it is possible that the current study has observed a similar nonsignificant relationship between emotional well-being outcomes and *capitalizing* behaviors. Still, other researchers have found that the practice of *capitalizing* can increase positive emotions (e.g., Gable & Reis, 2010), therefore an explanation may be incomplete.

Regarding the effectiveness of *Revealing Moments* at promoting positive emotion regulation, a question of dosage emerges. Perhaps the dosage of savoring activities was not large enough to deliver a significant impact on positive emotion. The dosage of savoring could be increased either by extending the duration of the intervention, or by expanding the frequency of either positive activities or savoring behaviors. In a study examining the BIT *Tiny Tasks*, the intervention was carried out

over 5 weeks with 6 happiness-increasing activities per week, totaling 30 positive experiences per participant (Desmet & Sääksjärvi, 2016). By comparison, the current study's intervention lasted for 8 days with 8 happiness-increasing activities corresponding to 8 savoring strategies (i.e., 8 positive experiences per person, in total). While this low dosage was thought to help maintain user engagement, it was likely not enough to see gains in well-being. Future iterations should increase the number of positive activities facilitated by the prompts. Finally, the lack of an adequate explanation for emotion outcomes leaves the door open for future research to assess individual ways of savoring as they relate to posttest measures of emotional well-being.

### ***Savoring Diversity and Cognitive Well-Being***

There were mixed results for the two cognitive well-being measures. First, satisfaction with life, as measured by the SWLS, did not register any group differences in the model-adjusted post test scores (see Table 5), however, the trend was in the hypothesized direction (see Figure 7). Previous literature on the satisfaction with life survey suggests that the construct is fairly stable over periods of up to 4 years with moderate temporal reliability and that “moving the needle” on this global happiness gauge during short time periods typically requires significant changes to an individual's outlook on life (see Pavot & Diener, 1993 for a review). Given the short time period and the low dosage of this intervention, it is not surprising that the study did not register movement of the “needle” for any of the three groups. This outcome is reinforced by the small effect size shown in the partial eta squared of the regression output (see Table 5).

In contrast, the FS followed the hypothesized trend with significant differences in model-adjusted, posttest means for the high savoring diversity group (see Figure 7). The medium effect size of group assignment is entirely attributable to the high

savoring diversity group (see Table 6), yet, it is not clear whether savoring diversity was the cause of the group differences in flourishing outcomes. It may be that the flourishing scale's focus on self-perceived success across life domains caused participants in the high savoring diversity group to respond favorably to the savoring strategy of *self-congratulation*, a savoring strategy which was unique to that group. Indeed, research on eudemonic savoring (i.e., cognitive appraisal of meaning in one's life; see Bryant et al., 2011) explains how savoring strategies such as gratitude, appreciation, and self-reflection can lead to increased cognitive well-being (Lauzon & Green-Demers, 2020). That being said, perhaps the lack of predictive value of the SBI pretest to predict flourishing (see Table 6) indicates another cause for the difference between the three groups. It bears mentioning that the SBI does not capture eudemonic savoring as part of its measurement. A future study may wish to include the recently developed savoring configuration inventory (SCI; Lauzon & Green-Demers, 2020) which granularly distinguishes between seven dimensions of hedonic and eudemonic savoring. Making use of such an instrument would allow for meaningful analysis between these seven savoring dimensions as they relate to both cognitive and emotional well-being outcomes.

Regarding a potential theoretical link between flourishing to regulatory diversity, it may be that using a greater diversity of savoring strategies gives individuals a chance to find a strategy that “works” for them and, in this case, students in the high savoring diversity group may have found a unique strategy – such as *self-congratulation* – to help them appreciate their circumstances as students pursuing a meaningful goal. In this light, the findings of this study are consistent with the theory of regulatory diversity proposed by Quoidbach and colleagues (2010). A future study should include a posttest measure of discreet savoring behaviors to determine which

savoring strategies predict cognitive well-being gains such as those estimated by the flourishing scale.

### ***The Role of Perceived Relatedness***

Perceived relatedness as attributed to the intervention(s) followed the hypothesized trend (see Figure 7; see Table 7). The two experimental groups independently attributed relatedness facilitation to their intervention experiences significantly more than the control group. With regard to savoring, the coding counts of savoring strategies in the qualitative data indicate much higher numbers of *capitalizing* practices (see Table 9). Higher counts of capitalizing in the two experimental groups indicate that *Revealing Moments* may serve as an effective tool for enhancing social connections and relatedness. Per the positive-activity model (Lyubomirsky & Layous, 2013), basic psychological needs such as relatedness mediate the relationship between positive activities and increased well-being.<sup>10</sup> Future research may wish to measure need fulfillment directly in addition to product attribution – as has been suggested by other researchers (e.g., Hassenzahl, Diefenbach, & Göritz, 2010) – to aid in causal inferences.

In addition, average motivation ratings were positively and significantly correlated with relatedness attribution ratings (see Table 3). A positive correlation between relatedness attribution and motivation aligns, at least in principle, with offshoots of self-determination theory that propose basic psychological need fulfillment can act as a mediator between product engagement and sustained user motivation (Peters, Calvo, & Ryan, 2018; Ryan & Deci, 2000a; Ryan & Deci 2000b). The current study's qualitative data give further insight into the observed relatedness-

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<sup>10</sup> An exploratory mediation test using Baron and Kenny's (1986) four step approach suggests that relatedness attribution fully mediated the relationship between group assignment and negative emotional experiences, however this outcome was only observed for the low savoring diversity group and additional testing is needed.

motivation relationship as participants in both experimental groups frequently used words like “fun,” “friends,” and “people” to describe their experiences (see Figures 9 & 10). The frequent appearance of hedonic descriptors such as “fun” may be meaningful because self-determination theory proposes that users who experience a sense of intrinsic motivation *vis á vis* product interaction are likely to use such positive descriptors (Peters et al., 2018). It is worth noting that while the comparison of group means indicates the highest motivation levels appear in the two experimental groups, the group mean comparison was nonsignificant when compared with the control group (see Table 1).

### ***Perceived Stress, Savoring, and Well-Being***

The written responses from participants suggest that the activities facilitated in the experimental groups were helpful at providing positive distraction during an immensely stressful time period. While the posttest perceived stress means did not reveal significant differences between groups (see Table 8), the high savoring diversity group showed the lowest model-adjusted perceived stress mean (see Figure 7). Posttest perceived stress was also directly correlated with negative experiences and inversely correlated with measures of both cognitive and emotional well-being (see Table 3). In sum, the data point to perceived stress as having an inverse relationship to overall well-being for participants in the current study; perhaps it is not a surprise that pretest scores of perceived stress predicted who would drop out of the study. Although past research has suggested that savoring can be a coping response during stressful situations (e.g., Samios, Catania, Newton, Fulton, & Breadman, 2020), future research should further explore whether pretest stress levels accurately predict attrition rates for savoring-based intervention such as *Revealing Moments*.

### ***Mental Health and the COVID-19 Pandemic***

This study took place during the beginning weeks of the COVID-19 pandemic in the United States of America. As the virus entered public consciousness, participants – along with the rest of us – were often without information about how the spread of the virus would impact daily life and the world at large. Such a loss of control often leads one to seek activities that promote emotion regulation and coping, however some behavioral responses are healthier than others. Compulsive checking of online newsfeeds – also known as “doomscrolling” (e.g., Watercutter, 2020) – is a common modern-day response to a lack of important information, and yet the level of pandemic-focused news media exposure has been linked to mental health declines in general populations around the world (Holman et al., 2020; Bendau et al., 2020; Lades, Laffin, Daly, & Delaney, 2020) and to U.S. college students specifically (Huckins et al., 2020). In response to the pandemic, alcohol consumption – including binge drinking – for adults over 30 has risen well above baseline in the United States (Pollard, Tucker, & Green, 2020). Many students also face future career anxiety caused by fear of the societal effects stemming from COVID-19 (Mahmud, Talukder, & Rahman 2020). These and other pandemic-related concerns (e.g., social isolation and economic downturn) have led to members of the United Nations to call for collective action on global mental health (United Nations, 2020, May 13).

A recent study ( $N = 604$ ) from Ireland regarding daily mental health during the pandemic found that pursuing hobbies, spending time in nature, and spending time engaging with family and in other supportive social interactions were among the activities associated with the greatest positive emotional gains and reduction of negative emotions (Lades et al., 2020). Indeed, spending time with others in supportive social relationships has been found to correlate with enhanced well-being during other large-scale stressful time periods such as the 2008 economic crisis (Gonza & Burger, 2017), yet social activity has been limited in many ways by the

COVID-19 pandemic. Within the context of this study, the qualitative data suggest that participants in the two experimental groups used the intervention as an impetus to maintain social connections during stay-at-home orders. A majority of participants in these groups shared stories of how they made phone calls or spent time in supportive social interactions while (generally) following physical distancing practices. It is no surprise that these experiences were among the favorite moments shared by participants.

In terms of coping, the positive distraction provided by the intervention was also explicitly welcomed by several participants. This finding is in line with literature which suggests that positive distraction can be a helpful coping strategy for chronic life stressors (e.g., Waugh, Shing, & Furr, 2020). The intervention-facilitated activities carried out by participants sometimes served as both coping and mood-boosting experiences. Some of the participants' activities align precisely with those observed in other populations (Lades et al., 2020), for example: practicing hobbies, spending time in nature, and engaging in pandemic-conscious, social engagement with supportive friends and family.

### ***Limitations and Future Work***

The current study has endeavored to extend the literature on savoring diversity, although it is not without its limitations. The central limitation of this study is the highly atypical time period during which it was conducted. Nationally, anxiety and stress are on the rise while subjective well-being is challenged by global events beyond our control. Thus, the unusual time period may limit the external validity of this study's findings to other times of societal duress.

A selection by history threat is present given the fact that the COVID-19 health crisis required the mailing of study materials (instead of handing out materials) and, as an unintended consequence, participants in the control group – who received a

standard envelope – started the study faster than students in the two experimental groups – who received a mailing tube. The unequal transit times led, inevitably, to a between-groups difference in students’ start times relative to their final examination periods (see Table 1), however, comparative analyses including this limitation in all regression models revealed it to be nonsignificant, with negligible effect sizes in all models. There is also a selection by regression threat for the low savoring diversity group, as their emotional well-being was lower than the other two groups on the pretest SPANE-B (see Table 1). However, given that the multiple regression analysis controlled for pretest scores, this should have reduced the apparent baseline difference between groups. In a related issue, a small sample size may have led to increased “noise” within the statistical models. Future studies should seek to increase the number of participants, which is an enduring problem with happiness activity studies, as pointed out by Brown & Rohrer (2020).

Self-report and lack of anonymity were limitations of this study that could have led to demand characteristics, social desirability bias, and experimenter effects. Future research may wish to incorporate more objective methods of testing for stress or well-being in order to build a mixed methods approach. Some participants went beyond the intended 10-day time period of the intervention, potentially “watering down” the intended dosage level for savoring.

Attrition was also an issue. Drop-out analysis showed that, on average, participants who left the study featured unusually high levels of stress and low levels of well-being, however, the number of participants who dropped from the study was evenly split between the three groups, likely reducing the impact of this demographic’s loss. In addition, an external validity issue arises from the fact that the population studied was entirely comprised of college students and was predominantly

female. Future studies may wish to expand the scope of the examined population and attempt to equally balance males and females within groups.

Lastly, it is advisable for future studies to track savoring *directly* with a posttest measure such as the Ways of Savoring Checklist (Bryant & Verhoff, 2007) instead of simply controlling for savoring beliefs with the SBI and looking for evidence of savoring in the qualitative data. Another approach would be to use a direct measure of savoring that includes granular differentiation between eudemonic and hedonic savoring strategies such as the recently published Savoring Configuration Inventory (SCI; Lauzon & Green-Demers, 2020). This measure splits savoring into seven levels of hedonia and eudaimonia and is a unique way to track savoring in such a way that it also captures the essence of certain basic psychological needs as an added dimension.

