

RHYTHMS OF ENGAGEMENT IN PROJECTS: HEALTH IMPACTS
AND CREATIVE OUTCOMES

by

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We frequently talk about trying to find balance in our work and in our lives. What if balance shouldn't be the goal though, and we instead function in rhythms? Anecdotal evidence suggests that many creative professionals engage with their work inconsistently. Research into the work-life interface has long focused on work-life balance and potentially overlooked the valuable perspectives rhythms have to offer. I posit that rhythms play an important role in describing the creative process in individual projects. Through a longitudinal study of student engagement and creative behaviors in a project at the University of Oregon, I examine the impact of rhythms on creativity and health outcomes. The results will help advance our understanding of the work-life interface.

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Chapter 1: Introduction

I don't know anybody who accomplishes anything worthwhile in steady equilibrium. And it seems to me that what we're striving for is more like rhythm, where there's a repeating pattern of different beats. Some might be job or family or friends or health or hobbies. That might vary in their duration and in their accent. (Adam Grant, 2021)

People are constantly trying to have a perfect work-life balance, but what if balance isn't the key to productivity and well-being? What if instead of balance, people operate best when having the autonomy to operate in patterns that suit their lives? Anecdotal evidence from researchers and creatives suggests that the best products and ideas are the result of freedom to work in a way befitting of that person (Aggeler, 2024; Grant, 2021).

While no formal attempts have been made at conceptualizing these rhythms within the work-life interface, the literature has long hinted these rhythms may exist. Jett and George (2003) wrote “In developing new ideas, organizational members need to have the autonomy to work in accordance with their own personal rhythms and the pace of their tasks, rather than conform to standards of persistent effort and steady progress”. This suggests that the rhythms are more likely to exist in environments where people work in creative roles. The idea that people need independence to determine how and when they work suggests that their level of engagement plays a key role in finding this rhythm. Engagement involves the application of cognitive, physical, and emotional resources to a role (Kahn, 1990), and on certain days they may lack the requisite resources. Research on the relationship between feeling recovered and the level of flow that an employee experiences on that day (Debus et al., 2014) helps support the notion that the resources needed to engage in work aren't constant. While their study focuses on

daily patterns, it hints at a broader concept: how actions on one day influence the next, potentially forming a larger pattern that extends across weeks.

Related studies in engagement literature reinforce the notion that creativity may be a major component in creating any sort of rhythm. Variable job engagement, or uneven job engagement across multiple weeks has been found to be negatively correlated with performance at work (Tewfik et al., 2024). Importantly, variable engagement in the Tewfik et al. study was measured using a sample of cadets in the ROTC. This may mean that those results won't be as translatable to people working in occupations requiring less consistency and structure. Engagement at the task level has also been studied and determined to ebb and flow throughout the day as residue from one task disturbs engagement in the next (Newton et al., 2020a). This finding gives some precedence for longer rhythms by showing how engagement can fluctuate within a day. If focused on a single task or project, it may be that engagement fluctuates across weeks as resources aren't consistent.

While these studies highlight how engagement fluctuates both daily and across weeks, there is a gap in understanding the broader implications of these fluctuations. To date, research on the relationship between engagement and job performance is missing valuable information on the impact of that engagement on the various health outcomes of employees. Without identifying the effects of consistency on health outcomes, it's difficult to understand the greater effects these variables have on long term sustainability. We'll be borrowing from the human sustainability literature by using restricted employee sustainability theory (REST) as the basis for our study. REST is a sustainability theory that builds on existing resource models to describe how employees allocate resources across three life functions (Maintenance, Growth, and Generativity). It further describes how sustainable certain allocations are when paired with

entropic forces (acute and chronic) (Barnes et al., 2023). Using this model as the framework for our study ensures that our findings on rhythms in engagement and creative behaviors can inform future research on employees' long-term well-being and health.

To investigate whether rhythms in engagement and creative behaviors exist, we will be having students in marketing at the University of Oregon take a survey every Thursday for six weeks. The survey will have questions regarding a project that each student is individually working on independent from this study. Applying the REST framework means we'll be asking questions about their engagement and creative behaviors as well as outcomes to each of the three functions outlined by the sustainability model and important creativity. Additionally, there will be questions relating to variables that are thought to be likely mediators in the relationship between engagement/creative behaviors and creativity.

Chapter 2: Literature Review

Theoretical Basis

Work-Life Interface

The work-life interface is among the most extensively studied areas in management and organizational behavior, with significant publications in recent years. However, literature reviews have expressed that the associated work-life interface theorizing has lagged. Despite an “explosion” of research in the past quarter century, the theoretical basis largely remains in literature from the 20th century (Powell et al., 2019). The reason for the increase of literature has been identified as a combination of changes in the nature of gender roles, careers, family, and work. A combination of the changing work nature and lack of recent theorizing (Powell et al., 2019) implies a theoretical gap.

Work-life research found its theoretical beginning over forty years ago as an examination of the impact that the work domain and the family domain have on each other. Work-family conflict (WFC) or family-work conflict (FWC) described how each domain may disturb participation in the other. Meanwhile, a variable called work-family enrichment (WFE) or family-work enrichment (FWE) explains how each domain may positively impact the other (Greenhaus & Powell, 2003; Wayne et al., 2022). To date these domains and the relationship between them have largely been explained using a few theories (role theory, conservation of resources, etc.) that aren’t great at explaining the changing work environment (Powell et al., 2019). Despite the breadth of work-life interface literature and need for better theories, the role of rhythms has been largely neglected with few exceptions (Lingard et al., 2010). This is

unfortunate because rhythms may help better explain the phenomena researchers are encountering.

Understanding the work-life interface isn't necessarily easy as there are prohibitively many similar terms. This issue has been recognized by work-life interface researchers and termed the jingle-jangle fallacy (Casper et al., 2018). Jingle refers to the multiple definitions of balance across papers (many definitions, same term). This may lead someone to believe they understand what the author of a paper on balance is discussing simply because they are familiar with the concept, even though the author may be using a different definition. Conversely, a jangle fallacy refers to two conceptually identical things that have unique names (same definition, many terms), this may cause someone to believe that they're different concepts (Casper et al., 2018). Jingle-Jangle fallacies cause the literature to be more convoluted and as result stifle research progress.

REST

Restricted employee sustainability theory (REST) is a framework developed by Barnes et al. (2023) to integrate employee maintenance, growth, and generativity outcomes. Drawing from the life-science framework dynamic energy budget theory (DEB), REST adapts biological sustainability into employee sustainability. Whereas DEB provides a basis for how organisms manage their resources to survive, it doesn't have the nuance to explain the variety of circumstances a human may experience. REST explains how humans can manage resources within growth and generativity functions while also caring for their psychological, physical, and social health (maintenance). Furthermore, REST describes how this balance between growth, maintenance, and generativity exists in a framework where depending on the resource division

between the three functions humans are either surviving, thriving, or in the process of a crash/recovery (See Fig.1).

This model provides a roadmap for designing future studies interested in employee sustainability. Maintenance refers to measures associated with physical, social and psychological health. Growth refers to applying resources to develop oneself (could be socially, emotional, or physically). Generativity means dedicating resources to development beyond oneself, generally this is toward the development of another.

Maintenance, growth, and generativity functions may also be synergistic, applying resources to one area may lead to long term sustainability results in another. Depending on the allocation of resources towards each of the three functions, people are either surviving or thriving. Surviving means that certain areas can be deferred in the short term in favor of one of the other two functions, for example not sleeping enough to get your thesis finished on time (deferring maintenance for growth). Thriving is when adequate resources are distributed to all three functions and those functions can support each other (ex. preventative maintenance allows you to be less stressed which allows you to more readily take on a mentee). If certain areas are deferred too long though, someone may leave the boundary of surviving/thriving and crash. Such an event is generally catastrophic and requires substantial investment of resources to recover from (Barnes et al., 2023).

