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## **THE GOOD KIND OF BAD STRESS**

How social media stress and procrastination are associated  
with feelings of productivity in the Finnish working  
population.

Faculty of Social Sciences

Master's thesis

June 2020

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## ABSTRACT

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Employee productivity has clear given benefits. Productive employees usually translate to productive organizations. Organizations have multiple ways to maintain and enhance employee productivity. Usually, the most effective way is to maintain a positive employee well-being. Well-being and productivity are well intertwined, and in most circumstances, a healthy employee is also a productive employee. One of the ways of maintaining employee well-being is to mitigate unnecessary work-related stress.

Social media is increasingly utilized in organizations. It has the potential to enhance communication, streamline work-related tasks, and provide effective marketing. The potential of utilizing social media is well known. It is designed for humans, to make us more efficient. Another increasing topic regarding social media is its negative associations. These negative phenomena caused by the new technology are referred to as *the dark side of the technology*. One of the major themes of this dark side is technostress. Technostress originally referred to the difficulties in *using* new technology, but it has since expanded to other dimensions. The present thesis utilizes two technostress dimensions: techno-overload (too much) and techno-invasion (always connected). These two technostress dimensions are perceived to be caused by challenge stressors. Challenge stressors initiate stress than can be appraised as an obstacle to conquer. In these stressful situations, the potential gain overshadows the potential losses. Hence, challenge stressors could lead to beneficial outcomes in addition to the negative ones. Stress is usually coped with and the present study adds the perspective of procrastination. Procrastination has multiple different concepts, but they all include an element of putting off tasks or delaying them. Procrastination is conceptualized as a tendency to procrastinate and also, as a form of avoidance coping. Additional view of curvilinearity was included. Curvilinear model of stress and productivity states that low levels of stress lead to low levels of productivity. A moderate level of stress increases productivity and an excess amount of stress decreases productivity. Curvilinear models are heavily debated in current literature, but rarely do they involve the perspective of stressor types.

The present thesis hypothesizes that 1) social media stress is positively associated with the feelings of social media enabled productivity, 2) procrastination is negatively associated with social media productivity, 3) social media stress is curvilinearly associated with social media productivity (inverted U-shape) and 4) procrastination moderates the effect of social media stress on social media productivity.

The present study utilizes the data from *social media at work in Finland survey*. It was conducted as a part of a Finnish project: *Social media and work engagement among young adults*, funded by the Finnish Work Environment Fund. The sample consists of Finnish full-time employees who use social media for work purposes (n = 1136). Age ranged from 18-65 and 43% were females. Hierarchical OLS regression was used to provide answers to the hypotheses.

The results showed support for the positive relationship between social media stress and productivity. Procrastination had no significant effect on productivity. The curvilinear effect was supported, and no significant moderation effect was found. The present thesis offers knowledge on the less known side of *good kind of bad stress*, referring to challenge stressors that may have beneficial outcomes. The present thesis also participates in the ongoing debate about the curvilinear models of stress and performance. It is important to elaborate on stressor types in stress research since stress is a complex process that takes time to progress.

Keywords: Social media, Social media stress, Technostress, Procrastination, Employee productivity.

The originality of this thesis has been checked using the Turnitin Originality Check service.

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## 1. INTRODUCTION

The American reimagination of *The Office*-TV series is about the everyday life of office workers in a paper company named Dunder Mifflin. A fan-favorite character, Dwight Schrute is a top salesman, skillful paintball player, and the assistant to the regional manager. In the episode “*Launch party*” (Season 4, Episode 3), the company launches its online store for the first time and an argument breaks out if Dwight could outsell the machine. Dwight ends up beating the machine by selling 1270 reams of paper while the machine only sold 1218. It was no surprise to the viewers that Dwight could do that since he is a persistent and goal-orientated employee. Besides, Dwight has a compulsive need to establish superiority to everything and everyone. Dwight's ordeals against the machine is an overly dramatic representation of regular work life, but there are some elements of the episode that is worth bringing up because of their relevance to the present thesis.

First, the inevitable reality that organizations are including and utilizing increasingly more information and communication technology (ICT). ICT enables organizations to reach customers widely, mitigate costs, and increase employee productivity (Parveen, Jaafar & Anin 2016). Everyday discussion about the rapid development of technology usually goes parallel with the development of social media. Social media today is affiliated with many parts of life. Maintaining self-image in Facebook, job hunt in LinkedIn, self-expression in YouTube, and handling work-related tasks in Slack. Social media had become so common in organizations, that they are defined as *enterprise social media*, which refers to applications for organizations' internal communication (Leonardi, Huysman & Steinfield 2013). These enterprise social media such as Yammer or Slack, are made to streamline work tasks and information flow. However, technology and social media tend to have a flip side to them. Information flow might become information overflow and social media enabled reachability might become invasive. These flip sides are commonly known as *the dark side of the technology* (e.g. Salanova, Llorens & Cifre 2013; Tarafdar, Cooper & Stich 2019). The dark side provides a rich field to study how empowering technology can additionally become a source of strain.