Future research on the topic of savoring diversity may wish to increase the dosage of savoring occurrences. This could be done, for example, by extending the duration of the intervention. Daily tracking of mood would have helped to better understand the relationship between daily mood ratings, motivation, and outcome variables.

Finally, regarding future work to expand the understanding of savoring diversity, it is apparent that a highly controlled, cross-sectional study is needed to investigate this topic. While a lack of random assignment will be a drawback to this approach – *vis à vis* the reduced prospect for causal inference – a well-designed cross-sectional study examining the impact of savoring diversity will add an important next step in this largely unexplored area of continued scientific interest. Follow-up posttests would help to determine whether there are medium-term benefits to interaction with this activity-based approach to facilitating positive emotion regulation through savoring.

The science-and-art nature of this research-through-design study leads to additional opportunities for design improvements and recommendations to guide others in developing their own evidence-based design interventions. First, regarding future iterations of this choose-your-own-adventure style PPI, examining the trait-based predictors of users would be helpful so that designers can better understand who benefits the most from these types of interventions. In other words, we need a better understanding of the person-activity fit for open-ended interventions to determine for whom this intervention works the best. To help in this matter, assessing within-person contributors such as emotional intelligence, curiosity, and the “big five” personality factors may be helpful (see John & Srivastava, 1999 for a review). For example, a person’s openness to experience may help with the novelty of choices and help to sustain the basic psychological need for interest, thereby increasing motivation and engagement. Other questions remain as to whether this intervention works best for people who are already fairly happy or who are not too stressed.

Basic psychological need theory may be crucial to the effectiveness of this intervention in designing future iterative experiences. Increasing the social support aspect of the product interaction may also tap into the basic psychological need for relatedness to a greater degree, thereby possibly increasing engagement per the METUX model (Peters et al., 2018). Therefore, a future study should lean more into the exploration of basic psychological needs fulfilment as this has implication for engagement. The basic psychological needs of interest and meaning may be filled by designed elements of serendipity, a factor which has been observed to produce promising outcomes (e.g., Leong, Howard, & Vetere, 2008). Following this line of thinking, it may be beneficial to observe the subjective experience of participants in a detailed qualitative context such as a semi-structured interview in order to understand the nuances of the experience. Given that participants in the current study and in an

earlier iteration of this project (Faulk et al., 2020) the “power of choice” emerged as a theme along with individuals suggesting a feeling of “control” over their lives, the basic psychological need for safety may also be impacted by this intervention.

Next, increasing the gamification of the intervention, specifically with an eye towards social support (Wiese et al., 2020; Lyubomirsky & Layous, 2013), would possibly help to maintain user motivation to continue. As an example, re-designing the intervention to take a different form such that it may become an interactive art installation, either for the general public or for members of a certain group (e.g., a company, community, or family).

A next-level iteration of the design may wish to broaden the scope from self-focused savoring into a multi-dimensional approach that focuses on training response modulation, or sustainable behavioral change for positive emotion regulation, as promoted through design (see Quidbach et al., 2015; Layous & Lyubomirsky, 2014). Incorporating the practice of gratitude to others may also be a worthwhile endeavor. For example, past research has found that participants in a 6-week study who began their intervention with a gratitude practice instead of an act of kindness experienced greater happiness benefits (Layous, Lee, Choi, & Lyubomirsky, 2013). Finally, future work geared towards showing the process of developing this design-driven PPI may be of some use in the cross-disciplinary fields of applied positive psychology and positive design.

### ***Conclusion***

Through research on savoring, we begin to see that our positive experiences require nurturing. During an exceptionally stressful time period such as the COVID-19 pandemic, experiencing life more fully through savoring can help us to up-regulate our positive emotions while reducing stress and connecting us to one another. Through savoring practices, we can look forward to life’s events, fully experience them, and

then reflect upon them to absorb all of the goodness they have to offer. Yet remembering to pause during our daily lives to reflect upon our positive experiences can be challenging. While it remains unclear whether the diversity of assigned savoring strategies leads to its own, unique boost in positive emotions, a designed intervention such as *Revealing Moments* offers a curated method for taking positive action and then up-regulating the resulting positive emotions.

Engaging with life creatively is always a possibility. We can choose to notice positive inspiration around us, searching for happiness-increasing possibilities in the background of our lives. Building this pattern-seeking habit can lead us to capitalize upon previously overlooked opportunities to bring light into our lives and the lives of those around us.

## TABLES

TABLE 1

**Table 1.** Means (*SD*) for pretest dependent variables, demographics, and fidelity measures with one-way ANOVAs (or chi-squared tests) to assess pretest group differences.

Variable	Low Savoring Diversity <i>n</i> = 23	High Savoring Diversity <i>n</i> = 20 or <sup>a</sup> <i>n</i> = 21	Control group <i>n</i> = 27	<i>F</i> -value or <sup>°</sup> Chi-square	<i>p</i> -value
	Mean ( <i>SD</i> ) or Percentage	Mean ( <i>SD</i> ) or Percentage	Mean ( <i>SD</i> ) or Percentage		
SWLS pretest	23.43 (6.17)	<sup>a</sup> 23.95 (5.69)	23.95 (5.69)	.07	.93
FS pretest	43.96 (5.60)	43.52 (6.48)	45.00 (6.46)	.37	.69
SPANE-P pretest	20.13 (4.27)	22.62 (3.71)	21.78 (3.71)	2.35	.10
SPANE-N pretest	16.87 (4.38)	15.05 (3.02)	14.56 (3.07)	2.85	.06
SPANE-B pretest	3.26 (7.07)	7.57 (6.14)	7.22 (6.12)	3.18	<b>.048</b>
PSS pretest	29.52 (7.94)	26.90 (8.72)	26.00 (7.46)	1.26	.29
SBI pretest	6.17 (6.45)	4.52 (6.68)	4.85 (6.10)	.42	.66
Sex (female)	70%	76%	78%	<sup>°</sup> .23	.79
Days Btw. Pre- & Post	10.35 (2.82)	12.43 (5.58)	10.85 (2.94)	1.71	.19
Finished Before Finals Ended	70%	52%	85%	<sup>°</sup> 6.11	<b>.047</b>
Avg. Effort	3.88 (.75)	3.76 (.75)	3.82 (.71)	.13	.88
Avg. Motivation	3.72 (.61)	3.74 (.50)	3.44 (.66)	1.96	.15
Avg. Enjoyment	3.25 (.67)	3.36 (.44)	3.24 (.79)	.23	.79
Avg. Activity Completion	3.99 (.65)	3.88 (.61)	4.12 (.53)	1.02	.37
How Often Involved Others	3.04 (.88)	3.00 (1.08)	2.81 (1.71)	.22	.81

*Note.* Scores with *p*-values of *p* < .05 are **bolded**. SBI = Savoring Beliefs Inventory. TENS-Life = Technology Effects on Need Satisfaction in Life Scale.

TABLE 2

**Table 2.** Unadjusted pretest and posttest means (*SD*) along with change scores by group for key measures.

Scale	Low Savoring Diversity			High Savoring Diversity			Control group		
	Pretest Mean	Posttest Mean	Change	Pretest Mean	Posttest Mean	Change	Pretest Mean	Posttest Mean	Change
SWLS	23.43 (6.17)	24.95 (5.74)	1.52 (4.38)	23.95 (5.69)	25.81 (4.78)	3.32 (1.86)	23.33 (5.70)	24.37 (6.45)	1.04 (3.32)
FS	43.96 (5.60)	44.56 (7.54)	0.61 (4.67)	43.52 (6.48)	46.6 (5.15)	2.95 (3.14)	45.00 (6.46)	44.33 (7.54)	-0.67 (4.02)
SPANE-P	20.13 (4.27)	21.22 (3.85)	1.00 (2.47)	22.62 (3.71)	23.60 (3.20)	1.09 (3.10)	21.78 (3.71)	22.52 (3.74)	0.74 (3.29)
SPANE-N	16.87 (4.38)	14.35 (4.34)	-2.52 (2.80)	15.05 (3.02)	13.55 (3.85)	-1.4 (2.80)	14.56 (3.07)	13.89 (3.40)	-0.67 (2.59)
SPANE-B	3.26 (7.01)	6.87 (6.96)	3.61 (4.76)	7.57 (6.14)	10.05 (6.34)	2.40 (4.32)	7.22 (6.12)	8.63 (6.35)	1.41 (5.33)
PSS	29.52 (7.94)	24.78 (6.78)	-4.74 (7.62)	26.90 (8.72)	21.20 (7.52)	-5.95 (6.95)	26.00 (7.46)	22.48 (7.22)	-3.52 (5.05)
TENS-Life (Rel.)	-	11.48 (2.19)	-	-	11.35 (2.79)	-	-	9.78 (2.81)	-

*Note.*  $N = 71$ . SWLS = Satisfaction With Life Scale; FS = Flourishing Scale; SPANE-P = Scale of Positive And Negative Experiences (Positive Subscale); SPANE -N = Scale of Positive And Negative Experiences (Negative Subscale); SPANE-B = Scale of Positive And Negative Experiences (Balanced Scale); PSS = Perceived Stress Scale; TENS-Life (Rel.) = Technology Effects on Need Satisfaction in Life Scale (Relatedness Subscale).

TABLE 3

**Table 3.** Pearson correlation matrix for continuous variables with Sidak-corrected, pairwise tests for significance ( $N = 70$ ).

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. SWLS posttest	1												
2. FS posttest	<b>.67**</b>	1											
3. SPANE-P posttest	<b>.42*</b>	<b>.56**</b>	1										
4. SPANE-N posttest	-.34	<b>-.44**</b>	<b>-.53**</b>	1									
5. SPANE-B posttest	<b>.43</b>	<b>.57**</b>	<b>.87**</b>	<b>-.88**</b>	1								
6. PSS posttest	<b>-.46**</b>	<b>-.52**</b>	<b>-.61**</b>	<b>.63**</b>	<b>-.71**</b>	1							
7. SBI	-.19	-.11	.12	.10	.01	.06	1						
8. Avg. Effort	.16	.13	.28	-.17	.26	-.13	.05	1					
9. Avg. Motivation	.14	.12	.27	-.03	.17	-.13	.18	<b>.65**</b>	1				
10. Avg. Enjoyment	.16	.13	.30	.06	.13	-.06	.14	<b>.56**</b>	<b>.69**</b>	1			
11. Avg. Activity Completion	.08	.02	.24	-.15	.23	-.17	.06	<b>.89**</b>	<b>.61**</b>	<b>.47**</b>	1		
12. How Often Involved Others	-.07	-.10	-.01	-.01	.00	-.09	-.02	.18	.16	.02	.19	1	
13. Relatedness (TENS-Life)	.22	.33	.30	-.25	.32	-.27	.20	.28	<b>.40*</b>	.31	.21	.32	1

*Note.* **Bolded** = significant. \*= $p < .05$ . \*\*= $p < .01$ . Sidak corrected significance tests. SWLS = Satisfaction With Life Scale; FS = Flourishing Scale; SPANE-P = Scale of Positive And Negative Experiences (Positive Subscale); SPANE-N = Scale of Positive And Negative Experiences (Negative Subscale); SPANE-B = Scale of Positive And Negative Experiences (Balanced Scale); PSS = Perceived Stress Scale; SBI = Savoring Beliefs Inventory; TENS-Life = Technology Effects on Need Satisfaction in Life Scale.