Restricted Employee Sustainability Theory

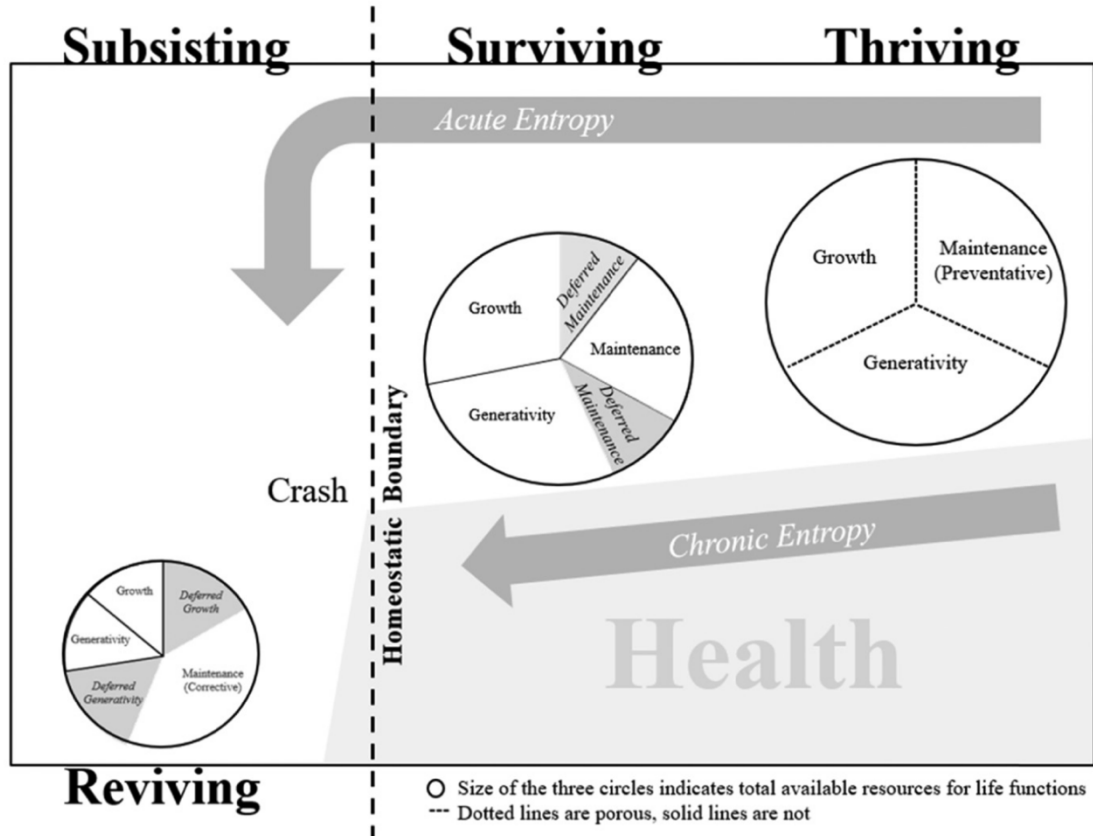


Figure 1. Restricted Employee Sustainability Theory (REST) Model

This is a diagram of the REST model described in the section above. Reprinted from “Human Sustainability and Work: A Meta-Synthesis and New Theoretical Framework”, by Barnes et al. 2023, Journal of Management, Volume 49, Issue 6, pg. 1967. Permission from David Wagner.

Predictors

This section will describe the independent variables used within this study and include a brief review of related literature. The goal of this study is to understand how fluctuations in these variables impact the outcomes we’re testing for over the course of a project. The two independent variables in this study are engagement and creative behaviors.

Creative Behaviors

Creativity is the generation of an idea that is both novel and useful, often this is the solution to a problem. The process which someone uses to get to that idea is often unclear before the person begins to address an issue (S. Harrison & Rouse, 2015). The somewhat ambiguous nature of creativity when compared to some other variables creates more complexity in measuring it. For the purposes of this study, it's important to note that creativity relates to both an outcome as well as an independent variable (behavior).

Creativity has long been a major topic of discussion in management literature with many variations due to its intangible nature. Early researchers discussed it in terms of a personality, amounting creativity to a trait that some possessed while others did not (Barron, 1955). Since then, the area of research has been broadened to delineate between creative outcomes and its antecedent behaviors (Drazin et al., 1999). The relationship between the two has been considered on the individual, group, and organizational level. Drawing from interactional psychology, researchers theorized that certain behaviors at each level impacted the resulting creative outcomes (Woodman et al., 1993a). This has subsequently spurred research into how creative behaviors fit into management models (Hurst et al., 1989) and how context moderates the impact of creative behaviors on performance (Hora et al., 2022).

Focusing on the individual level, researchers conceptualized creative behaviors based on individual's engagement in three processes: problem identification, information searching, and idea generation (T. M. Amabile, 1983; Zhang & Bartol, 2010). Then in 2016 those concepts were later operationalized alongside a fourth process: idea validation (S. H. Harrison & Wagner, 2016). Problem identification refers to the resources someone spent considering a problem before engaging in solving it. There is considerable difference in a well-defined problem as

opposed to an ill-defined problem, so it's important to consider this as the first step in the creative process. Information searching and encoding then describes behaviors related to preparing to solve a problem either presently or in the future. This is generally an internal and external process where cues in one domain guides the other (ex. something about the problem reminds you of a similar challenge you encountered previously), the more diverse and inconsistent the streams are, the more likely they are to lead to a creative outcome. Internal searching involves one's memories whereas external searching may involve searching the internet or some other repository of knowledge. Idea generation are all the behaviors then associated with trying to find the best solution to a problem. This involves applying the knowledge gathered in the information search and applying it to the problem identified earlier, this process can take many forms and researchers aren't entirely agreed on the best method (Reiter-Palmon & Illies, 2004). Idea validation finally involves consulting others about your solution to gather insights you may not have considered (S. H. Harrison & Wagner, 2016). This process of working towards a creative output isn't necessarily linear and any these behaviors can happen multiple times and in varying orders.

Engagement

Engagement is the allocation of one's cognitive, emotional, and physical resources towards a role (Kahn, 1990). This can be further divided into the high order concept of work engagement which stems directly from Kahn's seminal work as well as the lower-level task engagement. Based as a motivational theory, work engagement is defined as a combination of self-investment into one's role and their performance of work tasks (Christian et al., 2011). Work engagement has been the focus of most of the research into engagement because of its

association with personal work task performance and the achievement of organizational goals (Rich et al., 2010).

Work engagement may not tell the full story though when applied to a single task or project. As has been identified in multiple studies, there are variables that are impactful but aren't necessarily captured by work engagement like the time of day (Vogel et al., 2022) and the amount of disruptions (Jett & George, 2003). Therefore, it's important to consider task engagement which Newton et al. defines as "the degree to which individuals invest their physical, cognitive, and emotional energies into a specific task that composes part of their work role" (Newton et al., 2020a). To understand how work engagement and task engagement may differ it may be useful to give an example of a worker with a specific work project in mind. If that person spends little time in a given week on that specific project but is fully engaged in all their other responsibilities their work engagement would be high but their task engagement would be low. The distinction may be impactful when considering increasingly large and creative projects where each measure may be reporting different results.

While job engagement is positively associated with job performance (Rich et al., 2010), variability within that engagement has a negative relationship with job performance. This is to say that two identical people with the same level of job engagement will perform differently based on whether they were consistent in their engagement or if it fluctuated (Tewfik et al., 2024). This finding is rooted in habit theory which suggests that consistency can help people utilize their resources most effectively and ultimately be more productive (Volpp & Loewenstein, 2020; Wood & R nger, 2016). It is worth noting that little research has been conducted to understand if these findings continue to be true for jobs and projects in creative

fields. The Tewfik et al. study as well as the Rich et al. studies both use populations that may not require as much creativity as other fields (military and firefighters respectively).

Mechanisms

Mechanisms are the how or why a certain predictor determines an outcome. They will enhance the theory supporting the results by explaining the underlying reasoning a predictor leads to a certain outcome. In this study the potential mechanisms discussed are flow state, vitality, and recovery experiences.

Flow State

Flow describes an experience common in creative fields where someone is fully immersed in the task at hand. A person in flow can feel in control while simultaneously challenged. This was originally developed to be primarily physical and psychological but later was revised to include an emotional component (Csikszentmihalyi, 1999). Csikszentmihalyi, the developer of flow described it as such after reading transcripts from professionals in a variety of fields including poets and composers:

The concept describes a particular kind of experience that is so engrossing and enjoyable that it becomes autotelic, that is, worth doing for its own sake even though it may have no consequence outside itself. Creative activities, music, sports, games, and religious rituals are typical sources for this kind of experience. Autotelic persons are those who have such flow experiences relatively often, regardless of what they are doing. (Csikszentmihalyi, 1999)

Flow is thought of as a semi-meditative experience in which external stimuli are suppressed because of the attention that the task demands. Flow has been found to correlate with positive performance outcomes (Engeser & Rheinberg, 2008; Quinn, 2005). This finding makes sense with the definition given by Csikszentmihalyi: the more someone is engrossed in a task, the higher the likelihood they will perform well.

Flow has been expanded since Csikszentmihalyi's conceptualization in ways that make it more applicable to our study and further describe how it may moderate the relationship between our independent and dependent variables. Recent research has sought to clarify how flow and engagement while related, are separate concepts. Tewfik et al. defines the difference as "engagement reflects holistic mobilization of one's cognitive, emotional, and physical efforts, flow reflects a state defined by a perception of almost effortless, automatic action" (Tewfik et al., 2024). Furthermore, Debus et al. found that how recovered someone was before a workday impacted the amount of flow that person would experience that day (Debus et al., 2014). This means that people who are feeling recovered before they begin to work will be more likely to be in flow during that day than someone starting their day fatigued.

Energy

Energy has been present in management for decades as a resource that helps employees achieve organizational goals. Although it's been deemed important to managers and scholars alike, energy is a slightly ambiguous term that's been used to describe a variety of different measures (Quinn et al., 2012). It's been conceptualized as anything from blood-glucose level (Gailliot & Baumeister, 2007), over vigor (Carmeli et al., 2009), to vitality (Liu et al., 2021). While all important in helping an employee achieve their goals, the different definitions of what constitutes energy makes research on the topic difficult to connect.

While blood-glucose and vigor have a variety of applications in energy literature, vitality is the mechanism to explore within this study. Vitality is described the feeling of being full of psychological and physical energy. This concept is described as regenerative or restorative, which other positive feelings like happiness may not necessarily include (Nix et al., 1999). Importantly, vitality has been linked with positive outcomes both in psychological well-being as

well as physical health (Ryan & Frederick, 1997). This suggests that vitality may act as a good mediator for studies tying other variables related to energy with health outcomes.