Second, even when Dwight was in a highly stressful situation, he appraised it as a challenge and remained determined even when the competition was taxing. He remained highly productive under excessive amounts of stress. Often in organizational psychology, employee well-being and productivity goes hand in hand. An employee with positive well-being tends to be more productive at work. (Quick & Macik-Frey 2007, 25–27.) There are various studies on

how employee productivity is managed through their well-being. For example, work engagement (Hakanen & Koivumäki 2014), physical health (Mitchell, Ozminkowski & Serxner 2013), and social support (Baruch-Feldman, Brondolo, Ben-Dayana & Schwartz 2002). It seems like employee productivity and well-being are strongly intertwined and previously mentioned studies heavily suggest that changes in employee well-being reflects to their productivity. Work-related stress is a major subject in organizational psychology and the common themes revolve around *distress* (bad stress) that leads to harmful outcomes and *eustress* (good stress) that leads to beneficial outcomes (Rudland, Golding & Wilkinson 2020). However, there are certain situations where some stressors are appraised in a way that leads to beneficial (e.g. increased productivity) and harmful (e.g. exhaustion) outcomes simultaneously. Much like in Dwight's case, stressful experience that includes an interplay of good and bad aspects, differentiate itself from the dichotomous and robust view of good and bad stress.

Lastly, Dwight's appraisal of the stressful situation is affected by his attributes and occupational goals. Personal traits and occupational goals underline the individual differences in experiencing stress. For example, neuroticism is linked to traits like anxiety, self-handicapping, and procrastination (Steel 2007). Personal goals also influence how stress is dealt with. These individual properties influence how the stressor is appraised, how it is experienced, and how to cope with it. (Semmer & Meier 2009, 102.) Stress research in psychology is almost indistinguishable with coping mechanisms (e.g. Lazarus & Folkman 1984). Coping mechanisms are usually divided into dichotomous models, such as approach and avoidance (Roth & Cohen 1986), problem- and emotion-focused (Lazarus & Folkman 1984), or adaptive and maladaptive (e.g. Zeindner & Saklofske 1996). Different employees react differently and use different mechanisms to cope with stress. Stress research should not downplay individual properties in order to form a more comprehensible picture of occupational stress.

The main focus of the present thesis lies in work-related social media stress, procrastination, and social media-enabled feelings of productivity. The division of distress and eustress is considered to be a minor oversimplification and thus, the stress process is approached through the perspective of stressor types (things that initiate the stress process). A specific stressor type is singled out to be examined due to its dual nature to the employee. This stressor type is referred to as a *challenge stressor*. Challenge stressor is a part of the two-dimensional model of work stress, the other dimension being hindrance stressor. The model states that work-related stressors should be divided into exhausting but inspiring challenges, and grueling hindrances.

(LePine, Podaskoff & LePine 2005.) Challenge stressors are conceptualized together with two distinctive *technostress* dimensions: techno-overload and techno-invasion (Tarafdar, Cooper & Stich 2019). This is referred to as social media stress.

The present thesis attempts to clarify: 1) how social media stress (SM stress) is associated with social media-enabled feelings of productivity (SM productivity), 2) how procrastination is associated with SM productivity, 3) the nature between SM stress and SM productivity, and 4) the tendency to engage in procrastination coping moderate the effect of SM stress to SM productivity. The present thesis utilizes one of the survey data from a Finnish research project, *Social media and work engagement among young adults*. The project is lead by a professor of social psychology Atte Oksanen and the survey was carried out in 2019 and represents the Finnish working population. A literature review is presented first to grasp the concept of employee productivity, stress, and coping. The theme of organizational productivity is dominating the current economic literature, but productivity is approached from the more psychological and individual perspective, focusing on the subjective feeling of productivity. Stress has a rich history in its various theoretical concepts and theoretical foundations in the fields of physiology and psychology. Both perspectives are introduced since the common understanding of stress forms with both physical and psychological outcomes. Coping perspective is included to further emphasize the individual differences in stress experience. Procrastination is conceptualized to be a form of avoidance coping. These mentioned themes will be examined in an occupational and social media context in the Finnish working population. The hypotheses, data, and methods are introduced after the literature review, followed by results and discussion.

## 2. PRODUCTIVITY

Being productive (or unproductive) can be occasionally a topic in everyday conversation. Generally speaking, people often understand what is referred by "being productive" in different situations but seeking the definition from the literature can be a minor challenge. The definition of productivity can be especially vague when comparing similar terms such as performance, production, and profitability (Tangen 2005). The following section is meant to shed some light on the terminology of productivity and form a comprehensive image of perceived productivity. An economic and subjective perspective of productivity is presented first, followed by a brief review of productivity at work, through the perspective of employee health. Lastly, productivity is reviewed from the perspective of organization and social media.

### 2.1 Definition of productivity

Throughout economic literature, productivity is often referred to as organizational productivity and it is defined as a form of input to output ratio (productivity = input/output). Definitions can range from having single input (single-factor productivity) or having multiple inputs (multiple factor productivity). Single-factor is often conceptualized as hours worked and output usually consists of units produced. (Green 1993, 5–7.) The difficulties of defining productivity usually come from the difficulties to define inputs and outputs. Besides, it is also difficult to consider all the inputs that should be a part of the productivity equation. The definition of input and output measures are a common problem for productivity formulas. (Ibid.) Even if input and output measures could be accurately measured, it only holds value in certain organizational surroundings. For example, lumberjacks have vastly different inputs and outputs compared to nurses. Del Gatto, Di Liberto, and Petraglia (2011) call measuring productivity as *conditio sone qua non*, which loosely means that it only exists in *indispensable conditions*. Thus, inputs and outputs mean different things in different occupational surroundings and every occupation forms their own pattern of their concept of productivity.