TABLE 4

**Table 4.** Parameter estimates for a regression model predicting posttest SPANE-P scores.

**Scale of Positive and Negative Experiences (SPANE-P) Posttest**

Variable	Coefficient	SE	95% CI		Partial $\eta^2$	p-value
			LL	UL		
Low Savoring Diversity Group	-.374	.751	-1.875	1.127	[ .021 -	.620
High Savoring Diversity Group	.575	.774	-.970	2.121		.460
PSS (Pretest)	-.011	.049	-.110	.088	.001	.826
SBI	.124	.051	.023	.225	.086	<b>.017</b>
SPANE-P (Pretest)	.638	.100	.440	.837	.391	<b>.000</b>
Intercept (Control Group)	8.298	3.123	2.059	14.538	-	<b>.010</b>

*Note.*  $n = 70$ . Significance levels of  $p < .05$  are **bolded**. SPANE-P = Scale of Positive And Negative Experiences (Positive Subscale); PSS = Perceived Stress Scale; SBI = Savoring Beliefs Inventory.  $F(5,64) = 15.39$ .  $p > F = 0.000$ . R-Squared = .546. Root MSE = 2.589.

TABLE 5

**Table 5.** Parameter estimates for a multiple linear regression model predicting posttest SWLS scores.

**Satisfaction with Life Scale (SWLS) Posttest**

Variable	Coefficient	SE	95% CI		Partial $\eta^2$	p -value
			LL	UL		
Low Savoring Diversity Group	.842	1.005	-1.165	2.850	[ .018 -	.405
High Savoring Diversity Group	1.025	1.007	-.986	3.035		.312
PSS (Pretest)	-.067	.066	-.198	.064	.016	.313
SBI	-.072	.067	-.206	.061	.018	.285
SWLS (Pretest)	.729	.088	.552	.905	.511	<b>.000</b>
Intercept (Control Group)	9.454	3.406	2.651	16.257	-	<b>.007</b>

*Note.*  $N = 71$ . Significance levels of  $p < .05$  are **bolded**. SWLS = Satisfaction With Life Scale; PSS = Perceived Stress Scale; SBI = Savoring Beliefs Inventory.  $F(5,65) = 25.67$ .  $p > F = 0.000$ . R-Squared = .664. Root MSE = 3.441.

TABLE 6

**Table 6.** Parameter estimates for a multiple linear regression model predicting posttest FS scores.

**Flourishing Scale (FS) Posttest**

Variable	Coefficient	SE	95% CI		Partial $\eta^2$	p-value
			LL	UL		
Low Savoring Diversity Group	1.441	1.175	-.906	3.788	.119	.225
High Savoring Diversity Group	3.541	1.203	1.137	5.944		-
PSS (Pretest)	-.075	.075	-.225	.074	.016	.318
SBI	-.019	.079	-.177	.139	.001	.813
FS (Pretest)	.880	.095	.691	1.070	.574	<b>.000</b>
Intercept (Control Group)	6.776	5.605	-4.421	17.973	-	<b>.231</b>

*Note.*  $N = 70$ . Significance levels of  $p < .05$  are **bolded**. FS = Flourishing Scale; PSS = Perceived Stress Scale; SBI = Savoring Beliefs Inventory.  $F(5,64) = 28.72$ .  $p > F = 0.000$ . R-Squared = .692. Root MSE = 4.061.

TABLE 7

**Table 7.** Parameter estimates for a multiple linear regression model predicting posttest TENS-Life relatedness subscale scores.

**Technology Effects on Need Satisfaction in Life Scale (TENS-Life) Relatedness Subscale**

Variable	Coefficient	SE	95% CI		Partial $\eta^2$	p-value
			LL	UL		
Low Savoring Diversity Group	1.804	.738	.331	3.277	.104	<b>.017</b>
High Savoring Diversity Group	1.653	.754	.147	3.159		-
PSS (Pretest)	-.066	.040	-.145	.013	.041	.101
SBI	.098	.050	-.002	.197	.056	.054
Intercept (Control Group)	11.019	1.122	8.779	13.259	-	<b>.000</b>

*Note.*  $N = 70$ . Significance levels of  $p < .05$  are **bolded**. TENS-Life = Technology Effects on Need Satisfaction in Life Scale; PSS = Perceived Stress Scale; SBI = Savoring Beliefs Inventory.  $F(4,65) = 3.10$ .  $p > F = .021$ . R-Squared = .160. Root MSE = 2.551.

TABLE 8

**Table 8.** Parameter estimates for a multiple regression model predicting posttest PSS scores.

**Perceived Stress Scale (PSS) Posttest**

Variable	Coefficient	SE	95% CI		Partial $\eta^2$	p-value
			LL	UL		
Low Savoring Diversity Group	.381	1.612	-2.838	3.601	[ .032	.814
High Savoring Diversity Group	-1.958	1.648	-5.250	1.333		-
PSS (Pretest)	.584	.087	.411	.757	.412	<b>.000</b>
SBI	-.103	.109	-.321	.114	.014	.345
Intercept (Control Group)	7.799	2.451	2.904	12.695	-	<b>.002</b>

*Note.*  $N = 70$ . Significance levels of  $p < .05$  are **bolded**. PSS = Perceived Stress Scale; SBI = Savoring Beliefs Inventory.  $F(4,65) = 12.59$ .  $p > F = 0.000$ . R-Squared = .437. Root MSE = 5.576.

TABLE 9

**Table 9.** Coding of savoring strategies in qualitative data with absolute counts and column-relative percentages by group.

Code	Low Savoring Diversity <i>n</i> = 23		High Savoring Diversity <i>n</i> = 22		Control <i>n</i> = 27		Totals
	Count	Group Related Percent	Count	Group Related Percent	Count	Group Related Percent	
anticipating	4	13.79%	2	6.67%	3	17.65%	9
being present	4	13.79%	3	10.00%	1	5.88%	8
capitalizing	18	62.07%	15	50.00%	1	5.88%	34
counting blessings	<b>0</b>	<b>0.00%</b>	2	6.67%	3	17.65%	5
memory building	<b>0</b>	<b>0.00%</b>	1	3.33%	<b>0</b>	<b>0.00%</b>	1
reminiscing	<b>0</b>	<b>0.00%</b>	3	10.00%	8	47.06%	11
self-congratulation	2	6.90%	3	10.00%	1	5.88%	6
temporal awareness	1	3.45%	1	3.33%	<b>0</b>	<b>0.00%</b>	2
<b>Totals</b>	29	100.00%	30	100.00%	17	100.00%	77

*Note.* Absolute code counts of 0 are **bolded**.

TABLE 10

Table 10. Qualitative coding examples by group.

	Low Savoring Diversity	High Savoring Diversity	Control
Code	Example Quote	Example Quote	Example Quote
anticipating	"[It was] a little thing to be excited for during your morning routine." (Participant 50182)	"[The poster] made me feel like I had a goal to look forward to during the day." (Participant 38248)	"I started focusing on things to look forward to instead of things that went badly during the day or aspects I wish I could change." (Participant 44761)
being present	"I loved the 'secret dance' one [prompt] which allowed me to just be carefree and enjoy music for a moment." (Participant 31276)	"'Secret dance' was my favorite. I miss my dance team and practice and just recovered from a knee injury so it was a nice one." (Participant 29932)	"[Journaling] allows me to reflect on my day and then focus on the present." (Participant 53413)
capitalizing	"I had a really long conversation with my cousin who I used to be close with but hadn't seen in a while and we've been talking almost every day since!" (Participant 53527)	"For the 'bring light' prompt, I decided to watch the sunset with my family. It was great to share that beautiful moment with them." (Participant 49840)	"My grandmother walked in once when I was journaling and commented that she always journals every day. She proceeded to pull out all of her old journals and we talked about her life. We then journaled together." (Participant 53413)
counting blessings	-	"A few of the prompts really made me reflect on my relationships with people at times and that was really important because I really learned to value them a lot more after." (Participant 54337)	"[Journaling] made me realize that my life is pretty good even though it might not seem like that in the moment." (Participant 54505)
memory building	-	"A memory from college of our last day of all my friends sitting on the slope watching the sunset." (Participant 53341)	-
reminiscing	-	"My first prompt was 'secret dance'. For this one, I decided to text a old friend that I fell out of touch with since we used to have a secret dance together when we were younger." (Participant RB48)	"I really enjoyed this experience! It was really nice to read back through my responses and see all the random things that happened during my days." (Participant 32308)
self congratulation	"I've been doing a lot of art and I had the combo of beautiful sight and try it out so I made something I was actually really proud of in order to fill that prompt." (Participant 49243)	"Even if I didn't do something that brought me overwhelming joy, I often did something that at the very least made me feel more accomplished in my day." (Participant 53290)	"Sometimes, when I wasn't overly tired, it felt good to plan my day out for tomorrow and reflect on what had happened today / what I accomplished." (Participant 49132)
temporal awareness	"My friend and I planned on going on a hike for 'beautiful sight', but it was cold and rainy so we decided against it. This is cheesy, but instead I decided to see the beauty in her while we were still living together." (Participant 39304)	"A memory from college of our last day of all my friends sitting on the slope watching the sunset." (Participant 53341)	-

Note. All text in brackets was added by the author.

## FIGURES

FIGURE 1

The *positive-activity model* (Lyubomirsky & Layous, 2013), which proposes an explanation for how the characteristics of positive activities mix with those of the individual to moderate well-being.

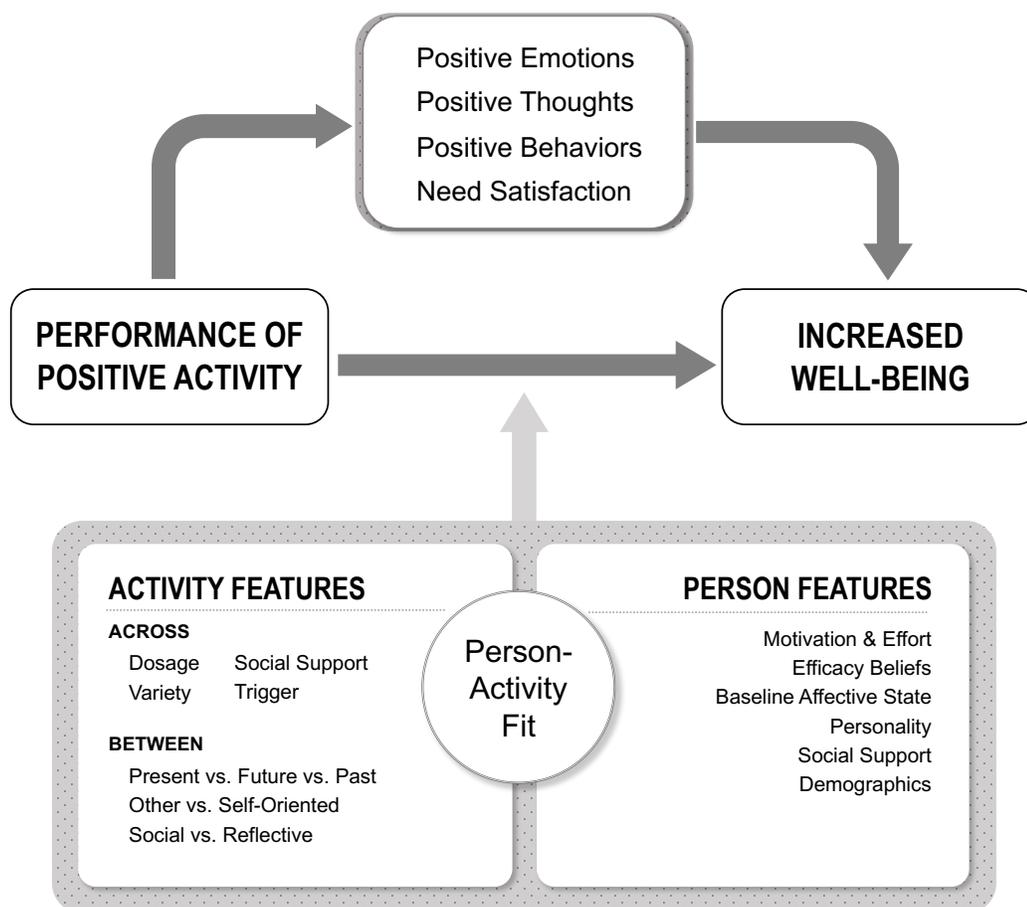


FIGURE 2

*Revealing Moments* 11 x 17-inch poster before (page 87) and after (page 88) interaction. This version of the scratch-off poster was sent to the high savoring diversity group.