Recovery Experiences

Recovery is the process of reversing the impact of strain from work activities (Sonnentag & Fritz, 2007; Westman & Eden, 1997). This process has a strong affective component, as the recovery experience needs to adequately transfer someone from their negative state leaving work to a positive state before returning to work the next day. Recovering will be easier if the person has to take a “shorter trip” to get there, this means if you have an intensely negative state leaving work (angry, nervous, etc.), it will be easier to feel recovered if your recovery experience matches that intensity while being positively valenced (exciting, happy, etc.) (Young et al., 2024). Imagining this on a circumplex with valence as the X axis and Intensity on the Y, recovery experiences that cause someone to move horizontally are more effective in making someone feel recovered the next day than moving diagonally (recovery always moves from the left (negative) to the right (positive)) (Russell, 1980; Young et al., 2024).

As such it becomes important to differentiate between recovery experiences and recovery activities. Recovery activities are the things people do outside of work. Whether it be leisure activities or chores, the activities are categorized by their affective attributes. Recovery experiences are the psychological experiences that exist throughout the process of recovering and can happen simultaneously with each other (Bennett et al., 2016; Sonnentag et al., 2017).

There are four different ways of categorizing a recovery experience: psychological detachment, relaxation, mastery, and control (Sonnentag & Fritz, 2007). Psychological detachment refers to the experience of forgetting about your work during non-work time, this means both physically and psychologically leaving work. Relaxation means that one has low

activation and generally happens during low intensity leisurely activities. Mastery experiences resemble challenges outside of work, these require one to engage in situations that make you feel like you are improving in some facet of your non-work life. Finally, control is the psychological experience of feeling you can choose how to spend your time outside of work (Sonnentag et al., 2017; Sonnentag & Fritz, 2007).

A strong relationship between recovery and engagement already exists, which reinforces its uses as a mediator. In previous studies, recovery was found to be positively correlated with engagement and was also found to be positively correlated with proactive behaviors such as personal initiative and pursuit of learning (Sonnentag, 2003; ten Brummelhuis & Bakker, 2012). In one of these articles, Sonnentag (2003) helps set the stage for future work in engagement, she writes “In other words, work engagement does not differ only between individuals (trait aspect) but also shows within-person variation over time”. Since they’ve already established the relationship between recovery and engagement, it makes sense to use recovery in future articles as mediator.

Outcomes

The dependent variables or outcomes in this study are determined based on the three functions (maintenance, growth, and generativity) of REST as outlined in the theoretical foundation section at the beginning. The maintenance refers to health which is captured in social, physical, and psychological well-being metrics. This means we’ll test somatic complaints (physical), life satisfaction (psychological), and relationship satisfaction (social) as measures of maintenance. Additionally, we’ll measure resilience (growth), helping behavior (generativity), self-esteem, and creative outcomes (performance).

Creative Outcomes

As students at Lundquist we're taught about the value that creativity can have in setting one company apart from another. Innovative strategy instead of operational effectiveness is frequently reinforced throughout our college careers even through our capstone course. The value of innovation as taught in classrooms mirrors similar conversations happening in the industry and in scholarly literature (Porter, 1996). Innovation is generally seen as the successful implementation of a creative idea (George, 2007). Because of the role creativity plays in innovation, it makes sense to study it as well as its antecedents (Woodman et al., 1993b).

Creative outcomes are described by two metrics: how useful and how novel is an idea (T. Amabile, 1988)? This means that an idea that is new must also be practical, novelty alone doesn't constitute creativity. Similarly, solving a problem with a useful solution also isn't creative unless it's approached from a way that hasn't been done before. Creativity can be widely varied in its scope; this means it can be anything from a groundbreaking new product to a more efficient process and beyond. A creative outcome also isn't limited in its impact, it can also be supremely impactful to the overall goals of an organization, or it can be a small solution to an everyday problem within the company. Creativity is the result of a variety of factors, such as intrinsic personality traits, but importantly to this study creativity correlates with creative behaviors (Woodman et al., 1993b).

Physical Health – Somatic Complaints

People frequently defer their physical health when resources are needed for other functions in the short-term (Barnes et al., 2023). This is something we do automatically, for example sleeping less or eating poorly when working hard on a large project. However, it's

important to study physical health due to the unsustainable nature of deferring maintenance and the potential for irreversible long-term impacts.

Physical health has been operationalized in multiple different ways in management literature. Either one can measure it objectively (through testing of vitals) or they can measure it subjectively (through the participants perception of their health) (Judge et al., 2010). If measuring someone's health objectively, this can require a field study where you gather information as they work (Ilies et al., 2010). Objective measurements of health can be values like heart rate, blood pressure, or body mass index (French & Allen, 2020; Ilies et al., 2010; Robbins et al., 2012). Subjective measurements of health are generally questions in a survey based around how someone is feeling relative to what's normal for them (Judge et al., 2010).

Since physical health can't be tested in a survey the same way it might be in the lab or in the field, a different solution needs to be utilized to gather that information. A 14-question survey was developed to help assess the severity of symptoms relating to fatigue in people. While not as accurate as lab tests, this alternative provides valuable information. Through this survey it's been possible to include physical health assessments as a variable in a variety of distanced studies. Despite its brevity, this survey has proven to be "reliable and valid" (Chalder et al., 1993).

Psychological Health – Life Satisfaction

Psychological health (mental health) is very commonly studied in management because of how interwoven it is with work (Rosado-Solomon et al., 2023). Many personal work outcomes as well as larger organizational outcomes are dependent on the psychological well-being of the focal worker. Psychological distress can directly impact the performance of a worker (Lim & Tai, 2014). Because of the impact poor mental health can have on someone and

the firm at large, the literature on psychological health and related measures is extensive (Ilies et al., 2010; Robbins et al., 2012). Despite the breadth of possible measures related with psychological health, it's useful when trying to be all encompassing to use a measure like life satisfaction.

Life satisfaction has been conceptualized as a “conscious cognitive judgement of one’s life” (Pavot & Diener, 1993). The life satisfaction scale benefits from its simplicity, although many measures are relevant to how someone may judge their life, they aren’t assigned a predetermined weight. This is rooted in the subjective well-being field (SWB), which also concerns itself with domain specific judgements (Diener et al., 1999). Since life-satisfaction doesn’t have any domain specific questions though, it gives a good overview of psychological health. Someone who is experiencing financial hardship but really enjoys their work may judge their life positively. Meanwhile, someone who dislikes their work but earns enough money to pursue their hobbies may also view their life positively. In this case both people have generally similar levels of life satisfaction despite living very different lives. Since questions weren’t domain specific and the people were allowed to give their own weight to different factors in their life, the results give an accurate depiction of their psychological health.

Social Health – Relationship Satisfaction

REST defines maintenance as activities that help counteract entropic forces, this can include socializing (Barnes et al., 2023). Since humans are social beings, it would make sense to test their social health as part of their overall health. The literature has been well aware of this since the role of relationships on work outcomes has been well documented (Gerbaso et al., 2015). Relationships is a pretty broad definition, it can be those at work with your colleagues and managers, or it could be those in your personal life, like acquaintances and friends, or it could

specifically be your life partner at home (Gerbasi et al., 2015; Ilies et al., 2010; Venkataramani et al., 2013).

Relationship satisfaction in terms of the measurements used in this study refers to close personal relationships. Originally thought of as a measure of satisfaction within a marriage (Norton, 1983), it's since been used more broadly to judge someone's satisfaction with their relationship with their partner at home (Ilies et al., 2010). It has also been found to correlate with emotional exhaustion from the focal employees workload (Pluut et al., 2018). This may serve as a valuable comparison for a study on rhythms within engagement which is not entirely dissimilar.

Furthermore, relationship satisfaction can help further develop the role of rhythms in work-life interface literature. The role of work-family conflict (WFC) and work-family enrichment (WFE) within the work-life interface is present in the literature (Ilies et al., 2010). Gathering data relating to relationship satisfaction alongside data on engagement rhythms may help further our understanding of the role rhythms within the work-life interface.

Growth – Resilience

Resilience is defined as the ability to encounter some sort of adversity, face it, recover from it, and grow from the experience (Stephens et al., 2013). Resilience has been conceptualized as a trait, a process, and a capacity (Kossek & Perrigino, 2016). Resilience can also exist at the individual level, the group level, or at the organizational level (Stephens et al., 2013; Stoverink et al., 2020; Williams et al., 2017). These many conceptualizations show the broad nature of resilience and why it's such a popular topic in management literature.

Even though it can be thought of on so many levels and in so many ways, for the purposes of this study it makes sense to consider it an individual capacity. The Stephens et al.

(2013) definition reflects on the growth nature of resilience, that each time you are forced to encounter an obstacle and overcome it, you will be more prepared for the next one. This understanding of how we grow from resilience is also what sets it apart from coping, which likely won't have any long lasting positive effects, and recovery which is just concerned with returning to one's baseline (Stephens et al., 2013).

Generativity – Helping Behavior

Workplaces and work-teams often need that some people go above and beyond what may be required of them. These extra behaviors that may not be tangible additions that people invest in their roles and groups has been termed helping behavior and has been the subject of many recent studies (Gonzalez-Mulé et al., 2014). These behaviors generally happen within social settings and are to the benefit of their colleagues or group members. Helping behaviors can be measured through organizational citizenship behavior.