Tangen (2005, 43) created the triple P-model to summarize the concept of productivity and its related terms. The three P's stand for productivity, profitability, and performance. All of the three concepts have an input to output definition at their core, but they vary from the degree of additional factors. The model conceptualizes productivity at its core, which means the raw input to output ratio. Profitability is the outer layer of productivity and it includes more



financial aspects such as price or cost recovery. The outermost layer is performance which included aspects of both productivity and profitability. Performance is described as an umbrella term to productivity and profitability and it includes all non-financial factors such as delivery or speed. Efficiency and effectiveness are cross-functional terms that can be manifested in all of the layers in the triple P-model. Efficiency refers to how well resources are utilized, and effectiveness refers to what degree are the wanted results achieved. (Ibid. 41–43.) Tangen (2005) concludes that productivity and related terms are rarely defined and used interchangeably throughout the literature. They usually have multiple interpretations across different research fields (mathematical and verbal). He calls productivity a multidimensional term, meaning that the definition varies between context and research fields. However, productivity has distinctive elements across all fields of study, and in essence, it always describes a form of efficiency in input to output conversion (Syverson 2011, 326, 329).

Moving on to psychology, there are few things to take away from the economic literature. First, productivity is a multidimensional term, meaning that the understanding of productivity is dependent on situational and occupational factors. Second, the essence of productivity lies in the conversion efficiency, in contrast to the accurate definitions of inputs and outputs (or formulas). In this sense, inputs and outputs can be virtually anything. To explore what affects employee productivity is to explore any aspect that might have an effect on the conversion efficiency. This also means a wide range of styles to measure productivity. External measures can be, for example, the amount of pay from services (Hakanen & Koivumäki 2014). For the readability and attempts to avoid any confusion, the present thesis will refer anything that describes the conversion efficiency of input to output as productivity, whether it is defined as performance or effective work in reviewed literature.

Objective measures for individual productivity are challenging due to the subjective nature of the concept (Brynjolfsson & Hitt 1998, 1). Roelofsens (2002, 248) mentioned a productivity measurement based on the respondents *feeling* of their conversion efficiency. This is referred to as *worker evaluation of productivity* (ibid. 249). The feeling of productivity avoids some of the definitional problems such as what exactly are inputs and outputs since in some cases, like in knowledge work, outputs are objectively hard to grasp (e.g. Ramirez & Nembhard 2004). The subjective measure takes account for situational (e.g. access to tools), organizational (e.g. bureaucracy), and individual (e.g. exhaustion) factors that affect the individual feeling of productivity. It can be considered a relative measure since productivity is measured through

feeling, regardless of actual units produced (Roelofsens 2002). For example, employees might be ill and have lower productivity than usual, but still, feel highly productive. The feeling of productivity forms together with the condition that one is sick (e.g. an employee was relatively productive considering that he was sick). In other words, there is no need to conceptualize any objective cut off points that reflect whether an employee is productive or not. A subjective measure of productivity brings all the respondents on the same page in terms of their perception of productivity, regardless of their occupation.

## **2.2 Productivity at work**

Employee productivity is a popular theme in organizational psychology. The benefits of productivity are given in most literature. In a macro perspective, increasing organizational or city productivity is associated with positive outcomes such as increased employment or economic gains. It also affects the individual by increasing their wage, which in turn leads to other positive outcomes. Of course, situational factors can moderate the degree of benefits, but overall productivity growth or high productivity is considered beneficial to the individual as well as to the organization. (Hornbeck & Moretti 2018.) Hence, more focus is placed on the elements that affect employee productivity. There are roughly two ways to approach the attempts to maintain productivity. These can be improving and maintaining the positive elements or mitigating harmful elements (or both). Some fields consider employee health and productivity as a trade-off, suggesting that job-related strains and demands are a part of work. However, positive psychology considers employee health and productivity as complementary, which means that health and productivity feed each other. The effects on employee health tend to reflect on their productivity. (Quick & Macik-Frey 2007, 25.)

Healthy employees translate to healthy organizations which in turn translates to profitable organizations. Maintaining employee well-being is an investment in maximizing productivity in organizations. A healthy employee is described to have purposeful work, having support systems, optimism, and work goals. These are affected by both organization and individual (Quick & Macik-Frey 2007, 27–28.) Health promotion is becoming more popular since the effects of occupational stress is well established. The effects of occupational stress harms organizations in terms of cost and loss of employees. These negative effects would have major repercussions on organizational and employee productivity. (Hendrix, Summers, Leap & Steel

1995, 73–74.) In other words, organizations and individuals share a common goal and they both have the responsibility to ensure healthy employees in order to maintain the organization's profitability. There is a wide variety of studies that focus on different factors to increase employee productivity ranging from financial counseling to employees (Joo & Grable 2000), managerial behavior (McNeese-Smith 1996), optimal office environment (Roelofsen 2002), and even energy-efficient office lighting (Katzev 1992). The high volume of different themes in productivity research only shows the importance of maintaining employee productivity.