\* Building bridges

\* Going up

\* **Try to imagine**, in the most precise way, what actions you might take in relation to today's prompt and how they may make you happy. You can imagine all kinds of positive events, from simple everyday pleasures to very important positive events.

\* Try it out

\* **Share and celebrate**, a pleasant experience with others based on what you've done regarding today's prompt. Ask them to join you - You can retell the experience or (re)enact it to engage them.

\* Beautiful sight

\* Reaching out

\* Bring light

\* **Be here now**, while working on today's prompt. Let yourself become fully immersed in the present pleasant experience. Don't worry about what will come next or think about how the situation could be different. Just enjoy.

+ Thank you

+ Secret dance

+ **Praise yourself**, for making it this far, or for completing a task. Recall how long you have waited for this moment. Pause to express congratulations to yourself with today's action.

**Instructions**  
Scratch off a golden area  
Find an action to fulfill the prompt  
Pair with instructions from the symbol  
Enjoy life's quests and simple pleasures

FIGURE 3

A flow diagram explaining how the intervention *Revealing Moments* is hypothesized to work.

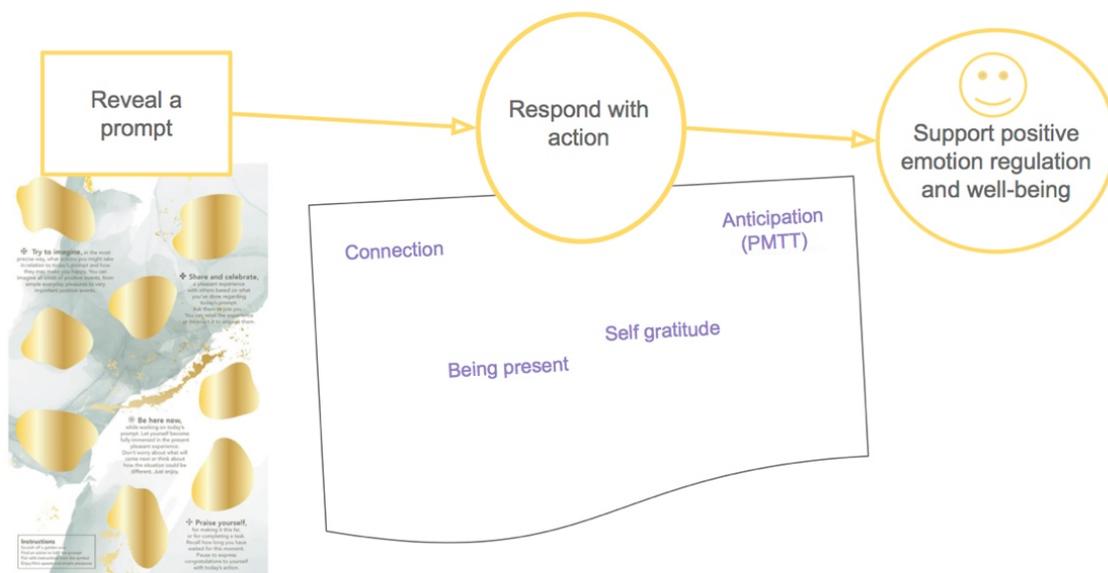


FIGURE 4

An example photograph showing the selected prompts for the savoring strategy of anticipating during the savoring strategy sorting workshop.

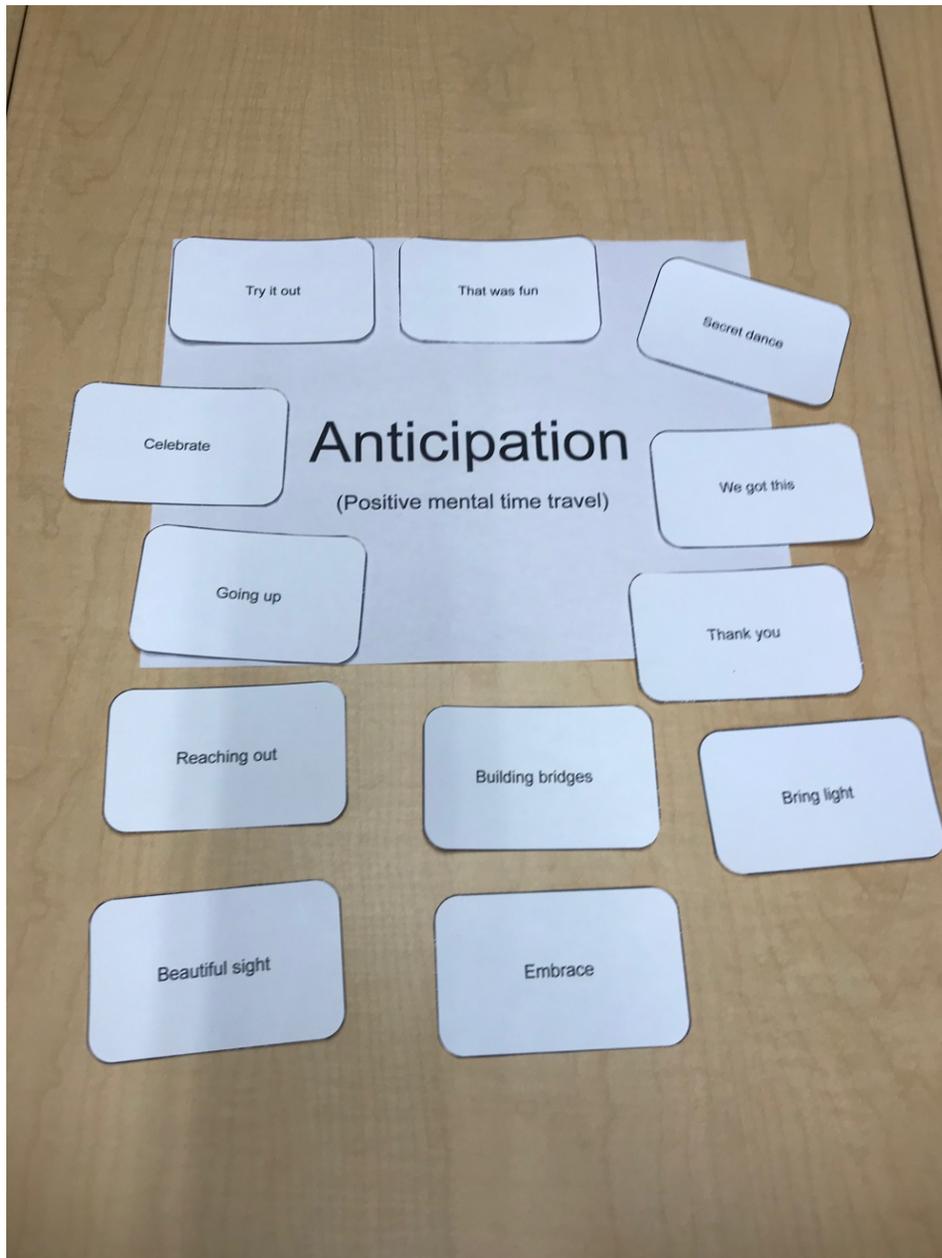
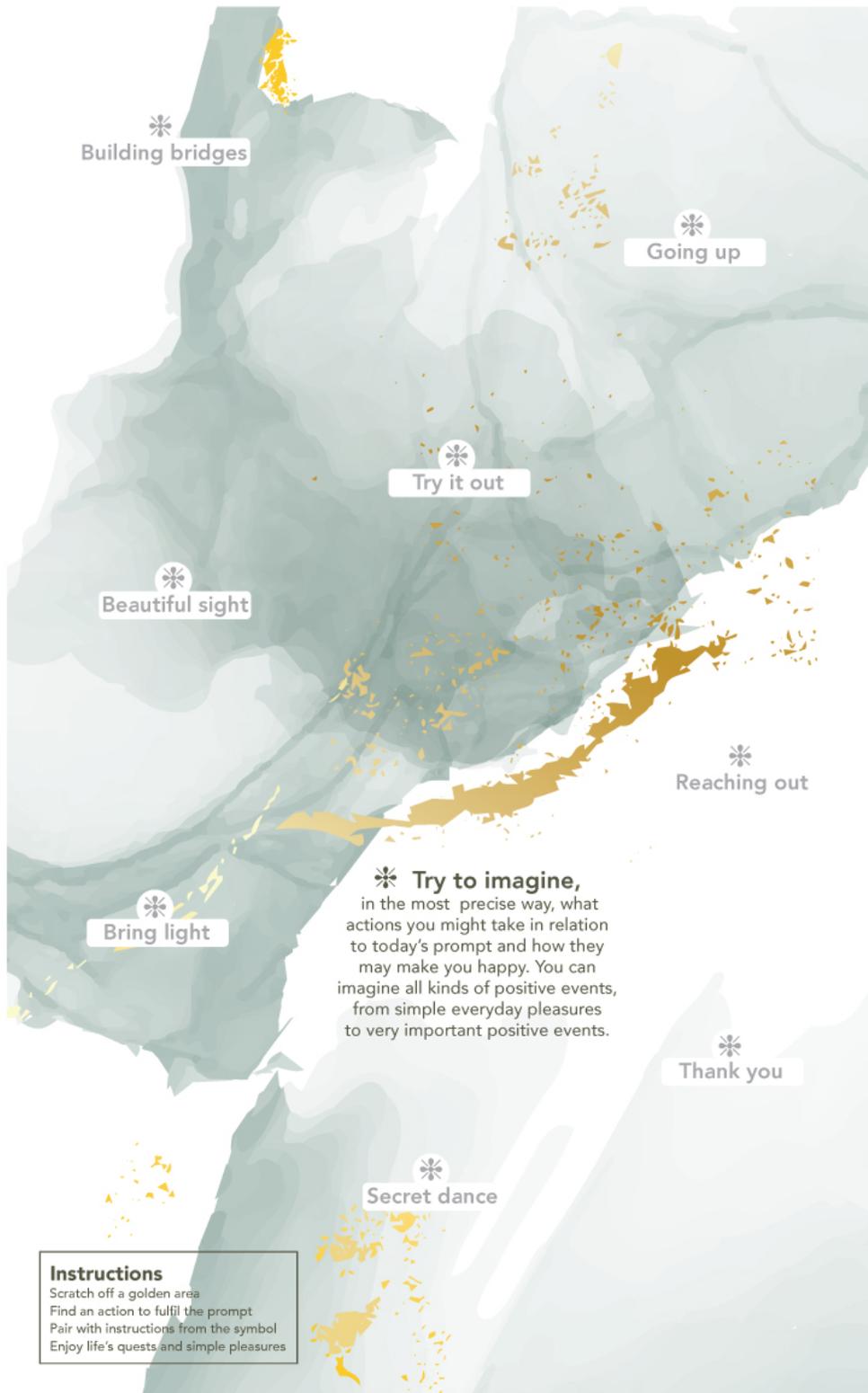


FIGURE 5

The alternative version of *Revealing Moments* intended for the low savoring diversity group. The pre-interaction poster appears on page 91, and the post-interaction version appears on page 92. Note that only the instructions for *anticipating* are present.





**Instructions**  
Scratch off a golden area  
Find an action to fulfil the prompt  
Pair with instructions from the symbol  
Enjoy life's quests and simple pleasures

**\* Try to imagine,**  
in the most precise way, what  
actions you might take in relation  
to today's prompt and how they  
may make you happy. You can  
imagine all kinds of positive events,  
from simple everyday pleasures  
to very important positive events.

FIGURE 6

Unadjusted means for key variables. 1 = Control (Journaling); 2 = Low Savoring Diversity; 3 = High Savoring Diversity.