Organizational citizenship behaviors (OCB) are when someone voluntarily helps others without the expectation that they will be rewarded for their actions (Bies, 1989). This is different that organizational commitment behavior which describes one's association with their organization (Chun et al., 2013). Organizational citizenship behavior can be further divided into categories: altruism, conscientiousness, sportsmanship, courtesy, and civic virtue (Podsakoff et al., 1990). Altruism behaviors are when someone chooses to go above and beyond in any way to impact the organization. Conscientiousness behaviors are related to going beyond role requirements in relation to the organization. Sportsmanship behaviors relate to tolerating sub-par conditions without complaining. Courtesy relates to behaviors beyond employee role requirements that are preventative towards potential future organization problems. Finally, civic

virtue behaviors are behaviors that suggest someone is concerned about the long-term well-being of the company.

Self-Esteem

Self-Esteem has been the subject of substantial debate, with conflicting arguments about its role and conceptualization (Ferris et al., 2010). While there are arguments to be made about whether it shifts around a baseline, is subject to recent experiences, or fluctuates frequently, there isn't one clear answer to how it should be treated. State self-esteem is scale created to measure self-esteem in the moment (Heatherton & Polivy, 1991). The goal is to separate the impacts of current self-esteem on other variables from the effects of mood.

Self-Esteem has been used as a control in similar studies to the one we're conducting on engagement rhythms (Tewfik et al., 2024). The argument for controlling for self-esteem comes from research on how people at various levels of self-esteem self-report aspects of their life (usually regarding their performance). Research on job performance has found that people with low self-esteem under-report their accomplishments and people with high self-esteem over-report their accomplishments when they had accomplished the same (Farh & Dobbins, 1989).

Chapter 3: Thesis Design

Theory and Hypothesis Development

As has been alluded to throughout the literature review and outlined in the introduction, my study aims to explore the role of rhythms in the work-life interface. As I proceed in developing a theory of rhythms as an alternative to balance, it's important I make sure that what I describe as a rhythm isn't just another instance of the jangle fallacy. This is to say that I don't want to add to the confusion present around processes in the work-life interface but instead need to be clear that what I'm presenting is a new concept.

Based on anecdotal evidence it seems likely that engagement (the allocation of cognitive, emotional, and physical resources) is likely the variable that will behave in rhythms. As a result, my model treats rhythms of engagement as the predictor of the various outcomes I'm testing for. To try isolating engagement in a creative setting, I'm specifically looking at engagement in a singular project over the course of weeks. This is to parse apart the rhythmic task engagement that I'm theorizing exists in creative endeavors from the potentially more constant role engagement.

Outcomes are then categorized in two ways, those associated with the project and those associated with human sustainability. Since I'm looking at engagement in creative behaviors in a project, it is important to then see whether rhythmic engagement then leads to greater creative outcomes. Additionally, it's important to support the claim that autonomy in determining when/how you work is more sustainable. To test for this, we measure various outcomes drawn from the functions outlined in the REST theory (growth, generativity, maintenance). Most importantly this is looking at the impacts of rhythmic engagement on health outcomes.

To help explain the process of why rhythmic engagement exists and why it leads to various outcomes, I use energy as the mediating variable. This mechanism is intuitive since it's easy to understand how the amount of energy present on a certain day determines the amount of resources someone can allocate towards a project they're working on. If someone doesn't feel like they have the physical and cognitive energy on a given day they likely won't be able to engage with their project very much. To supplement this mechanism of energy, I'm also testing for a few other potential mediators like recovery behaviors and flow state. Recovery behaviors (behaviors associated with undoing one day's strain) and flow state (matching your ability with a challenge) may help further explain why engagement fluctuates when it does.

These variables, together with the support work-life interface literature has given for the existence of rhythm, develop the theory which is modeled in figure 2. Rhythm of engagement in a project leads to creative and health outcomes and is mediated by state recovery variables. My expectations for what will be found in the results will then be further clarified below in my hypotheses.

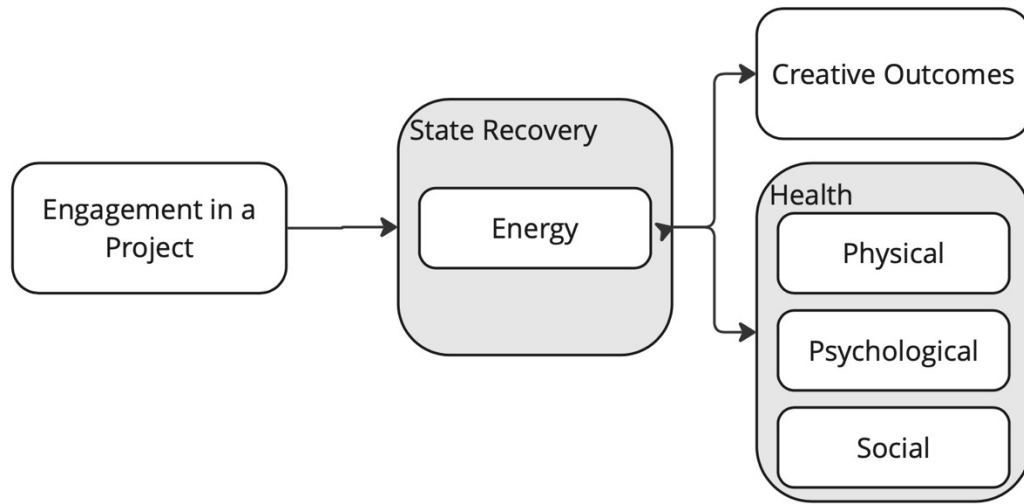


Figure 2. Theoretical Model Diagram

This is a simple depiction of the theoretical model explained in this section and that underlies the rhythms in engagement. Moving from left to right the image shows the independent variable, the mechanisms, and the dependent variables.

Hypothesis Development

Based on our understanding of each variable as explained in the literature review, the following are our hypotheses:

1. Engagement rhythm in a project will be positively related to creative outcomes.
2. Engagement rhythm will be positively related to health outcomes.
 - a. Rhythmic engagement will correlate with less somatic complaints.
 - b. Rhythmic engagement will correlate with greater life satisfaction.
 - c. Rhythmic engagement will correlate with greater relationship satisfaction.
3. State recovery variables will mediate the relationship between engagement in a project and creative outcomes.

4. State recovery variables will mediate the relationship between engagement in a project and health outcomes.
 - a. State recovery variables will mediate the relationship between engagement in a project and somatic complaints.
 - b. State recovery variables will mediate the relationship between engagement in a project and life satisfaction.
 - c. State recovery variables will mediate the relationship between engagement in a project and relationship satisfaction.

Methods

Study Design

The design of this study is to have participants respond to surveys once a week at ideally the same time over the course of six weeks (or more). Questions on the survey will come from the measures section below and will all relate to the same project a participant is working on. While literature does suggest there may be smaller rhythms that happen within each week or even within each day (Newton et al., 2020b), measuring week by week should help capture longer overarching rhythms. These longer rhythms that happen over the course of weeks instead of over the course of the same day may be important in determining the creative success of an employee and their associated long-term sustainability.

Participants should respond the survey at the same time each week. To ensure this, the survey is only open on Thursdays and participants are encouraged to try and complete the survey at the same time. This is meant to act as a control against any unexpected factors and keep consistency in terms of where one is during the work week when asked about their behaviors and well-being.

Measures

The questions in the survey have almost all been taken from previous studies and are proven to accurately measure that variable within our theory. All these questions can be found in figure 10 and can be matched with my theoretical model (Fig. 2) through the corresponding block title. Questions regarding engagement have been taken from Parke et al. (2018), which are based on Rich et al. (2010) with an additional two questions from Tewfik et al. (2024). Questions based on these studies were then altered to reflect the sample (students), and to be

specific to a project rather than a role. Creative behaviors questions were taken from Harrison & Wagner (2016), with the addition of asking about these behaviors in relation to the participant's project.

Recovery behavior questions have been adapted from Sonnentag & Fritz (2007) and Sonnentag & Krueger (2006) to reflect how participants feel that day/evening. Questions in this category are supposed to reflect recovery related to their project and that specific week. Vitality was measured through questions from (Ryan & Frederick, 1997). Flow questions came from Tewfik et al. (2024) in a study similar enough to ours that they didn't need altering.

Creative outcomes are measured using questions from Zhou & George (2001) and are altered from a work setting to a student setting. Physical health is measured through a fatigue scale (somatic checklist) developed by Chalder et al. (1993). Psychological health is tested through life satisfaction which is gathered using a scale created by Diener et al. (1985). Social health is measured using relationship satisfaction as is gathered by Ilies, Keeney, & Scott (2011). This updates Norton R, (1983), to use questions designed for a marriage to be used for relationships. Resilience (growth) is measured using questions from Stephens et al. (2013) and changed to reflect the previous week. Helping behavior (generativity) is measured using the organizational citizenship behavior scale developed by Podsakoff et al. (1990). It's been adapted for school roles and two questions: "Neglected aspects of the job I need to perform (R)" and "Fulfilled responsibilities specified in job description" were left out because of their irrelevance to the participants. Finally, self-esteem was measured using scale from Heatherton & Polivy (1991).

The opening survey had additional questions not related to any literature but still potentially relevant (Fig. 3, 4). Two questions at the end ask about participant demographics,

though questions such as age are likely not relevant since the participants are all undergraduate students. Questions were also asked about the nature of the project the student would work on throughout the term, which will be described more in the survey design section. Finally, a question at the end of the survey asked about the time participants plan to fill out the following surveys to hopefully help impact their behavior throughout the study.