Kompier and Cooper (1999, 1–5.) states that work-related stress is a major theme in organizational psychology since it has been associated with diminished employee health which leads to loss of productivity. Thus, one of the potential ways to increase employee productivity is to mitigate work-related stress. They elaborate more on stress prevention research and conclude, that the majority of stress management seems to be dealing with mitigating the effects of stress instead of causes. This leads to managing secondary prevention instead of dealing with the source. Also, most of the mitigation efforts focus on individuals instead of an organizational perspective. This would lead to attempts to manage individual perceptions and skills to deal with stress. In contrast, organizational approach would provide ways of redesigning tasks or changes in organizational culture. (Ibid. 2–3.) Popular organizational strategies to reduce stress involves redesigning the task and work environment, establish flexible schedules, encourage participative management, including the employee in career development, provide social support and sharing rewards (Elkin & Rosch 1990). Work-related stress has gathered attention for at least four reasons: 1) work-related stress causes health and well-being problems, 2) it causes organizational and societal losses on economic perspective, 3) it affects individual productivity and hence organizational productivity and 4) most of the societal legislations requires work environments to be physically and psychologically safe. (Kinnunen & Felt 2005, 13.)

### **2.3 Social media in organizations**

*“You can see the computer age everywhere but in the productivity statistics”* (Solow 1987, 36). This phrase was written by Nobel prize awarded economist Robert Solow. It sums up the nature of the popular phenomenon – productivity paradox. The rise of technology and the application to organizations was presumed to increase productivity, but paradoxically it had inverse effects.

(Ibid.) Key arguments to address the myth of the paradox revolve around mismeasurement of productivity, delay to potential benefits due to slow learning, and mismanagement of ICT (Brynjolfson 1993, 73). Although the productivity paradox is an old phenomenon, certain paradoxical elements can be seen in the use of modern ICT. Social media and technology overall are designed for people. To entertain, to network, and overall to be more effective. However, social media has many qualities that could be considered paradoxical.

Pittman and Reich (2016) concluded in their study, that people are now connected more than ever before, but still, some young groups feel extremely lonely. Rennecker and Derks (2012) found out that e-mail enabled information flow increases organizational productivity, but at the same time, are harmful to individuals with overflowing demands. Zimbardo and Coulombe (2016) have widely studied the paradoxical nature of the digital age on young people. The digital age comes with devices and software that enable experiences that create the feeling of "mastering the universe". However, potential flipsides had become an increasingly discussed topic. How internet porn disrupts sexuality and how gamers are isolating despite the networking via online games, and how empowering technology becomes the source of strain (Salanova, Llorens & Cifre 2013; Zimbardo & Coulombe 2016). Salanova, Llorens, and Cifre (2013, 423) stated that technologies' purpose is to make our lives easier, but more often than not, technology may lead to harmful outcomes. These flipsides that arise from the use of new technology are referred to as *the dark side of the technology*.

Social media varies in definition and sometimes it feels like almost every web-based site is considered as social media. This only shows how the traits of social media have spread to almost every corner of web-based services. VTT's (Technical Research Centre of Finland) defines social media as a software platform that consists of three primary elements: contents, online communities, and web 2.0 technology. In other words, the three elements represent user content, user interaction, and technological basis. (Pönkä 2014, 35–36.) VTT's definition fits most of the social media that exist in Finnish culture today. Social media is used for the ability to be connected to others and sharing content. The most distinctive aspect of social media is the focus on user content. (King 2015, 7.) Kietzmann, Hermkens, McCarthy, and Silvestre (2011) distinguish seven different social media building blocks regarding user experience. These are identity, sharing, conversations, groups, reputation, relationships, and presence. This means that when organizations utilize social media, they are implicating these blocks. Building

and maintaining the organization's image and communication. Social media can significantly affect the organization's sales, image, or even their survival. (Ibid.)

External social media for the public is separated from internal social media for employee use. Organizations that utilize social media applications for internal use are referred to as *enterprise social media* by Leonardi, Huysman, and Steinfield (2013). They acknowledge the increased social media implications in modern organizations and further examine social media that are exclusively meant for internal use (employees and managers). The traits of enterprise social media are similar to the previously mentioned definitions: communication, posting, editing, and sharing. These are depicted to streamline tasks and to enhance information flow and productivity. Enterprise social media is called *a social lubricant* that enhances and sustains the social aspects of organizations. (Ibid. 14.) Razmerita, Kirchner, and Nabeth (2014) also found similar results about the benefits of social media. The information flow from social media tends to increase employee and collective knowledge and thus, potentially increase productivity.

The potential of social media in organizations is well established. They are embedded into organizations at a rapid pace (Huy & Shipiloy 2012). It can reach a wide audience, improve organizational performance, and mitigate costs. (Parveen, Jaafar & Ainin 2016). Having a social media page is a default trait of any modern organization. It is not so much as a choice whether to have a social media profile or not. Of course, smaller businesses could go on without internal social media, but mainstream social platforms, for example, for promotional purposes are often free and easy to sign up. Social media has become more common in organizations in the way of marketing and boosting internal and external communication. (Geho & Dangelo 2012, 61, 66–67.) Social media is a powerful tool to maintain organizations' public image. Also, it is also a strong marketing tool, overtaking traditional marketing methods (Geho & Dangelo 2012, 61–63; Ashley & Tuten 2015). In addition, social media has been deemed to especially increase productivity in surroundings with a wide information network (Wu 2013).