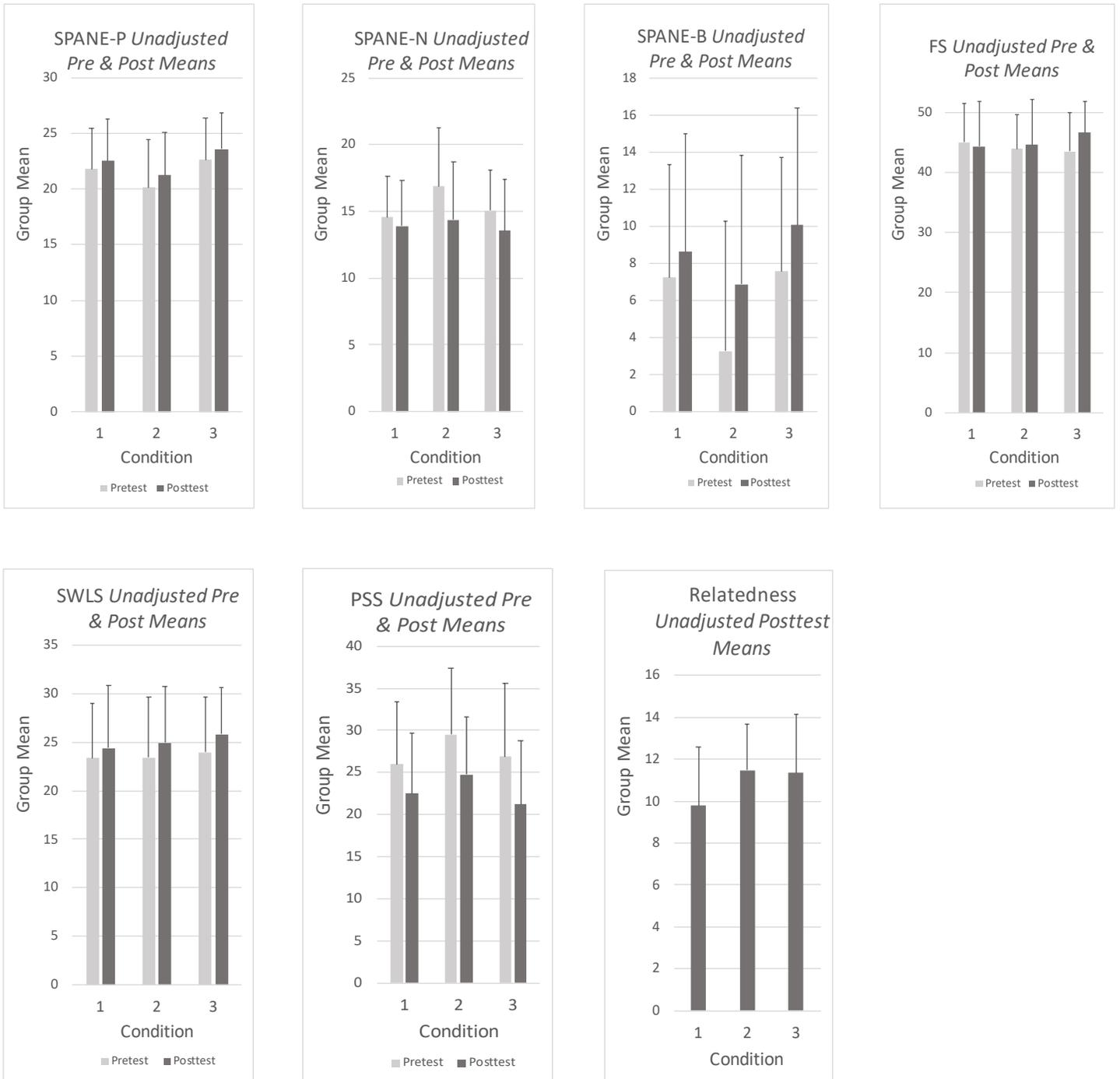


FIGURE 7

Model-adjusted means for key variables. 1 = Control (Journaling); 2 = Low Savoring Diversity; 3 = High Savoring Diversity.

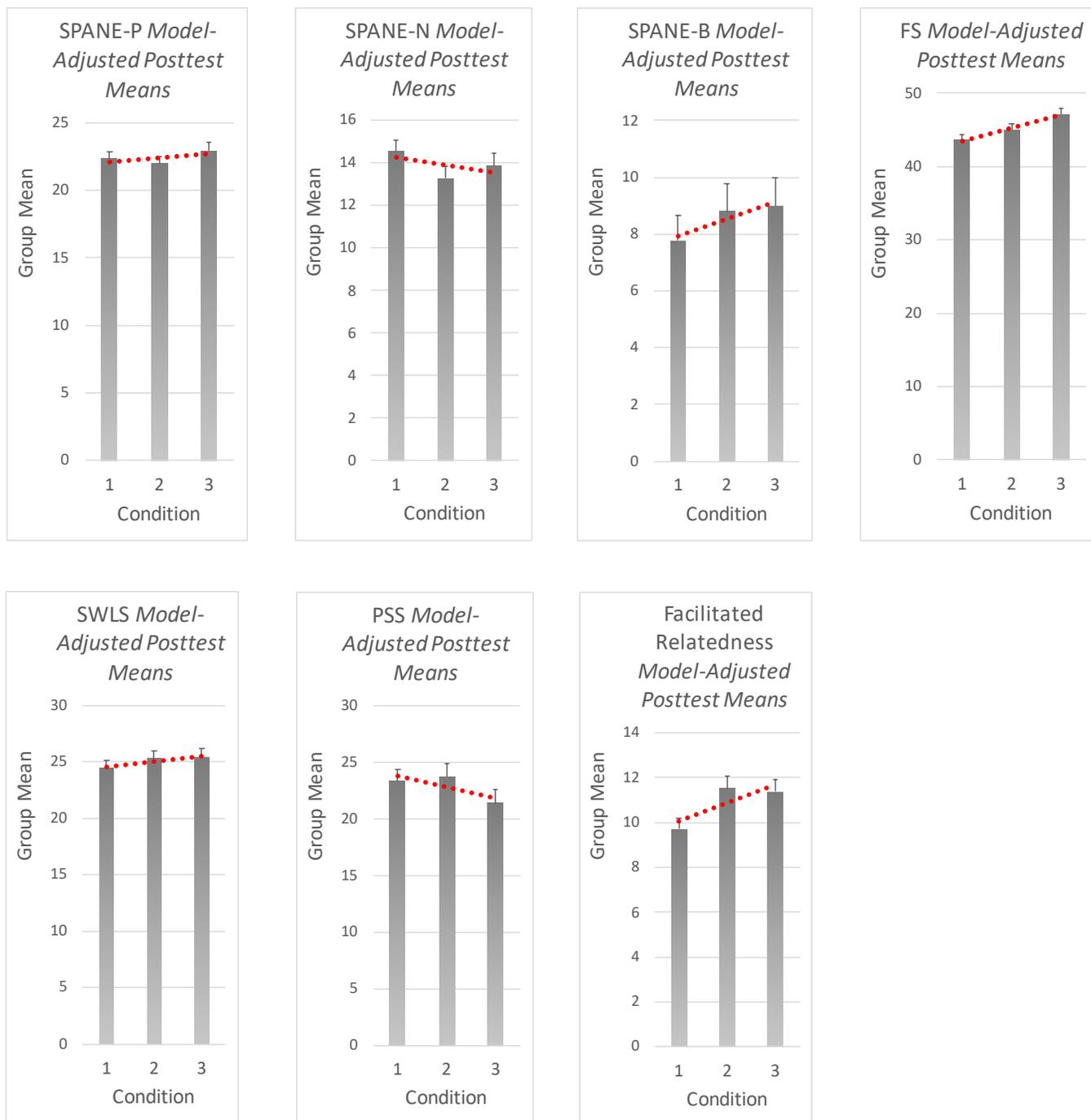


FIGURE 8

Word cloud for the journaling group. The cutoff for number of words is six. A “stop list” of excluded words and characters can be found in Appendix E.



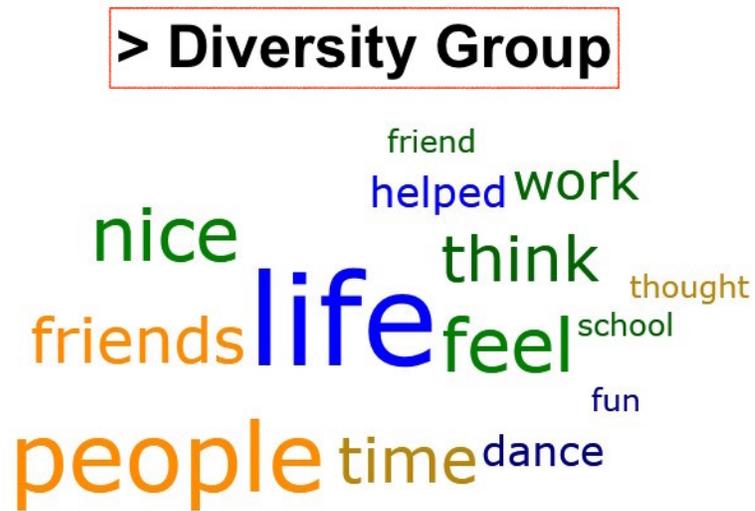
FIGURE 9

Word cloud for the low diversity savoring group. The cutoff for number of words is four. A “stop list” of excluded words and characters can be found in Appendix E.



FIGURE 10

Word cloud for the high diversity savoring group. The cutoff for number of words is four. A “stop list” of excluded words and characters can be found in Appendix E.



## APPENDICES

## APPENDIX A

Mean ratings for 75 prompt candidates sorted by mean difficulty (1= low, 7= high).

### Judges' Ratings

*N* = 27

Prompt Candidate	Mean Difficulty	Mean Positivity
Thank you	1.33	5.56
Listen	1.74	4.19
That was fun	1.85	5.59
Celebrate	1.85	5.63
Face to face	1.88	4.07
Help out	1.89	4.74
Embrace	1.93	5.44
Reaching out	1.96	4.96
Move it	2.00	3.44
Wear it proudly	2.04	4.96
Beautiful sight	2.04	5.63
Get out	2.08	1.04
Show up	2.19	4.22
Observe closely	2.22	3.81
Finish it	2.22	3.37
Breathe it in	2.44	4.81
Just because	2.56	4.33
Eyes closed	2.56	3.78
We got this	2.62	5.73
A little scared	2.63	2.41
Secret dance	2.63	4.85
Wireless	2.63	3.56
I need	2.65	2.73
Balance	2.65	4.30
Try it out	2.67	4.48
Mirroring	2.70	3.22
Building bridges	2.74	4.59
Going up	2.78	4.48
One thing	2.78	3.15
Bring light	2.81	4.89
My hero	2.85	5.12
Whatever I want	2.85	3.89
You're it	2.89	4.37
Mean it	2.89	4.52
Open house	2.93	4.07
Got a match?	3.00	3.59
Unlocking	3.04	3.74
Turn it around	3.07	3.70

<b>Prompt Candidate</b>	<b>Mean Difficulty</b>	<b>Mean Positivity</b>
Like a turtle	3.15	3.78
Upside down	3.26	2.81
Whoa there	3.30	2.59
Seasons change	3.33	3.67
Anonymous	3.33	3.07
Find the words	3.37	3.93
Back into order	3.37	3.93
Polished	3.44	4.22
Best lesson ever	3.48	5.41
Next	3.59	2.85
Walkie talkie	3.59	3.78
Hidden talent	3.63	4.85
Raise the stakes	3.67	3.22
See through reflection	3.69	3.73
Merge into one	3.70	4.04
Put magic in it	3.73	5.19
Find a vessel	3.81	3.48
Same tune, new key	3.89	3.70
Behind the mask	3.92	2.96
Reversal	3.96	2.96
Laughter bubbles	4.04	5.04
Near or far	4.19	3.37
Come and take it	4.41	2.26
Find the seams	4.42	3.11
Left shoe, right foot	4.48	2.89
Molehills are mountains	4.59	2.41
Rewinding life	4.59	3.19
Time is your setting	4.63	3.37
Sleight of hand	4.67	2.64
Round it out	4.67	3.19
Change the scale	4.70	3.37
Second circle	4.81	3.07
The real roots	4.81	3.70
Crack in the wall	4.89	2.41
Bottom of the sky	4.93	3.41
Attentional orbit	5.52	2.96

*Note.* Each prompt was judged on a scale of 1-7 (1 = least, 7 = most) for its perceived level of difficulty in envisioning an action to take during one's daily life (i.e., "difficulty"). Each prompt's level of perceived subjective positivity was also rated on a 7-point scale (1 = least, 7 = most).