Sona and IRB

Our study population of students is recruited by the Insights Research Lab (IRL) at the University of Oregon. Students in most marketing classes at the Lundquist business school are required to take part in marketing research as part of their class grade (generally 10% of grade value). This class requirement provides the incentive for students to take part in our study (they must complete 1 credit). Students sign up through the SONA system and are given a variety of options in terms of studies they can participate in. Most studies through SONA at the IRL take an hour or less and grant 0.5 credits. Our study grants students the full one credit, given they participate in all six weeks. 0.5 credit is granted after the first four weeks and the second 0.5 credit is given after the final two. The idea behind them being weighted differently is to further encourage complete participation. As far as researchers are concerned students are completely anonymous and don't require compensation from the research team for their participation. The IRL helps provide us with resources necessary to make sure that data is being collected correctly.

All studies that take place at the University of Oregon and involve human subjects are required to receive Institutional Review Board (IRB) approval. The IRB assesses the potential risk that your study poses to participants and whether that risk outweighs the benefits it can provide. Although, we don't have direct contact with our participants, we still needed to have our study approved before we could collect any data. Because of the low-risk nature of our questions

and that our sample comes from the IRL, our study was determined to be fit for exempt review. Due to the time sensitive nature of our study beginning early in the term our exempt application managed to be turned around and approved extremely quickly.

Survey Design

The survey (Fig. 10) was designed using Qualtrics, with questions drawn from the measures listed in the section above. As mentioned in the study design, students were asked to reflect on the same project throughout the course of the study to track how their engagement and behaviors fluctuated in relation to that task. It was crucial that students did not forget which project they initially identified, as this could lead to inconsistencies in their responses. This is legitimate concern since students were answering questions about their project weekly, which leaves substantial time to misremember between collection points. If there was any confusion or doubt about the project they had listed, they might unintentionally answer questions about a different project, class, or role in their lives.

To address this, the survey design included measures to ensure that participants consistently referred to the same project each week. Because this was a longitudinal study with anonymous participants, additional design considerations were necessary to connect responses over time and remind participants of the specific project they were working on. It was determined that the best way to track these projects would be to have two surveys instead of one. While nearly identical, the first survey would collect the necessary information to then keep all responses to the second survey consistent. The second survey would then have information from the first survey piped in so the responsibility wouldn't be placed on the participants to remember which project they'd answered about in week prior. This means one survey would be used in the

first week of the study (Fig. 3, 4), and then all the subsequent weeks would use the second survey (Fig. 10) which populates certain question with the answers from the first week.

The design choices regarding this two-survey system can be clearly understood in figures 3, 4, and 10. As can be seen in figure 3, there is a question asking students about a project they are currently working on as well as their SONA ID (which is a number generated by SONA to remain consistent throughout the study). Then the second study (Fig. 10) removes those questions as well as the demographic questions from the first survey (Fig. 3, 4). All other questions seen on figure 10 are identical to the first survey. The second survey (Fig. 10) has the new question “On the initial survey you described a project on which you would be working during this study. Here’s a reminder: “Embedded project data field”. In your own words, please describe your involvement with the project this week:”. This question then populates the reminder portion with their answer from week one’s question: “Please provide a few words or a brief title for the project you just described. We will use this to remind you about the project each week” (Fig. 3).

As part of the fast IRB approval, no identifiable information can be used to connect these two surveys, and the anonymous links are sent out through SONA. Thus, to connect the two and have the embedded data field (participant project) populate correctly, we had to use a different mechanism. This process involved a contact list in the directory, essentially making each SONA ID number and associated project name a contact feature. Data collected in the week one survey is downloaded as a csv file, cleaned, and then uploaded as a list of contacts. Then in the week two survey when the questions are changed, Qualtrics draws from this contact list to correctly populate the questionnaire. This is done using an authenticator placed at the top of the survey flow, simultaneously locking the questions until the right ID is typed and then loading the

associated questions. The authenticator is only connected to the contact list from the first week, this means no other SONA codes would work on this questionnaire.

Additional features exist in this questionnaire that aim to ensure consistency and accuracy in responses. Due to the fragile nature of this two-questionnaire system, responses in the first questionnaire or restricted to increase the likelihood a participant puts in the correct corresponding SONA code. An incorrect SONA code in the first week would mean that they wouldn't be able to progress in future weeks since the questionnaire draws from the contact list based on week one responses instead of a SONA databank.

Both questionnaires utilize a variety of question types to collect data from participants that help give accurate information both objective and subjective. Questions used in this survey (Fig. 10), ask questions primarily based off a 5- or 7-point Likert scale. However, there are some short text response questions and sliders that allow respondents more freedom in their responses.

Winter Term Analysis

Current research still lacks a high enough N to conclusively say anything about how rhythms impact creative outcomes and sustainability outcomes. Yet based on the data we collected in winter term we can already see if any interesting trends are emerging.

Cronbach alphas were determined for each variable in the data set. Engagement questions were found to have a Cronbach alpha of 0.92. Cronbach alphas for creative behaviors were problem identification - 0.89, information searching – 0.86, idea generation – 0.89, and idea validation – 0.90. In terms of meditators: flow questions – 0.98, vitality (with reverse coded questions flipped) – 0.90, and recovery behaviors = psychological detachment – 0.88, relaxation – 0.91, mastery – 0.91, and control 0.91. Outcomes had Cronbach alphas of life satisfaction - 0.90, relationship satisfaction – 0.94, resilience – 0.89, self-esteem -0.90 physical health – 0.90,

helping behavior – 0.88 and creativity – 0.94. Since all the variables had Cronbach alphas over 0.70 that means that the questions functioned as intended.

The Cronbach alphas as well as the means and standard deviations present within the collected data can all be found in figure 5. Figure 5 shows a correlation table of the different variables as well as metrics for the entire dataset. Figures 6-9 show regressions for engagement onto each outcome variable taken from the hypotheses section. Regressions are displayed in a table as well as graphically.

Future Analysis

While our initial group of participants aren't able to give us enough data yet to make any conclusive understandings of rhythms, we can look ahead and begin to think about the sort of analysis we'll use. Our analysis will likely borrow from trajectory research to explain the role of rhythms within the work-life interface. Trajectories in management research has become increasingly popular throughout the last two decades, but until recently was fairly disparate (Swider et al., 2024) .

Trajectories are helpful in longitudinal research because they can help quantify change by regressing multiple observations onto one or more variables (Swider et al., 2024). Analysis into trajectories in our own study may borrow from previous research into discontinuous trajectories, or prediction trajectories. Rhythms may require the combining of multiple trajectories into profiles. It may also be that we find multiple profiles of rhythm that require different trajectories to describe accurately. As we approach the analysis portion of our study it will be valuable to make sure we don't repeat similar mistakes in other research using trajectories to establish patterns of change. The important consideration here is framing our rhythms so that the rhythms don't grow indefinitely.

Future Iteration and limitations

Our first attempt at studying this relationship is nearing a close and while not fully successful, it has given us valuable information that will help shape the next iteration in spring 2025. Major issues that prevent us from using this data highlight what we need to focus on doing differently into the future. The two largest issues are: recruiting enough participants to be able to conduct an analysis and keeping participants throughout the entire course of the study.

While a power analysis is a little difficult to conduct since we aren't entirely sure what size effect we're looking for, similar studies can be used to guide us. A study by Tewfik et al. (2024) used 176 cadets across 10 weeks to research engagement variability. So, an N similar to that number would be ideal for our study. Because they used a population likely to respond weekly (ROTC cadets), they had great retention across ten weeks. From our experience with our first attempt at this study in winter term, retention among college students isn't nearly as good. Therefore, our N should be between 200-230 ideally to account for loss of participants.

A few things in winter term created obstacles to having that number of participants in winter term and will need to be addressed. First, we added our study to SONA later than desirable and missed out on a longer registration period. In the spring term our study will be open to registration immediately. Awareness is also likely a large factor in reaching our desired N, anecdotal evidence from students at Lundquist suggests that many don't consider their SONA credit requirement until late into the term. Additional efforts will be made (within the allowances of the IRB and SONA) to try driving higher registration in early weeks. This is incredibly important because of the multi-week longitudinal nature of the study; participants won't be able to register past week four. Efforts may include classroom visits at/before the start of class to

raise awareness for courses with a SONA requirement, this may also be the inclusion of a raffle or other incentive (beyond the credit they already receive) to help drive student's action.

The other major issue we encountered in our winter term study was participant retention throughout the six weeks. Our winter study began with 43 participants, and to date (4 weeks later) only 11 have completed each survey. Similar studies solved this problem with their study population by using highly consistent and dependable participants (military, civil servants). Since students are less likely to be comparably consistent, we need to make sure we provide as many safeguards against losing participants as possible. This means making sure that students have reminders to complete the survey each week as well as enough motivation to do so through incentives.

Another consideration for the next term is to change the amount of data points collected. While this term participants were rewarded with their first credit after the first four weeks and the second after two more, next term students will receive both at the completion of all 6 weeks. If it becomes feasible, changing the length of the study to eight or even nine weeks will help collect even more data relevant to determining the nature of rhythms.