Besides the seemingly obvious benefits of social media in organizations, a lot of effort has also put on the exploration of the dark side of the technology. The dark side of technology has been referred by many authors including Slanova, Llorens, and Cifre (2013), and Pirkkalainen and Salo (2016). The dark side refers to the negative side of technology. Take information flow for example, it has the potential to increase productivity in work. Information overload on the other hand has been linked to employee fatigue (Lee, Son & Kim 2016). Since it has been established that positive employee well-being usually translates to a productive employee and fatigued

employee could have reversed effects (see chapter 2.2). The dark side of technology includes several negative phenomena such as anxiety, stress, and addiction. (Pirkkalainen & Salo 2016.) Thus, the potential of social media does not only include beneficial outcomes but also negative ones.

Since social media comes with good and bad, organizations tend to invest in attempts to mitigate the dark side of technology. Organizations overall are in a unique place in ways of mitigating the dark side of ICT. They hold a degree of control to their employees and how they use social media at work. They can set up support and guidance for employee work-related social media use. This raises questions on how management oversee social media usage and mitigate their harmful effects. How to introduce and train employees to manage constantly increasing and updated social media applications is a common challenge. (Fisher & Wesolkowski 1999.) In contrast to personal social media use, where individuals need to seek and carry out mitigation attempts themselves. Individuals have the responsibility in their own personal social media use and hence, they are left to handle the dark side by themselves. However, the most important and challenging task is to find ways to mitigate the harmful and still keep the beneficial traits of social media. Take the previously mentioned information overload for example. How to prevent strain caused by information overload and still keep the benefits of efficient information flow. (Ibid. 10–12.)

The need to understand social media does not only apply to occupational context but also the general understanding of society. Social media is not an optional or extrinsic phenomenon anymore. It is becoming increasingly mandatory to have social media skills to fluently interpret cultural phenomena like selfies, blogging, and political activism within social media (Murray 2015). By now it has been established that social media is potentially becoming an essential part of a modern organization. It is a default assumption for any organization to have a form of social media page and organizations seem to include them increasingly as they evolve. (Parveen, Jaafar & Ainin 2016; Geho & Dangelo 2012). This means new forms of digital abilities, capacities, and awareness in the workplace.

However, adopting and implementing new technologies' is a long process and merely having new technology is not enough to fluently facilitate their use. (Tronatzky 1986, 64.) Workplaces are more and more networked and the structural changes are meant more and more for the social media generation. (Mergel 2012, 472.) To summarize, Social media is an important resource for an organization. It enhances and streamlines tasks, but at the same time creates

harmful effects on employees that cause loss of productivity (Tarafdar, Tu, Ragu-Nathan & Ragu-Nathan 2007). *"Technology especially needs to be embraced, but how we embrace it will make the difference between healthy and unhealthy human interaction"* (Zimbardo & Coulombe 2016, 251). The mentioned literature on social media and its effects on employee and organizational productivity is manifold. The use of modern ICT has clear benefits to boost information flow and thus, increase productivity (Leonardi, Huysman, and Steinfield 2013). However, at the same time, the use of modern ICT is conceptualized to also lead to technostress which in turn would decrease productivity (Salanova, Llorens, Cifre 2013).

### 3. STRESS

The word *stress* is well established in everyday conversation. Anything can be stressful, and it is common in general speech to frame stress to a specific context (work stress, life stress, technostress, etc.). It seems like popular culture has a unilateral image of stress. Various lifestyle guides and mainstream media provides tips and tricks to either relieve stress or mitigate stressors. However, stress has some variety in its definition. In psychology, it is considered a process that includes multiple stages. This is referred to as *the transactional model of stress* which highlights stress as a process (Lazarus & Folkman 1984). The process of stress should not be confused with stressors. Stressors can be anything that causes stress (Selye 1956, 97–98). In other words, stressors initiate the stress process. Since stressors can be virtually anything, work-related stress research has a variety of themes. Cartwright and Cooper (1997, 14–22) separates some of the popular workplace stressors that have been studied in occupational research. These include working conditions, working hours, travel, work overload, role ambiguity, colleagues, and new technology. Work-related social media stress makes a rich field to study since it is rapidly evolving and also increasingly used in organizations (e.g. Treem & Leonardi 2013). The following chapter is divided into four parts. First, a review of popular stress concepts in the fields of medicine and psychology are presented. Second, the Two-dimensional model of work stress is reviewed in detail. Third, the concept of technostress is reviewed in detail. Finally, a review of curvilinearity is presented.

#### 3.1 Medical roots and psychological extension

The concept of stress has had a versatile trajectory in its development. Since there are various stress concepts across different research fields and in occupational context, it is not possible to review every branch of stress research (see Cartwright & Cooper 1997). *“The way stress is used in research is almost as subjective as an individuals’ experience of stress”* (Robinson 2018, 341). Robinson (2018) wrote a comprehensive summary of the history of stress research. He describes how stress had its roots in medicine and physiology before eventually adopted by psychology. Stress was mainly developed in the field of medicine by the likes of Hans Selye and Walter Cannon. The concept of stress was slowly expanded to the psychological field where it also included individual appraisal and coping. This brought a cognitive side for understanding stress at the time when stress started to take over the field of psychology. (Ibid.)