## APPENDIX B

The final 20 prompt candidates with their mean positivity and difficulty ratings from the judging phase along with their indicator selection status during the savoring strategy workshop.

Prompt Candidate	Judges' Ratings <i>N</i> = 27		Savoring Strategy Workshop Selections <i>N</i> = 6			
	Mean Difficulty	Mean Positivity	Being Present	Anticipating	Capitalizing	Self-Congratulation
Celebrate	1.85	5.63	1	1	1	1
Beautiful sight	2.04	5.63	1	1	0	0
That was fun	1.85	5.59	0	1	1	1
Thank you	1.33	5.56	0	1	0	1
Embrace	1.93	5.44	1	1	0	1
Wear it proudly	2.04	5.15	0	0	1	1
Reaching out	1.96	4.96	0	1	1	0
Bring light	2.81	4.89	0	1	1	0
Secret dance	2.63	4.85	0	1	0	1
Breathe it in	2.44	4.81	1	0	0	1
Help out	1.89	4.74	0	0	1	0
Building bridges	2.74	4.59	0	1	1	0
Try it out	2.67	4.48	1	1	0	0
Going up	2.78	4.48	0	1	0	1
We got this	2.62	4.38	0	1	1	0
Just because	2.56	4.33	1	0	1	1
Balance	2.65	4.30	1	0	0	1
Show up	2.19	4.22	1	0	1	0
Listen	1.74	4.19	1	0	1	0
Face to face	1.88	4.07	1	0	1	0
<b>Total Mean (SD)</b>	<b>2.23 (0.43)</b>	<b>4.81 (0.53)</b>				

*Note.* The above table summarizes two phases of the prompt selection process. On the left-hand side are average difficulty and positivity ratings (1-7) for the top twenty prompts that emerged from the online anonymous judging phase. On the right-hand side (denoted by grey column headings), are binary indications of whether the prompt was selected during the savoring strategy sorting workshop. Prompts that are highlighted in grey indicate final selections. The eight final selections also include a grey-highlighted savoring strategy column indicator to show with which strategy they are associated. There are two prompts per savoring strategy.

## APPENDIX C

The general instructions included with mailed packets for the two poster versions.

Hello Fellow Student,

I hope this letter finds you well. Thank you for joining my study about emotions and daily activities.

I have included a poster that features eight golden shapes. These are "scratch off" areas with brief prompts beneath them. Think of each prompt like an open-ended riddle for your day. The goal is for you to reveal a new prompt each day and to **identify some action, big or small, that you can take during the day to fulfill the prompt to your own satisfaction.**

For example, if today's prompt says, "one thing", I would reflect about what that means to me. Perhaps I could finally do the "one thing" I have been putting off, like reading a book I enjoy. Or, maybe I could close my eyes and pick "one thing" from the pantry to see if I can make a meal around it. I might decide to write a poem about the "one thing" that I am really looking forward to, or, perhaps I could alter "one thing" about my evening routine. The action can be anything you choose.

When you imagine an action for the day, **try to choose something that you will enjoy or find interesting.** Just know there is no wrong answer.

There is also a symbol that accompanies each prompt. Try to **incorporate the added instruction from the symbol into your chosen action.** For example, if today's symbol asks me to vividly imagine and anticipate my chosen action, perhaps I might think of "one thing" that will really bring me joy today, like going outside after lunch. I would try to picture the peacefulness that will bring. I may recall the smell of the grass, the feeling of the breeze, and picture what the squirrels are doing today.

This study will occur over 10 days. On the first and last days of the study, there will be a 10-to-20-minute questionnaire. On most other days, I will ask you to complete a 1-minute questionnaire about the prior day before revealing a new prompt. Remember, you should **always complete the day's questionnaire before revealing a new prompt.**

You can start today or tomorrow, whichever you prefer. **Please keep these instructions somewhere you will be able to reference them.**

Let me know if you have questions by emailing [REDACTED]

Cheers!

Sincerely,  
Jeremy



## APPENDIX D

Example daily instructions included with mailed packets for the two poster versions.

### Scratch-off Poster

#### DAY 1

- a. There is **no prompt today**.
- b. **Please hang the poster** somewhere you will see it regularly over the next 10 days, preferably in a prominent location.
- c. Up for **sharing a photo** of your poster? Send to [REDACTED]
- d. Please complete today's **10-minute questionnaire** by visiting [REDACTED] or by scanning the QR code.
- e. **Tomorrow, you will reveal the first prompt.**



Day 1

#### DAY 2

- a. There is **no questionnaire** today.
- b. Please **reveal a prompt** for the day by scratching off a golden shape.
- c. **Pair today's prompt** with the instruction from the accompanying symbol.
- d. **Imagine an action** that could fulfill today's prompt to your satisfaction. It can be big or small. Make it something you will enjoy or find interesting.
- e. **Perform some action** to fulfill today's prompt.

Thanks  
for your help!

Day 2

#### DAY 3

- a. First, complete today's **1-minute questionnaire** about yesterday's prompt by visiting [REDACTED] or by scanning the QR code.
- b. Then, **reveal a prompt** for the day by scratching off a golden shape.
- c. **Pair today's prompt** with the instruction from the accompanying symbol.
- d. **Imagine an action** that could fulfill today's prompt to your satisfaction. It can be big or small. Make it something you will enjoy or find interesting.
- e. **Perform some action** to fulfill today's prompt.



Day 3

#### DAY 4

- a. First, complete today's **1-minute questionnaire** about yesterday's prompt by visiting [REDACTED] or by scanning the QR code.
- b. Then, **reveal a prompt** for the day by scratching off a golden shape.
- c. **Pair today's prompt** with the instruction from the accompanying symbol.
- d. **Imagine an action** that could fulfill today's prompt to your satisfaction. It can be big or small. Make it something you will enjoy or find interesting.
- e. **Perform some action** to fulfill today's prompt.



Day 4

## APPENDIX E

The “stop list” of words excluded when generating the word clouds (see Figures 8-10).

This list includes the default “English” stop list on Atlas.ti 8 with some additions.

3	definitely	his	off	that	which
5/14/2020	did	how	old	that's	while
5/15/2020	didn't	how's	on	the	who
5/16/2020	do	i	once	their	whom
5/18/2020	does	i,äöve	one	theirs	who's
5/29/2020	doesn't	i'd	only	them	why
a	doing	if	or	themselves	why's
able	don't	i'll	order	then	with
about	down	i'm	other	there	won't
above	during	in	ought	there's	would
actually	each	instead	our	these	wouldn't
after	else	into	ours	they	yet
again	even	is	ourselves	they'd	you
against	every	isn't	out	they'll	you'd
all	few	it	over	they're	you'll
also	find	its	overall	they've	your
am	for	it's	own	thing	you're
an	forward	itself	pm	things	yours
and	found	i've	pm	this	yourself
any	from	journal	post_identifier	those	yourselves
anything	further	journaling	poster	though	you've
are	gave	journals	pretty	through	
aren't	get	just	proceeded	to	
around	getting	keep	prompt	too	
as	go	keeping	prompts	under	
aspects	going	known	reaching	until	
at	got	last	really	up	
back	greatest	later	responseid	upstairs	
be	group_assignment	let's	same	used	
because	had	like	see	usually	
been	hadn,äöt	little	several	very	
before	hadn't	long	shan't	w	
being	happened	lot	she	was	
below	has	made	she'd	wasn't	
benefit	hasn't	make	she'll	way	
best	have	me	she's	we	
between	haven,äöt	might	should	we,äöve	
bird	haven't	more	shouldn't	we'd	
bluebird	having	most	since	we'll	
both	he	much	so	went	
box	he'd	mustn't	some	were	
but	he'll	my	something	we're	
by	her	myself	sometimes	weren't	
can	here	nests	stemmed	we've	
cannot	here's	no	still	what	
can't	hers	nope	story	what's	
close	herself	nor	such	when	
could	he's	not	taking	when's	
couldn't	him	nothing	text	where	
day	himself	of	than	where's	

## REFERENCES

## REFERENCES

- Aart, J. V., Bartneck, C., Hu, J., Rauterberg, M., & Salem, B. (2010). How to behave as Alice in Wonderland—about boredom and curiosity. *Entertainment Computing*. Entertainment Computing. <http://doi.org/10.1016/j.entcom.2010.09.003>
- Attfield, S., Kazai, G., Lalmas, M., & Piwowarski, B. (2011). Towards a science of user engagement.
- Baron, R. M. and Kenny, D. A. (1986), Moderator-Mediator Variables Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations, *Journal of Personality and Social Psychology*, 51 (6), 1173–82.
- Baumeister, R.F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117, 497-529.
- Bendau, A., Petzold, M. B., Pyrkosch, L., Mascarell Maricic, L., Betzler, F., Rogoll, J., ... Plag, J.. (2020). Associations between COVID-19 related media consumption and symptoms of anxiety, depression and COVID-19 related fear in the general population in Germany. *European Archives of Psychiatry and Clinical Neuroscience*. *European Archives of Psychiatry and Clinical Neuroscience*. <http://doi.org/10.1007/s00406-020-01171-6>
- Boon, B., Rozendaal, M., & Stappers, P. J. (2018). Ambiguity and Open-Endedness in Behavioural Design. In C. Storni, K. Leahy, M. McMahon, P. Lloyd, & E. Bohemia (Eds.), *Proceedings of DRS 2018* (pp. 2075-2085). (Proceedings of DRS; Vol. 5). London: Design Research Society. <https://doi.org/10.21606/drs.2018.452>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 167-203.
- Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, 84(4), 822–848. <https://doi.org/10.1037/0022-3514.84.4.822>
- Brown, N. J., & Rohrer, J. M. (2019). Easy as (happiness) pie? A critical evaluation of a popular model of the determinants of well-being. *Journal of Happiness Studies*, 1-17.
- Bryant, F. (2003). Savoring beliefs inventory (SBI): A scale for measuring beliefs about savouring, *Journal of Mental Health*, 12(2), 175-196. [doi:10.1080/0963823031000103489](https://doi.org/10.1080/0963823031000103489)
- Bryant, F.B., Chadwick, E.D., & Kluwe, K. (2011). Understanding the Processes that