The final consideration for the last term is altering the survey so that the first week responses will be captured in one Qualtrics form and all the subsequent weeks in another form. Currently every week requires a new survey to be created to gather data for that week. At the end of this term that will mean we will have six individual tables that we will have to combine and sort to conduct any sort of analysis on. This issue will have to be addressed with help from the people at the University of Oregon's Insights Research Lab (IRL).

Theoretical Implications and Conclusion

The theoretical implications of our study ideally will help further research into the work-life interface. Understanding whether rhythms in engagement/creative behaviors help further creative and health outcomes will hopefully help set a foundation for future research into this underdeveloped segment of management literature. This study is valuable step to understanding creative process involved in larger projects.

Appendix

A.

Q1

What is your Sona ID number

Q2

Starting with this survey, and each Thursday for six weeks, we want you to tell us about how and how much you have engaged in an important project during the prior 7 days. This can be a project for school or work, or some other important project on which you spend a significant amount of time. The important thing is that it is a sizable project that requires a substantial amount of time and effort to complete.

Once you have thought of such a project, continue with the survey.

Now describe the project below in a good amount of detail:

Q3

At the beginning of each Thursday's survey we will remind you about the project and ask you about how and how much you worked on the project during the week.

Please provide a few words or a brief title for the project you just described. We will use this to remind you about the project each week.

Figure 3. Survey 1 Questions

B.

Q34

Please report your gender:

Q35

Age

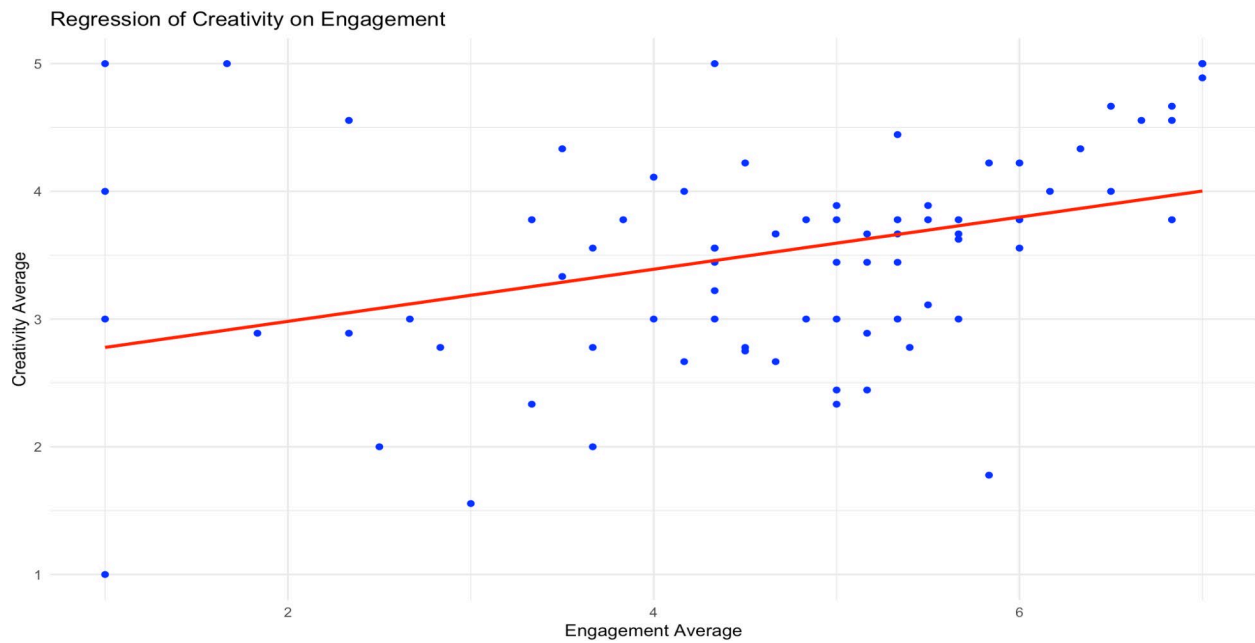
Figure 4. Demographic questions

C.

Variable	M	SD	a	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Engagement	4.66	1.52	0.92	1.00																	
2. Problem Identification	3.59	1.08	0.89	0.56	1.00																
3. Information Searching	3.68	1.01	0.86	0.59	0.49	1.00															
4. Idea Generation	3.44	0.94	0.89	0.50	0.70	0.63	1.00														
5. Idea Validation	3.54	1.07	0.90	0.64	0.51	0.47	0.47	1.00													
6. Flow	4.92	1.67	0.98	0.80	0.47	0.53	0.45	0.73	1.00												
7. Vitality	3.22	0.66	0.90	0.48	0.30	0.23	0.34	0.35	0.53	1.00											
8. Psychological Detachment	2.62	1.19	0.88	-0.37	-0.44	-0.50	-0.37	-0.25	-0.29	0.07	1.00										
9. Relaxation	3.41	1.09	0.91	0.16	-0.03	0.02	0.07	0.15	0.25	0.40	0.36	1.00									
10. Mastery	3.77	0.93	0.91	0.65	0.63	0.57	0.69	0.54	0.62	0.37	-0.28	0.19	1.00								
11. Control	3.98	0.87	0.91	0.53	0.42	0.45	0.40	0.36	0.46	0.35	-0.18	0.42	0.60	1.00							
12. Life Satisfaction	3.39	1.07	0.90	0.08	-0.03	0.00	0.15	-0.05	0.10	0.40	0.09	0.18	0.13	0.07	1.00						
13. Relationship Satisfaction	5.63	1.26	0.94	0.10	0.12	-0.02	0.16	-0.15	0.05	0.34	-0.06	0.14	0.17	0.25	0.64	1.00					
14. Resilience	5.81	0.87	0.89	0.06	0.09	0.17	0.32	-0.03	0.01	0.10	-0.27	-0.04	0.20	0.05	0.39	0.53	1.00				
15. Physical Health	2.40	0.63	0.90	-0.37	-0.28	-0.20	-0.20	-0.21	-0.45	-0.51	0.04	-0.25	-0.23	-0.29	-0.25	-0.23	0.10	1.00			
16. Creativity	3.52	0.87	0.93	0.36	0.28	0.38	0.35	0.27	0.34	-0.08	-0.22	-0.03	0.46	0.10	0.27	0.26	0.43	0.05	1.00		
17. Helping Behavior	4.79	1.33	0.88	0.46	0.22	0.36	0.25	0.28	0.35	0.13	-0.02	0.26	0.37	0.36	0.18	0.18	0.31	0.05	0.47	1.00	
18. Self-Esteem	2.78	0.73	0.91	-0.24	-0.15	-0.07	0.01	-0.07	-0.24	-0.40	0.21	-0.25	-0.01	-0.19	-0.08	-0.23	0.07	0.40	0.15	-0.03	1.00

Figure 5. Correlation Table

D.



=====	
Dependent variable:	

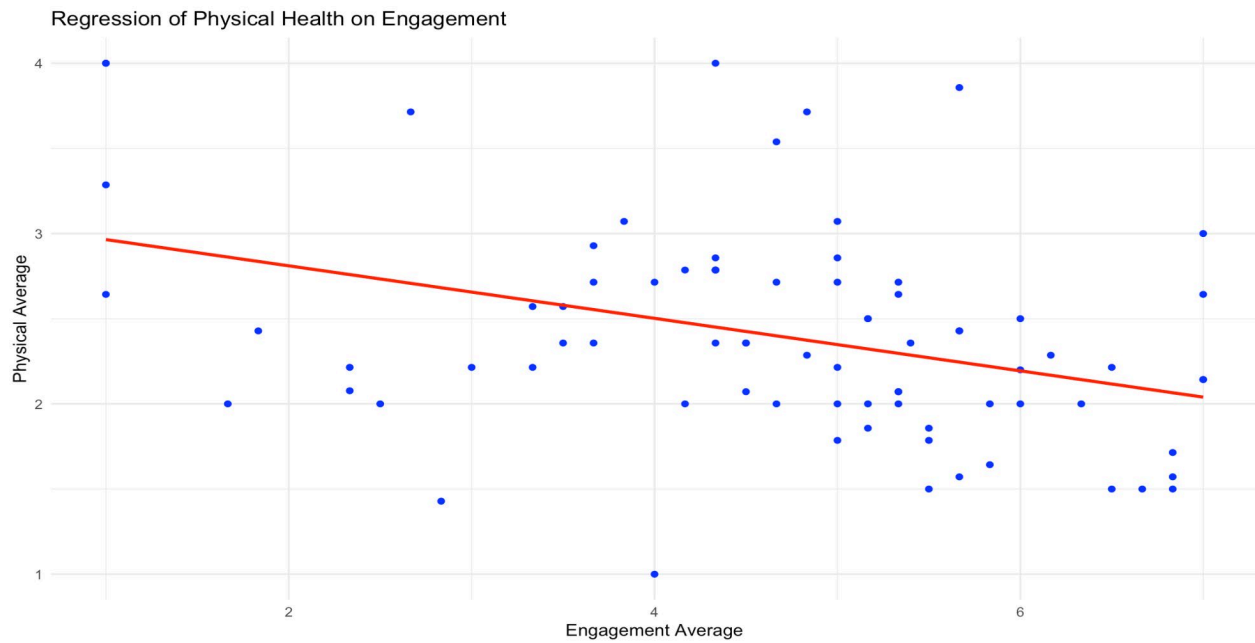
Creativity_Avg	

Engagement_Avg	0.355*** (0.064)
Constant	1.812*** (0.326)

Observations	60
R2	0.349
Adjusted R2	0.338
Residual Std. Error	0.659 (df = 58)
F Statistic	31.129*** (df = 1; 58)
=====	
Note:	*p<0.1; **p<0.05; ***p<0.01

Figure 6. Regression for Engagement on Creativity

E.