Starting from the physiological and medical view, Cannon's (1929, 399–400) concept of maintaining homeostasis can be seen as a preliminary basis for stress. He describes the *equilibrium* that the body tries to achieve through its organs and regulatory systems. In simple terms, the body reacts and tries to remedy itself with regulatory systems. By regulating and maintaining homeostasis, the body can remain its optimal function. He also discusses the voluntary and involuntary reactions to the environment (ibid. 422–423) that would later become the model of *fight or flight* (Wainwright & Calnan 2002, 35). Cannon's descriptions about a "stressed body" never really had any negative effects. A body that tries to maintain homeostasis is mostly described as necessary for human survival. (Ibid. 38–39.) For example, in hot weather, the body reacts by cooling the body by sweating. Cannon's view of stress simply means that the body regulates a certain balance and becomes "stressed" when that balance is shifted. This triggers efforts to restore the balance.

Perhaps the biggest name in the field of stress research was Hans Selye. He defined stress as a "*nonspecific response of the body to any demand made on it*" (Selye 1980, 6). At the time, the concept seemed partly vague. It focused on the elaborating stress responses and left little room for causes of stress. Causes or stressors were referred to as anything that produces stress. (Selye 1956, 97–98.) Due to vagueness, the early concept was deemed to be "*unobservable, unmeasurable, and overly plastic*" at the time by many in the field of medicine (Viner 1999, 396). Selye did later create a model that would include physical and emotional stressors. The model explained how the human body reacts during stress, and similar to Cannon, how the human body tries to remain balanced while facing stressors (see GAS model, Selye 1956, 25–30).

When the use of the word stress became popular, it was used to mainly describe *distress*, which meant "*excessive or harmful stress*". It was argued that the original meaning of stress was forgotten. The necessity of stress was often overlooked and Selye did attempt to elaborate implications of stress in his next pinnacle work *stress without distress*. (Selye 1974, 26.) Selye's view of stress can be best condensed in his popular phrase "*complete freedom from stress is death*" (Ibid. 32). This mainly meant that the body needs cues to function properly. Without these cues, it does not know what to do and how to regulate. Although stress was mainly conceptualized in human physiology, some notions of psychosomatic (mental) and philosophical applications were noted in the early stages of the stress concept. (Selye 1956, 262–277.) Without delving deeper into the medical perception of stress, there is an important

notion that needs to be highlighted from the early concepts. Stress is often seen as a necessary reaction for the body to respond properly to an environmental stressor and it is not always accurate to depict it as distress. Selye also distinguishes good stress known as *eustress*, which means stressful situations that would lead to beneficial outcomes (Selye 1974).

After the second world war, the rise of traumatized veterans raised attention for potential psychological stressors (Wainwright & Calnan 2002, 39). As mentioned earlier, stress was defined as a body's reaction and that brought some problems with it. Since it was a reaction-based definition, it had trouble explaining individual differences to the same stressors. Problems would arise when some stressors were stressful to some but not others. (Ibid.) Attempts would be made to explain individual reactions to the same stressor with external (i.e. diet or drugs) and internal (i.e. age or gender) conditioning (e.g. Selye 1974, 44–45). In turn, a neurologist named Sir Charles Symonds argued in 1947 that stress concept should rely solely on stressors (stimulus approach), since "*stress happens to the man. Not in him*" (Cox & Mackey 1981, 97). The concept cannot completely rely on stressors either since it has the same problems as reaction approach – same stressors awoke different reactions on individuals (Sonnentag & Frese 2003, 454; Cooper, Dewe & O'Driscoll 2001, 9).

Cognitive psychology would later offer the transactional model of stress, which has been a basis for modern stress and technostress research in the field of psychology. The transactional model of stress was developed by Richard Lazarus and Susan Folkman in their work: *Stress, appraisal, and coping* (Lazarus & Folkman 1984). The model was based on the earlier model from Lazarus (1966) called *stress and coping*. The essence of the model is the transaction of environment and person, and the process of appraising and coping. (Lazarus & Folkman 1984, 294.) The transactional model of stress consists of following stages: 1) *stressor* (external or internal demand), 2) *primary appraisal* (is this a problem?), 3) *secondary appraisal* (what can I do?), 4) *coping mechanisms* (problem- or emotion-focused) and 5) *reappraisal* (i.e. is this still a problem). (Ibid.) Note that the major difference here, compared to the concept of homeostasis or Selye's view of stress is that, the transactional model includes a significant degree of individual agency. Since psychological stress and stressors are formed through the transaction of environment and person, it is difficult to predict stress reactions from stressors without taking individual properties into account. In other words, people have different personalities, attitudes, resources, and these properties affect how stressors are appraised and coped. Hence, people react and cope differently to the same stressor to some degree. The

transactional model includes both reaction and stimulus (stressor) based approach. (Lazarus 2006, 49; Lazarus & Folkman 1984, 20–21.)

Lazarus and Folkman (1984, 33–34, 294) states that the appraisal is *transactional*, which means that the meaning of the stressor is formed with the combination of humans and the environment. Thus, environmental stimuli are not considered stressors on their own. It only becomes a stressor when it is joined with a human element (appraisal). The transactional model has two appraisal stages: primary and secondary. Contrary to their names, *primary* and *secondary*, neither are more important than the other and neither precedes the other. Both of them can occur at the same time or in an overlapping manner. Primary appraisal is divided into three sections: positive, stressful, and irrelevant. Positive and irrelevant appraisals are quite self-explanatory. On the other hand, a stressful appraisal is further divided into three sections: harm/loss, threat, and challenge. (Ibid.)