- Regulate Positive Emotional Experience: Unsolved Problems and Future Directions for Theory and Research on Savoring. *International Journal of Wellbeing*, 1.
- Bryant, F. B., Ericksen, C. L., & DeHoek, A. (2008). Savoring. In S. J. Lopez (Ed.), *Encyclopedia of positive psychology* (Vol. 2, pp. 857-859). New York, NY: Wiley.
- Bryant, F. B., & Veroff, J. (2007). *Savoring: A new model of positive experience*. Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.
- Chadwick, E. D., Jose, P. E., & Bryant, F. B. (2020). Styles of everyday savoring differentially predict well-being in adolescents over one month. *Journal of Happiness Studies: An Interdisciplinary Forum on Subjective Well-Being*. <https://doi-org.proxy.library.cornell.edu/10.1007/s10902-020-00252-6>
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of health and social behavior*, 385-396.
- Cohn, M. A., & Fredrickson, B. L. (2010). In search of durable positive psychology interventions: Predictors and consequences of longterm positive behavior change. *Journal of Positive Psychology*, 5, 355-366.
- Cohn, M. A., Fredrickson, B. L., Brown, S. L., Mikels, J. A., & Conway, A. M. (2009). Happiness unpacked: Positive emotions increase life satisfaction by building resilience. *Emotion*. <http://doi.org/10.1037/a0015952>
- Desmet, P. M. A. & Pohlmeier, A. E. (2013). Positive design: An introduction to design for subjective well-being. *International Journal of Design*, 6(2), 1-29.
- Desmet, P. M. A., & Sääksjärvi, M. C. (2016). Form matters: Design creativity in positive psychological interventions. *Psychology of Well-being*, 6(1), 1-17. [doi:10.1186/s13612-016-0043-5](https://doi.org/10.1186/s13612-016-0043-5)
- Dickens, C. (1995). *A Christmas carol and other stories*. New York: Modern Library.
- Diener, E., & Biswas-Diener, R. (2008). *Happiness: Unlocking the mysteries of psychological wealth*. Malden, MA: Blackwell publishing.
- Diener, E., Inglehart, R., & Tay, L. (2013). Theory and validity of life satisfaction scales. *Social Indicators Research*, 112(3), 497-527.
- Diener, E., Larsen, R. J., Levine, S., & Emmons, R. A. (1985). Intensity and frequency: Dimensions underlying positive and negative affect. *Journal of Personality and Social Psychology*, 48(5), 1253-1265. <https://doi.org/10.1037/0022-3514.48.5.1253>
- Diener, E., Lucas, R. E., & Scollon, C. N. (2006). Beyond the hedonic treadmill: Revising the adaptation theory of well-being. *American Psychologist*, 61(4), 305-314. <https://doi.org/10.1037/0003-066X.61.4.305>
- Diener, E., Sandvik, E., & Pavot, W. (2009). Happiness is the frequency, not the

- intensity, of positive versus negative affect. In E. Diener (Ed.), *Social indicators research series: Vol. 39. Assessing well-being: The collected works of Ed Diener* (p. 213–231). Springer Science + Business Media.  
[https://doi.org/10.1007/978-90-481-2354-4\\_10](https://doi.org/10.1007/978-90-481-2354-4_10)
- Diener, E., Suh, E. M., Lucas, R. E., & Smith, H. L. (1999). Subjective well-being: Three decades of progress. *Psychological Bulletin*, *125*, 276-302.
- Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D. W., Oishi, S., & Biswas-Diener, R. (2010). New well-being measures: Short scales to assess flourishing and positive and negative feelings. *Social indicators research*, *97*(2), 143-156.
- Dunn, B. (2017). Opportunities and Challenges for the Emerging Field of Positive Emotion Regulation: A Commentary on the Special Edition on Positive Emotions and Cognitions in Clinical Psychology. *Cognitive Therapy and Research*, *41*, 469 - 478.
- Faulk, J. D., Dewey, C., Oluwadairo, O., Aguiar, C., & Yoon, J. (2020). Designing future memories: An evidence-based self-help intervention to promote user well-being. In, *AMPS Proceedings Series 17.3. Experiential Design – Rethinking relations between people, objects and environments, USA 16-17 January 2020*. ISSN: 2398-9467 (in press)
- Frayling, C. (1993). Research in Art and Design. *Royal College of Art Research Papers* 1(1), 1-5.
- Fredrickson, B. L. (2001). The role of positive emotions in positive psychology. The broaden-and-build theory of positive emotions. *The American psychologist*, *56*(3), 218–226. <https://doi.org/10.1037//0003-066x.56.3.218>
- Fredrickson, B. L., & Branigan, C. (2005). Positive emotions broaden the scope of attention and thought-action repertoires. *Cognition and Emotion*, *19*(3), 313–332. <https://doi.org/10.1080/02699930441000238>
- Fredrickson, B. L., & Joiner, T. (2002). Positive emotions trigger upward spirals toward emotional well-being. *Psychological science*, *13*(2), 172–175.  
<https://doi.org/10.1111/1467-9280.00431>
- Gable, S. L., & Reis, H. T.. (2010). Good News! Capitalizing on Positive Events in an Interpersonal Context. In *Advances in Experimental Social Psychology* (pp. 195–257). Advances in Experimental Social Psychology.  
[http://doi.org/10.1016/s0065-2601\(10\)42004-3](http://doi.org/10.1016/s0065-2601(10)42004-3)
- Gander, F., Proyer, R. T., & Ruch, W. (2016). Positive Psychology Interventions Addressing Pleasure, Engagement, Meaning, Positive Relationships, and Accomplishment Increase Well-Being and Ameliorate Depressive Symptoms: A Randomized, Placebo-Controlled Online Study. *Frontiers in psychology*, *7*, 686. <https://doi.org/10.3389/fpsyg.2016.00686>
- Gonza, G., & Burger, A. (2017). Subjective well-being during the 2008 economic

- crisis: Identification of mediating and moderating factors. *Journal of Happiness Studies*, 18, 1763-1797. <https://doi.org/10.1007/s10902-016-9797-y>
- Gross, J. J. (2015). Emotion regulation: Current status and future prospects. *Psychological Inquiry*, 26(1), 1–26. <https://doi.org/10.1080/1047840X.2014.940781>
- Hassenzahl, M. (2010). *Experience design: Technology for all the right reasons*. San Rafael, Calif.: Morgan & Claypool.
- Hay, E. L., & Diehl, M. (2011). Emotion complexity and emotion regulation across adulthood. *European Journal of Ageing*, 8(3), 157-168.
- Heintzelman, S. J., & Kushlev, K. (2020). Emphasizing scientific rigor in the development, testing, and implementation of positive psychological interventions. *The Journal of Positive Psychology*, 15(5), 685-690.
- Holman, E. A., Thompson, R. R., Garfin, D. R., & Silver, R. C. (2020). The unfolding COVID-19 pandemic: A probability-based, nationally representative study of mental health in the United States. *Science Advances*. Science Advances. <http://doi.org/10.1126/sciadv.abd5390>
- Howells, A., Ivtzan, I., & Eiroa-Orosa, F. J. (2016). Putting the ‘app’ in happiness: A randomised controlled trial of a smartphone-based mindfulness intervention to enhance wellbeing. *Journal of Happiness Studies*, 17(1), 163-185. doi:10.1007/s10902-014-9589-1
- Huckins, J. F., Dasilva, A. W., Wang, W., Hedlund, E., Rogers, C., Nepal, S. K., ... Campbell, A. T. (2020). Mental Health and Behavior During the Early Phases of the COVID-19 Pandemic: A Longitudinal Mobile Smartphone and Ecological Momentary Assessment Study in College Students (Preprint). *Journal of Medical Internet Research*. Journal of Medical Internet Research. <http://doi.org/10.2196/20185>
- Hurley, D. B., & Kwon, P. (2013). Savoring helps most when you have little: Interaction between savoring the moment and uplifts on positive affect and satisfaction with life. *Journal of Happiness Studies*, 14(4), 1261-1271.
- John, O. P., & Srivastava, S. (1999). *The Big Five Trait taxonomy: History, measurement, and theoretical perspectives*. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (p. 102–138). Guilford Press.
- Jose, P. E., Bryant, F. B., & Macaskill, E. (2020). Savor now and also reap the rewards later: amplifying savoring predicts greater uplift frequency over time. *The Journal of Positive Psychology*. The Journal of Positive Psychology. <http://doi.org/10.1080/17439760.2020.1805504>
- Jose, P. E., Lim, B. T., & Bryant, F. B. (2012). Does savoring increase happiness? A daily diary study. *The Journal of Positive Psychology*, 7(3), 176-187.

doi:10.1080/17439760.2012.671345

- Kahriz, B. M., Bower, J. L., Glover, F. M., & Vogt, J. (2020). Wanting to be happy but not knowing how: Poor attentional control and emotion-regulation abilities mediate the association between valuing happiness and depression. *Journal of Happiness Studies*, 21(7), 2583-2601.
- Kiken, L. G., Lundberg, K. B., & Fredrickson, B. L. (2017). Being Present and Enjoying It: Dispositional Mindfulness and Savoring the Moment Are Distinct, Interactive Predictors of Positive Emotions and Psychological Health. *Mindfulness*. Mindfulness. <http://doi.org/10.1007/s12671-017-0704-3>
- Kok, B. E., Coffey, K. A., Cohn, M. A., Catalino, L. I., Vacharkulksemsuk, T., Algoe, S. B., Brantley, M., & Fredrickson, B. L. (2013). How Positive Emotions Build Physical Health: Perceived Positive Social Connections Account for the Upward Spiral Between Positive Emotions and Vagal Tone. *Psychological Science*, 24(7), 1123–1132. <https://doi.org/10.1177/0956797612470827>
- Lee E. H. (2012). Review of the psychometric evidence of the perceived stress scale. *Asian nursing research*, 6(4), 121–127. <https://doi.org/10.1016/j.anr.2012.08.004>
- Lades, L. K., Laffan, K., Daly, M., & Delaney, L. (2020). Daily emotional well-being during the COVID-19 pandemic. *British Journal of Health Psychology*. British Journal of Health Psychology. <http://doi.org/10.1111/bjhp.12450>
- Lauzon, A., & Green-Demers, I. (2020). More of a Good Thing is Even Better: Towards a New Conceptualization of the Nature of Savouring Experiences. *Journal of Happiness Studies*. Journal of Happiness Studies. <http://doi.org/10.1007/s10902-019-00125-7>
- Layous, K., Lee, H., Choi, I., & Lyubomirsky, S. (2013). Culture Matters When Designing a Successful Happiness-Increasing Activity: A Comparison of the United States and South Korea. *Journal of Cross-Cultural Psychology*, 44(8), 1294–1303. <https://doi.org/10.1177/0022022113487591>
- Layous, K., & Lyubomirsky, S. (2014). *The how, why, what, when, and who of happiness: Mechanisms underlying the success of positive activity interventions*. In J. Gruber & J. T. Moskowitz (Eds.), *Positive emotion: Integrating the light sides and dark sides* (p. 473–495). Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780199926725.003.0025>
- Leong, T., Howard, S., Vetere, F. (2008). Choice: abdicating or exercising? In: Proceedings of the CHI 2008 Conference on Human Factors in Computing. ACM Press, New York, pp. 715-724.
- Lyubomirsky, S., Sheldon K. M., Schkade, D. (2005). Pursuing happiness: the architecture of sustainable change. *The Review of General Psychology*, 9, 111-131.

- Lyubomirsky, S. (2008). *The how of happiness: A scientific approach to getting the life you want*. New York: Penguin Press
- Lyubomirsky, S. (2011). Hedonic adaptation to positive and negative experiences. In S. Folkman (Ed.), *Oxford handbook of stress, health, and coping* (pp. 200-224). New York: Oxford University Press.
- Lyubomirsky, S., Dickerhoof, R., Boehm, J. K., & Sheldon, K. M. (2011). Becoming happier takes both a will and a proper way: An experimental longitudinal intervention to boost well-being. *Emotion, 11*(2), 391-402.
- Lyubomirsky, S., King, L., & Diener, E. (2005). The benefits of frequent positive affect: Does happiness lead to success? *Psychological Bulletin, 131*(6), 803-855. doi:10.1037/0033-2909.131.6.803
- Lyubomirsky, S., & Layous, K. (2013). How do simple positive activities increase well-being? *Current Directions in Psychological Science, 22*(1), 57-62. doi:10.1177/0963721412469809
- Lyubomirsky, S., & Lepper, H. S. (1999). A measure of subjective happiness: Preliminary reliability and construct validation. *Social Indicators Research, 46*, 137-155.
- Mahmud, M. S., Talukder, M. U., & Rahman, S. M. (2020). Does ‘Fear of COVID-19’ trigger future career anxiety? An empirical investigation considering depression from COVID-19 as a mediator. *International Journal of Social Psychiatry*. International Journal of Social Psychiatry. <http://doi.org/10.1177/0020764020935488>
- Mauss, I. B., Tamir, M., Anderson, C. L., & Savino, N. S. (2011). Can seeking happiness make people unhappy? [corrected] Paradoxical effects of valuing happiness. *Emotion (Washington, D.C.), 11*(4), 807–815. <https://doi.org/10.1037/a0022010>
- Mikolajczak, M. (2009). La régulation des émotions négatives. In M. Mikolajczak, J. Quoidbach, I. Kotsou, & d. Nélis (Eds.), *Les compétences émotionnelles* (pp. 153-191). Paris: Dunod.
- Mittelman, M., Gonçalves, D., & Andrade, E. B. (2019). Out of Sight, Out of Mind: Usage Frequency Considerations in Purchase Decisions. *Journal of Consumer Psychology*.
- Nakamura, J., & Csikszentmihalyi, M. (2002). The concept of flow. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of positive psychology* (p. 89–105). Oxford University Press.
- Nelson, S. K., & Lyubomirsky, S. (2014). *Finding happiness: Tailoring positive activities for optimal well-being benefits*. In M. M. Tugade, M. N. Shiota, & L. D. Kirby (Eds.), *Handbook of positive emotions* (p. 275–293). The Guilford Press.