=====	
Dependent variable:	

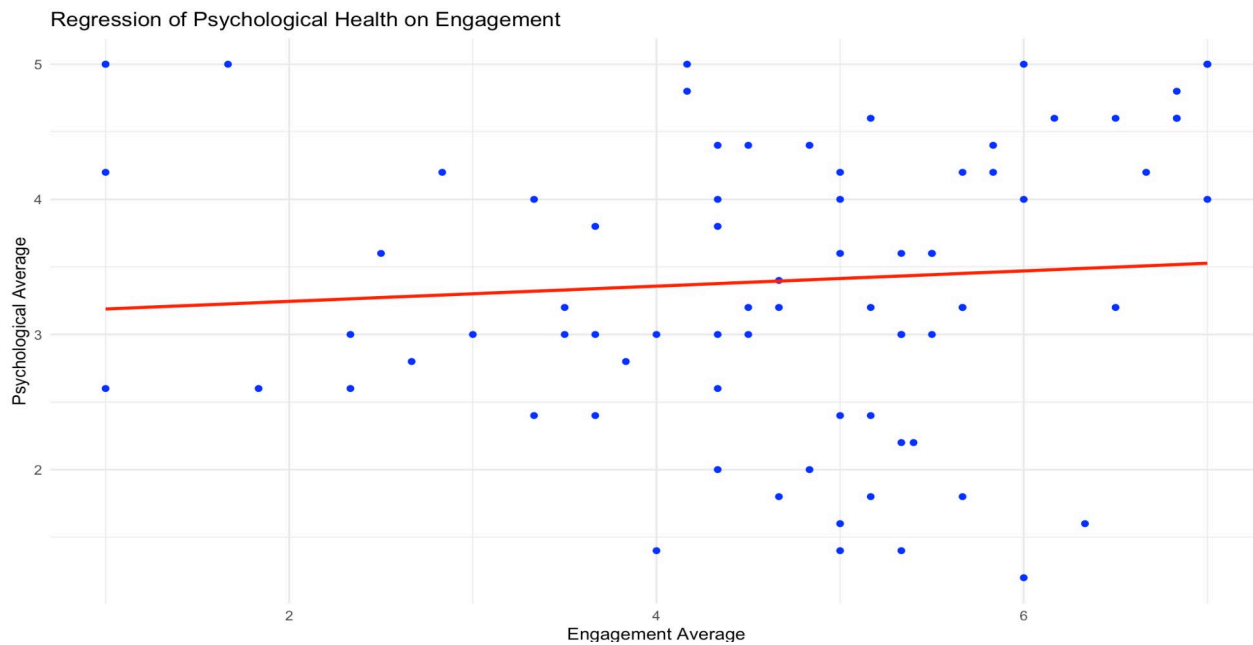
Physical_Avg	

Engagement_Avg	-0.157*** (0.051)
Constant	3.152*** (0.260)

Observations	60
R2	0.142
Adjusted R2	0.127
Residual Std. Error	0.527 (df = 58)
F Statistic	9.572*** (df = 1; 58)
=====	
Note:	*p<0.1; **p<0.05; ***p<0.01

Figure 7. Regression for Physical Health on Engagement

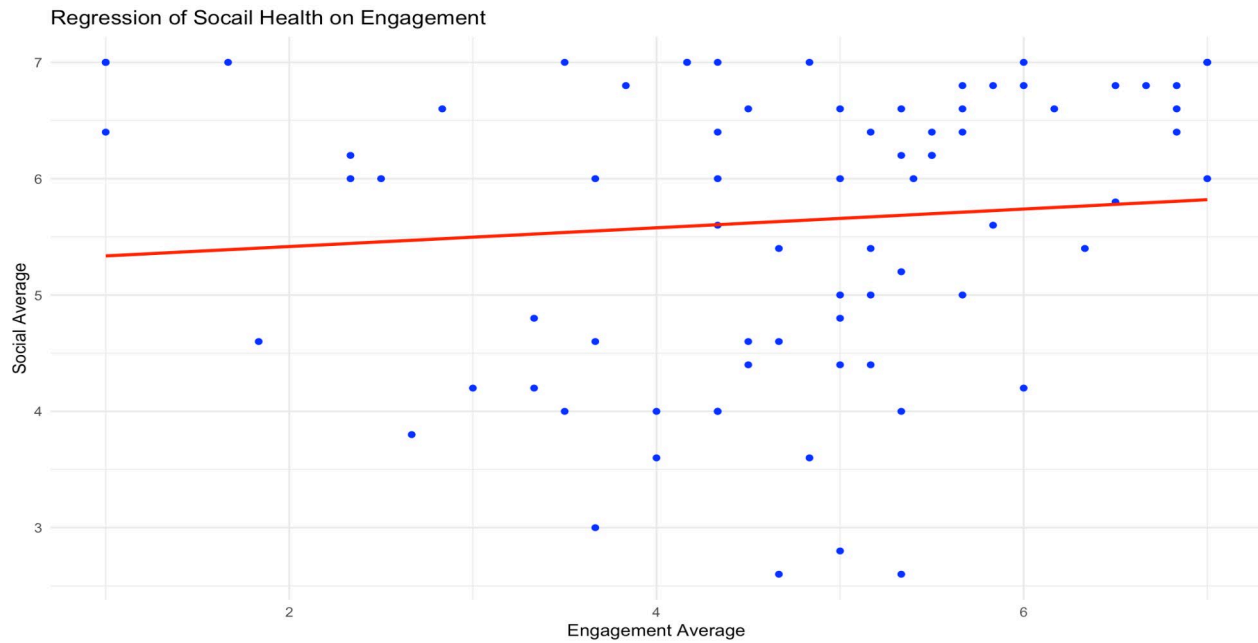
F.



Dependent variable:	
LifeSAT_Avg	
Engagement_Avg	0.204** (0.097)
Constant	2.400*** (0.497)
Observations	60
R2	0.071
Adjusted R2	0.055
Residual Std. Error	1.004 (df = 58)
F Statistic	4.432** (df = 1; 58)
Note: *p<0.1; **p<0.05; ***p<0.01	

Figure 8. Regression of Psychological Health on Engagement

G.



Dependent variable:	
RelationSAT_Avg	
Engagement_Avg	0.327*** (0.113)
Constant	4.025*** (0.580)
Observations	60
R2	0.126
Adjusted R2	0.111
Residual Std. Error	1.172 (df = 58)
F Statistic	8.371*** (df = 1; 58)
Note: *p<0.1; **p<0.05; ***p<0.01	

Figure 9. Regression for Social Health on Engagement

H.



What is your Sona ID?

SONA Code





On the initial survey you described a project on which you would be working during this study. Here's a reminder: test

In your own words, please describe your involvement with the project this week:

A large, empty rectangular box with a light gray background and a thin black border, intended for the user to type their response.



We will now ask you some questions about how you have felt while working on your project this week.

To what extent do you agree with the following statements about your engagement in your project this week:

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I felt energetic while working on my project this week	☐	☐	☐	☐	☐	☐	☐
I was excited about my project this week	☐	☐	☐	☐	☐	☐	☐
I focused a great deal of attention on my project this week	☐	☐	☐	☐	☐	☐	☐
I had good concentration on my project this week	☐	☐	☐	☐	☐	☐	☐
I put in quite a bit of effort toward the project this week	☐	☐	☐	☐	☐	☐	☐
I exerted a lot of energy when working on the project this week.	☐	☐	☐	☐	☐	☐	☐

How much TIME did you put into your project over the last week?

0 10 20 30 40 50 60 70 80 90 100

0 = No Time | 100 = All of My Time



How much EFFORT did you put into your project over the last week?

0 10 20 30 40 50 60 70 80 90 100

0 = No Effort | 100 = Maximum Effort





To what extent do you agree with the following statements about your actions this week, when seeking to accomplish something or solve a problem related to your project?

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I spent considerable time trying to understand the nature of the problem.	☐	☐	☐	☐	☐
I thought about the problem from multiple perspectives.	☐	☐	☐	☐	☐
I decomposed a difficult problem/assignment into parts to obtain greater understanding.	☐	☐	☐	☐	☐

To what extent do you agree with the following statements about your actions this week, when seeking to accomplish something or solve a problem related to your project?

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I consulted a wide variety of information.	☐	☐	☐	☐	☐
I searched for information from multiple sources (e.g., personal memories, others' experience, documentation, Internet, etc.).	☐	☐	☐	☐	☐
I retained large amounts of detailed information in my area of expertise for future use.	☐	☐	☐	☐	☐

To what extent do you agree with the following statements about your actions this week, when seeking to accomplish something or solve a problem related to your project?

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I considered diverse sources of information in generating new ideas.	☐	☐	☐	☐	☐
I looked for connections with solutions used in seeming diverse areas.	☐	☐	☐	☐	☐
I generated a significant number of alternatives to the same problem before I choose the final solution.	☐	☐	☐	☐	☐
I tried to devise potential solutions that move away from established ways of doing things.	☐	☐	☐	☐	☐
I spent considerable time sifting through information that helps to generate new ideas.	☐	☐	☐	☐	☐

To what extent do you agree with the following statements about your actions this week, when seeking to accomplish something or solve a problem related to your project?