Threat appraisal focuses on potential losses where challenge appraisal focuses on potential gains. Threat and challenge appraisals do not exclude each other and thus, some stressors could be appraised as a threat and a challenge. Since stress is a process, the interplay of simultaneous appraisal as a threat and a challenge might vary over time. They may occur simultaneously, but both of the appraisal styles have their own distinctive emotions. Challenge and potential gain involve positive emotions where threat involves mainly negative emotions. (Lazarus & Folkman 1984, 33–35.) The primary appraisal describes the part of the process of "what is happening?". The secondary appraisal describes the part of the process of "what can I do". It is a thought process of what can be done given by the options, resources, and coping mechanisms that the individual has in hand. If the primary appraisal is appraised to cause harm and the individual does not have sufficient coping, the overall experience is highly stressful. (Ibid. 35–36.)

Appraisals are not divided into appropriate or inappropriate styles by their own. The notion with whether certain appraisal styles are "good" or "bad" depends on the context of the stressful encounter. (Lazarus & Folkman 1984, 185.) As appraisal happens, coping mechanisms are involved to form an overall evaluation of the situation. The transactional model divides coping mechanisms into problem-focused and emotion-focused coping. Problem-focused coping involves attempts to change the situation itself within the reach of the person's resources (i.e. asking for help, working overtime, etc.). Emotion-focused coping on the other hand involves attempts to relieve emotions (i.e. relaxation techniques to reduce anxiety). (Folkman, Lazarus,

Dunkel-Schetter, DeLongis & Gruen 1986, 993; Lazarus & Folkman 1984, 44.) Reappraisal occurs later during the stress process. Reappraisal simply is the changed appraisal of the situation after coping or environment modifies the original appraisal process (Lazarus & Folkman 1984, 38). Coping mechanisms are another popular field of stress research and they reviewed in more detail in chapter 4.

Semmer and Meier (2009, 99) point out, that individual appraisals for stressors have been emphasized to a point where the concept of stress is reduced to a mass of appraisals and coping styles. They argue that individual differences in appraisals and coping does not mean that they are only differences in individuals but also in subcultures. Vollrath (2001) argues that the transactional stress process should almost be inseparable from personality traits, because of the tendencies of how certain personalities react to similar stressful situations. It is important to note that appraisal and coping stem from cultural and personal traits. This means certain cultures or subcultures at work, and personality traits also imply how stressors are appraised and coped. In other words, stress and coping forms alongside environmental and individual factors.

Lazarus (2006, 61) mentions four major environmental factors that affect stress and appraisal: demands, constraints, opportunity, and culture. Demands refer to demands that have a certain fixed appraisal attached to it and later internalized. In other words, there are *social conventions* to appraise certain demands in a certain way. Whereas demands describe a way something is "usually perceived", constraints depict situations where a certain action is limited to constraints. For, example excessive work stress might affect a home-work relationship, which would create more stress. A sufficient coping would be to lower the workload, but it might be constrained by the disapproval of the supervisor. Opportunity describes situations, where opportunity is the primary focus. For example, an employee might expose himself to a stressful situation, if he sees an opportunity in it (personal growth or financial compensation). Culture refers to situations where cultural aspects affect what things one should be proud, ashamed, embarrassed, or feel guilt. Besides, the mentioned environmental factors are intertwined with individual factors such as goals, resources, or beliefs. (Ibid. 61–72).

Reviewing the core physiological and psychological models mentioned in this section, there are some common things to address. In some models, the overall stress experiences are separated to eustress and distress (e.g. Selye 1974). Many studies conclude that eustress leads to good outcomes and distress leads to bad outcomes (e.g. Rudland, Golding & Wilkison 2020).

However, Lazarus (2006, 32) states that the attempt to divide stress into good and bad is vague and controversial. He mentions that the division has its appeals, but it has received inconsistent empirical support. The closest resemblance to eustress in the transactional model is the challenge appraisal (ibid. 76). The transactional model includes both positive and negative emotions, but stress is not fundamentally divided into good or bad (ibid. 264).

Polarized conceptions of stress might not be the most cohesive way to examine it. As it turns out in the transactional model, stress is a delicate and complex process that shifts over time. The emotional state and situational factors are rarely static during the process of stress. A stressful event starts with a stressor and emotions, appraisals, and coping vary as the situation proceeds. (Lazarus & Folkman 1984.) The division of good and bad stress is a way to demonstrate at a general level that stress does not exclusively lead to only harmful outcomes. LePine, Podsakoff, and LePine (2005, 765) state that the distinction between eustress and distress is a potential ground for developing work-related stress concepts, but it does not hold strong theoretical ground in an organizational and occupational context yet. In many studies, eustress is often referred to as in its original conception and thus, many studies are often using an underdeveloped model of eustress (Nelson & Simmons 2003).