- Parks, A. C. (2015). *Putting positive psychology into practice via self-help*. In J. Stephen (Ed.), *Positive psychology in practice: promoting human flourishing in work, health, education, and everyday life* (p. 237-248). John Wiley & Sons Inc.
- Parks, A. C., & Biswas-Diener, R. (2013). Positive interventions: Past, present, and future. In T. B. Kashdan & J. Ciarrochi (Eds.), *The Context Press mindfulness and acceptance practica series. Mindfulness, acceptance, and positive psychology: The seven foundations of well-being* (p. 140–165). New Harbinger Publications, Inc.
- Parks, A. C., Della Porta, M. D., Pierce, R. S., Zilca, R., & Lyubomirsky, S. (2012). Pursuing happiness in everyday life: The characteristics and behaviors of online happiness seekers. *Emotion, 12*(6), 1222-1234.
- Parks, A. C., & Schueller, S. (Eds.). (2014). *The Wiley Blackwell handbook of positive psychological interventions*. John Wiley & Sons.
- Parks, AC., Schueller, SM., & Tasimi, A. (2013). Increasing happiness in the general population: Empirically supported self-help? In S. David, I. Boniwell, & AC. Ayers (Eds.), *Oxford Handbook of Happiness* (pp. 962-977). Oxford University Press.
- Pavot, W., & Diener, E. (1993). Review of the Satisfaction With Life Scale. *Psychological Assessment, 5*(2), 164–172. <https://doi.org/10.1037/1040-3590.5.2.164>
- Peters, D., Calvo, R. A., & Ryan, R. M. (2018). Designing for motivation, engagement and wellbeing in digital experience. *Frontiers in psychology, 9*, 797.
- Peterson, C., & Seligman, M. E. P. (2004). *Character strengths and virtues: A handbook and classification*. American Psychological Association; Oxford University Press.
- Pohlmeyer, A. (2014). Enjoying joy: A process-based approach to design for prolonged pleasure. Proceedings of the NordiCHI'14, *The 8th Nordic conference on human-computer interaction*, 26-30, October 2014, Helsinki, Finland, 12/2014. doi:10.1145/2639189.2670182
- Pollard, M. S., Tucker, J. S., & Green, H. D. (2020). Changes in Adult Alcohol Use and Consequences During the COVID-19 Pandemic in the US. *JAMA Network Open, 3*(9), e2022942. <https://doi.org/10.1001/jamanetworkopen.2020.22942>
- Quoidbach, J., Mikolajczak, M., & Gross, J. (2015). Positive interventions: An emotion regulation perspective. *Psychological bulletin, 141* 3, 655-93.
- Quoidbach, J., Berry, E. V., Hansenne, M., & Mikolajczak, M. (2010). Positive

- emotion regulation and well-being: Comparing the impact of eight savoring and dampening strategies. *Personality and Individual Differences*, 49(5), 368–373. <https://doi.org/10.1016/j.paid.2010.03.048>
- Quoidbach, J., Wood, A. M., & Hansenne, M. (2009). Back to the future: The effect of daily practice of mental time travel into the future on happiness and anxiety. *The Journal of Positive Psychology*, 4(5), 349–355. <https://doi.org/10.1080/17439760902992365>
- Ryan R. M., & Rigby C. S. (2018). *MIT Handbook of Gamification*, Boston, MA: The MIT Press.
- Ryan, R. M., & Deci, E. L. (2000a). Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary Educational Psychology*, 25, 54-67. <http://doi.org/10.1006/ceps.1999.1020>
- Ryan, R. M., & Deci, E. L. (2000b). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American psychologist*, 55(1), 68.
- Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: A review of research on hedonic and eudemonic well-being. *Annual Review of Psychology*, 52, 141–166. <https://doi.org/10.1146/annurev.psych.52.1.141>
- Salovey, P., Detweiler-Bedell, B. T., Detweiler-Bedell, J. B., & Mayer, J. D. (2008). Emotional intelligence. In L. F. Barrett, M. Lewis, & M. Haviland-Jones (Eds.), *Handbook of emotions* (3<sup>rd</sup> ed., pp. 533-547). New York, NY: The Guilford Press.
- Samios, C., Catania, J., Newton, K., Fulton, T., & Breadman, A. (2020). Stress, savouring, and coping: The role of savouring in psychological adjustment following a stressful life event. *Stress and Health*, 36(2), 119-130.
- Schiffirin, H. H., & Nelson, S. K. (2010). Stressed and happy? Investigating the relationship between happiness and perceived stress. *Journal of Happiness Studies*, 11(1), 33-39.
- Schueller, S. M. (2011). To each his own well-being boosting intervention: Using preference to guide selection. *Journal of Positive Psychology*, 6, 300-313.
- Schueller, S. M. (2014). Behavioral intervention technologies for positive psychology: Introduction to the special issue. *Journal of Positive Psychology*, 9(6), 475-476.
- Schueller, S. M., Muñoz, R. F., & Mohr, D. C. (2013). Realizing the potential of behavioral intervention technologies. *Current Directions in Psychological Science*, 22(6), 478-483.
- Schueller, S. M., & Parks, A. C. (2014). The science of self-help: Translating positive psychology research into increased individual happiness. *European Psychologist*, 19(2), 145-155. doi:10.1027/1016-9040/a000181

- Seligman, M. E. P. (2002). *Authentic happiness: Using the new positive psychology to realize your potential for lasting fulfillment*. Free Press.
- Seligman, M. E. P. (2011). *Flourish: A visionary new understanding of happiness and well-being*. Free Press.
- Sheldon, K. M., Boehm, J. K., & Lyubomirsky, S. (2012). Variety is the spice of happiness: The hedonic adaptation prevention (HAP) model. In S. David, I. Boniwell, & A. Conley Ayers (Eds.), *Oxford handbook of happiness* (pp. 901-914). Oxford, UK: Oxford University Press.
- Sin, N. L., & Lyubomirsky, S. (2009). Enhancing well-being and alleviating depressive symptoms with positive psychology interventions: A practice-friendly meta-analysis. *Journal of Clinical Psychology*, 65(5), 467-487. doi:10.1002/jclp.20593
- Skydsgaard, M. A., Møller Andersen, H., & King, H. (2016). Designing museum exhibits that facilitate visitor reflection and discussion. *Museum Management and Curatorship*. Museum Management and Curatorship. <http://doi.org/10.1080/09647775.2015.1117237>
- Smith, J. L., Harrison, P. R., Kurtz, J. L., & Bryant, F. B. (2014). *Nurturing the capacity to savor: Interventions to enhance the enjoyment of positive experiences*. (pp. 42-65). Chichester, UK: John Wiley & Sons, Ltd. doi:10.1002/9781118315927.ch3
- Smith, M. A., Thompson, A., Hall, L. J., Allen, S. F., & Wetherell, M. A. (2018). The physical and psychological health benefits of positive emotional writing: Investigating the moderating role of Type D (distressed) personality. *British Journal of Health Psychology*. British Journal of Health Psychology. <http://doi.org/10.1111/bjhp.12320>
- Taylor, S. J., & Bogdan, R. (1998). Introduction to qualitative research methods: A guidebook and resource. (p. 127). New York: Wiley.
- Tractinsky, N., Katz, A. S., & Ikar, D.. (2000). What is beautiful is usable. *Interacting with Computers*. *Interacting with Computers*. [http://doi.org/10.1016/s0953-5438\(00\)00031-x](http://doi.org/10.1016/s0953-5438(00)00031-x)
- Tugade, M. M., & Fredrickson, B. L. (2004). Resilient individuals use positive emotions to bounce back from negative emotional experiences. *Journal of personality and social psychology*, 86(2), 320–333. <https://doi.org/10.1037/0022-3514.86.2.320>
- Tugade, M. M., Fredrickson, B. L., & Barrett, L. F. (2004). Psychological resilience and positive emotional granularity: examining the benefits of positive emotions on coping and health. *Journal of Personality*, 72(6), 1161–1190. <https://doi.org/10.1111/j.1467-6494.2004.00294.x>
- United Nations (2020, May 13). United Nations Sustainable Development Group.

- Policy Brief: COVID-19 and the Need for Action on Mental Health. Retrieved November 15, 2020, from <https://unsdg.un.org/resources/policy-brief-covid-19-and-need-action-mental-health>
- Vittinghoff, E., & McCulloch, C. E. (2007). Relaxing the rule of ten events per variable in logistic and Cox regression. *American journal of epidemiology*, *165*(6), 710–718. <https://doi.org/10.1093/aje/kwk052>
- Washburn, L. T., Traywick, L., Thornton, L., Vincent, J., & Brown, T. (2018). Using ripple effects mapping to evaluate a community-based health program: Perspectives of program implementers. *Health Promotion Practice*, *15*(2483991880450). doi:10.1177/1524839918804506
- Waugh, C. E., Shing, E. Z., & Furr, R. M. (2020). Not all disengagement coping strategies are created equal: positive distraction, but not avoidance, can be an adaptive coping strategy for chronic life stressors. *Anxiety, Stress, & Coping*. Anxiety, Stress, & Coping. <http://doi.org/10.1080/10615806.2020.1755820>
- Watercutter, A. (2020). Doomscrolling Is Slowly Eroding Your Mental Health. Retrieved November 15, 2020, from <https://www.wired.com/story/stop-doomscrolling/>
- White, C. A., Uttl, B., & Holder, M. D. (2019). Meta-analyses of positive psychology interventions: The effects are much smaller than previously reported. *PloS one*, *14*(5), e0216588.
- Wiese, L., Pohlmeier, A. E., & Hekkert, P. (2020). Design for Sustained Wellbeing through Positive Activities—A Multi-Stage Framework. *Multimodal Technologies and Interaction*, *4*(4), 71. MDPI AG. Retrieved from <http://dx.doi.org/10.3390/mti4040071>
- Wilson, D. M., & Cash, T. F. (2000). Who reads self-help books? *Personality and Individual Differences*, *29*(1), 119–129. [https://doi.org/10.1016/s0191-8869\(99\)00182-8](https://doi.org/10.1016/s0191-8869(99)00182-8)
- Wood, J. V., Heimpel, S. A., & Michela, J. L. (2003). Savoring Versus Dampening: Self-Esteem Differences in Regulating Positive Affect. *Journal of Personality and Social Psychology*, *85*(3), 566–580. <https://doi.org/10.1037/0022-3514.85.3.566>
- Yoon, J., Desmet, P.M.A., & van der Helm, A. (2012). Design for interest: Exploratory study on a distinct positive emotion in human-product interaction. *International Journal of Design*, *6*(2), 67-80.
- Yoon, J., Li, S., & Yu, H. (2020). Design-mediated positive emotion regulation: The development of an interactive device that supports daily practice of positive mental time traveling, *Computers in Human Behavior*. (Under review)
- Zimmerman, J., Forlizzi, J., & Evenson, S. (2007). Research through design as a method for interaction design research in HCI. *CHI 2007 Proceedings*.

<http://doi.org/10.1145/1240624.1240>