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I tried to get others' opinions about my new ideas.	☐	☐	☐	☐	☐
I tested out my ideas by explaining them to my classmates or friends.	☐	☐	☐	☐	☐
I considered diverse sources in assessing whether my new ideas are appropriate.	☐	☐	☐	☐	☐
I sought feedback from colleagues about the feasibility of my new ideas.	☐	☐	☐	☐	☐
I talked to my colleagues about new ideas I have to see if they will work.	☐	☐	☐	☐	☐





Think about what it was like to work on the project this week, then indicate your level of agreement with the following statements:

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I was able to get in the groove while working on the project	☐	☐	☐	☐	☐	☐	☐
I was able to get into the rhythm of the project	☐	☐	☐	☐	☐	☐	☐
I was able to get in the flow while working on the project	☐	☐	☐	☐	☐	☐	☐





During this portion of the survey we want you to tell us about how you used your time when you were not working on your project.

To what extent do you agree with the following statements about your activities after engaging in work on your project this week.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I have forgotten about the project.	☐	☐	☐	☐	☐
I have not thought about the project at all.	☐	☐	☐	☐	☐
I have distanced myself from my project.	☐	☐	☐	☐	☐
I got a break from the demands of the project.	☐	☐	☐	☐	☐

To what extent do you agree with the following statements about your activities after engaging in work on your project this week.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I have kicked back and relaxed.	☐	☐	☐	☐	☐
I have done relaxing things.	☐	☐	☐	☐	☐
I have used the time to relax.	☐	☐	☐	☐	☐
I have taken time for leisure.	☐	☐	☐	☐	☐

To what extent do you agree with the following statements about your activities after engaging in work on your project this week.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I have learned new things.	☐	☐	☐	☐	☐
I sought out intellectual challenges.	☐	☐	☐	☐	☐
I have done things that challenge me.	☐	☐	☐	☐	☐
I have done something to broaden my horizons.	☐	☐	☐	☐	☐

To what extent do you agree with the following statements about your activities after engaging in work on your project this week.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I have felt like I can decide for myself what to do.	☐	☐	☐	☐	☐
I have decided my own schedule.	☐	☐	☐	☐	☐
I determined for myself how I would spend my time.	☐	☐	☐	☐	☐
I took care of things the way that I wanted them done.	☐	☐	☐	☐	☐





Please indicate the degree to which the following statements apply to how you feel right now, using the scale provided below.

	Not at all True	Slightly Not True	Neutral	Slightly True	Very True
I feel alive and vital.	☐	☐	☐	☐	☐
I don't feel very energetic.	☐	☐	☐	☐	☐
I feel so alive I just want to burst.	☐	☐	☐	☐	☐
I don't feel very energetic.	☐	☐	☐	☐	☐
I have energy and spirit.	☐	☐	☐	☐	☐
I look forward to each new day.	☐	☐	☐	☐	☐
I feel alert and awake.	☐	☐	☐	☐	☐
I feel energized.	☐	☐	☐	☐	☐





Please indicate the extent to which you agree or disagree with each of the following statements:

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Judging for today, my life is close to ideal.	☐	☐	☐	☐	☐
Right now, I am satisfied with my life.	☐	☐	☐	☐	☐
At this moment, I think I have gotten the important things I want in life.	☐	☐	☐	☐	☐
Right now, I think the conditions of my life are excellent.	☐	☐	☐	☐	☐
If I could live my life over, I would change almost nothing.	☐	☐	☐	☐	☐

Please indicate the extent to which you agree with each of the following statements about how you feel at the present moment:

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I feel that I have good relationships.	☐	☐	☐	☐	☐	☐	☐
My relationships are very stable.	☐	☐	☐	☐	☐	☐	☐
My relationships with important others are strong.	☐	☐	☐	☐	☐	☐	☐
My relationships with close others make me happy.	☐	☐	☐	☐	☐	☐	☐
I really feel like part of a team with others who are close to me.	☐	☐	☐	☐	☐	☐	☐

Please answer the following questions using the scale provided:

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I am getting better at my schoolwork because I learn from my mistakes.	☐	☐	☐	☐	☐	☐	☐
Dealing with difficult people (or situations) enables me to grow.	☐	☐	☐	☐	☐	☐	☐
I see challenges as an opportunity to learn.	☐	☐	☐	☐	☐	☐	☐
I have found ways to handle unexpected situations.	☐	☐	☐	☐	☐	☐	☐
I bounced back when I confronted setbacks at school.	☐	☐	☐	☐	☐	☐	☐





Please describe how you have felt during the past week:

	Better than usual	Somewhat better	Somewhat worse	Much worse than usual
Have you had problems with tiredness?	☐	☐	☐	☐
Have you needed to rest more?	☐	☐	☐	☐
Have you felt sleepy or drowsy?	☐	☐	☐	☐
Have you had problems starting things?	☐	☐	☐	☐
Have you started things without difficulty but gotten weak as you went on?	☐	☐	☐	☐
Have you lacked energy?	☐	☐	☐	☐
Have you had less strength in your muscles?	☐	☐	☐	☐
Have you felt weak?	☐	☐	☐	☐

Please describe how you have felt during the past week:

	Better than Usual	Somewhat better	Somewhat worse	Much worse than usual
Have you had difficulty concentrating?	☐	☐	☐	☐
Have you had problems thinking clearly?	☐	☐	☐	☐
Have you had slips of the tongue when speaking?	☐	☐	☐	☐
Have you found it more difficult to find the correct word?	☐	☐	☐	☐
How has your memory been?	☐	☐	☐	☐
Have you lost interest in the things you used to do?	☐	☐	☐	☐





To what extent do you think each of the following statements is characteristic about you this week?

As I worked on my project this week, I have...

	Not at all characteristic	A little bit	Neutral	Characteristic	Very Characteristic
Come up with new and practical ideas to improve performance.	☐	☐	☐	☐	☐
Searched out new technologies, processes, or techniques.	☐	☐	☐	☐	☐
Been a good source of creative ideas.	☐	☐	☐	☐	☐
Not been afraid to take risks.	☐	☐	☐	☐	☐
Exhibited creativity in my schoolwork when given the opportunity.	☐	☐	☐	☐	☐
Come up with new and innovative ideas.	☐	☐	☐	☐	☐
Come up with creative solutions to problems.	☐	☐	☐	☐	☐
Taken a fresh approach to problems.	☐	☐	☐	☐	☐
Suggested new ways of performing tasks.	☐	☐	☐	☐	☐

Over the past week, I have...

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Helped others who have heavy workloads.	☐	☐	☐	☐	☐	☐	☐
Been ready to lend a helping hand to those around me.	☐	☐	☐	☐	☐	☐	☐
Gone above and beyond the call of duty when helping out.	☐	☐	☐	☐	☐	☐	☐
Helped my friends or family members with tasks that are not technically my responsibility.	☐	☐	☐	☐	☐	☐	☐

Over the past week, I have...

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree
Adequately completed assigned duties.	☐	☐	☐	☐	☐	☐	☐
Performs tasks that are expected of me.	☐	☐	☐	☐	☐	☐	☐
Met formal performance requirements of my classes.	☐	☐	☐	☐	☐	☐	☐
Engaged in activities that directly affect my performance in classes.	☐	☐	☐	☐	☐	☐	☐
Failed to complete essential work.	☐	☐	☐	☐	☐	☐	☐





To what extent have you felt each of the following adjectives during the past week.

	Very slightly or not at all	A little	A moderate amount	A lot	Extremely
Inspired	☐	☐	☐	☐	☐
Alert	☐	☐	☐	☐	☐
Excited	☐	☐	☐	☐	☐
Enthusiastic	☐	☐	☐	☐	☐
Determined	☐	☐	☐	☐	☐
Afraid	☐	☐	☐	☐	☐
Upset	☐	☐	☐	☐	☐
Nervous	☐	☐	☐	☐	☐
Scared	☐	☐	☐	☐	☐
Distressed	☐	☐	☐	☐	☐

Please indicate the extent to which you agree with each of the following statements:

	Not at all	A little bit	Somewhat	Very much	Extremely
I feel confident about my abilities.	☐	☐	☐	☐	☐
I feel frustrated or rattled about my performance.	☐	☐	☐	☐	☐
I feel that I am having trouble understanding things that I read.	☐	☐	☐	☐	☐
I feel as smart as others.	☐	☐	☐	☐	☐
I feel confident that I understand things.	☐	☐	☐	☐	☐
I feel that I have less scholastic ability right now than others.	☐	☐	☐	☐	☐
I feel like I'm not doing well.	☐	☐	☐	☐	☐
I am worried about whether I am regarded as a success or failure.	☐	☐	☐	☐	☐
I feel self-conscious.	☐	☐	☐	☐	☐

I feel displeased with myself.	☐	☐	☐	☐	☐
I am worried about what other people think of me.	☐	☐	☐	☐	☐
I feel inferior to others at this moment.	☐	☐	☐	☐	☐
I feel concerned about the impression I am making.	☐	☐	☐	☐	☐
I am worried about looking foolish.	☐	☐	☐	☐	☐

Is there anything else you would like to share?



Figure 10. Thesis Questionnaire Survey

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