### **3.2 The two-dimensional model of work stress**

When the nature of work and organization changes throughout time, so does stress at work (Cooper 1999, 571). There are many popular occupational stress models in organizational psychology (Le Fevre, Matheny & Kolt 2003, 730–731). Early occupational stress research acknowledges at least six themes of occupational stress: 1) Intrinsic job factors (workload, conditions, new technology), 2) role-related factors, 3) relationships at work, 4) career developments, 5) organizational climate and 6) home-work interface (Cartwright & Cooper 1996, 204–205). Work-related stress can be approached through the two-dimensional model of work stress that has been conceptualized by LePine, Podaskoff, and LePine (2005).

Thinking back to the transactional model, one of the stressful appraisals was to treat a stressor as a challenge (or both challenge and a threat). It would be taxing and includes a risk of failure, but the principal attention of the appraisal style lies in potential gains. Even if beneficial stressors would exceed the person's recourses to cope, it will still lead to unfavorable outcomes (Lazarus 2006, 58). Similar to the appraisal styles in the transactional model, Podsakoff,

LePine, and LePine (2007) argues that work stressors should be divided into *challenge* and *hindrance* stressors. Challenge stressors consist of task-related difficulties such as pressure to complete the task, cognitive demand, time pressure, quantitative and subjective workload. Hindrance stressors have to do with situational factors like hassles, bureaucracy, role conflict, or resource inadequacies. (Ibid. 442.) In general terms, challenge stressors are depicted as something that the individual has a high degree of control, but the work-related task is demanding. Challenge stressors are best described as *obstacles* to overcome. Hindrance stressors are the exact opposite, where work-related task involves a lot of variables that prevent the employee to complete the task efficiently. Hindrance stressors can be described as "*red tape*" to prevent employees from completing tasks. (LePine, Podsakoff & LePine 2005.)

The two-dimensional model of work stress was inspired by the inconsistent findings in studies involving a stress-strain perspective. Stress is usually associated with strain, but in some cases, stress led to beneficial outcomes such as job satisfaction. (Podsakoff, LePine & LePine 2007.) For example, Cavanaugh, Boswell, Roehling, and Boudreau (2000) found out that self-reported work stress had a positive association with job satisfaction. They state that stressors can be divided into two distinctive categories (challenge and hindrance) with their own distinctive behavioral and attitudinal outcomes (ibid. 70). The two-dimensional model overlaps with the transactional model and it can be considered as an extension or more comprehensive examination of stressors (Podsakoff, LePine & LePine 2007, 438). The model states that challenge stressors involve potential gain but also taxes the person for increased effort. Thus, while challenge stressors are often linked to beneficial outcomes like work engagement, job satisfaction, and organizational commitment, it is also linked to poor outcomes such as burnout. Hindrance stressor is appraised mainly as harmful which negative outcomes such as exhaustion, decreased job satisfaction, and decreased organizational commitment. (LePine, Podsakoff & LePine 2005; Crawford, LePine & Rich 2010, 837.) LePine, LePine, and Jackson (2004) also found that both challenge and hindrance stressors were associated with exhaustion, but a positive association was only found between challenge stressors and performance, while Hindrances had a negative association to learning performance.

Semmer and Meier (2009, 102) describe how appraisals are always done with goals and aspirations in mind. This means that appraisals are contextualized and reflected towards individual goals. These goals or "*personal strivers*" as Emmons (1996) calls them, are an important part of the individual appraisal process. Goals can range from minor ones like current

task goals to long-term goals, like building professional identity. Striving to accomplish these goals could be comparable to a more general version of motivation. (Semmer & Meier 2009, 101–103.) Individual work-related goals are an important part of the appraisal process since the potential gain in challenge stressors usually affects the goal directly. This is the reason why stressors, while taxing, might increase productivity. It has the potential to move individuals towards their occupational goals (promotion, identity building, keeping their job, money, etc.). (Lazarus 2006, 70–72.)

The two-dimensional model has two weaknesses and they both have to do with the individual properties. First, appraisals vary across individuals and it may lead to a faulty situation where challenge stressors are appraised as hindrance stressors instead. This would lead to a faulty depiction of the phenomena in attempts to measure it. Second, individual differences are overlooked in the sense that perhaps certain individuals tend to always find the positive traits in everything. For example, it could be that only goal-orientated people may find some stressors as a challenge. (Min, Kim & Lee 2015, 107.)

### **3.3 Technostress**

The early concept for technostress was developed by Brod (1984, 16) who defined it as *“modern disease of adaptation caused by an inability to cope with the new computer technologies in a healthy manner.”* Brod's technostress is conceptualized to mainly address organizational context. His model of technostress consists of two distinct but related parts. Anxiety and overidentification. Techno anxiety is manifested by the pressure from peers, employer, or culture to use new technology and it is outlined by reactions such as frustration and helplessness. Brod describes people who overidentify with technology as techno centered people. They form a "symbiotic" relationship with technology causing them to modify their behavior towards computerlike, losing the ability to emphasize and relate to others. (Brod 1984, 16–20.) In his early work, technology often referred to hardware with default built-in user interfaces (e.g. ATM machine). The concept of technostress is mainly to do with the use of hardware. The rise of modern ICT creates a major contrast to Brod's early perception of "new technology". Today's conversation about technology is inseparable of the software it can support, and more discussion revolves around new software in contrast to new hardware. For

example, there is no need to purchase smartphones that often, but software updates are frequent events for improving existing technology.

Brod (1982, 755) describes how technostress overall leads to loss of productivity and additional stress. He calls this the technostress error cycle, where demands regarding technology create stress which leads to increased error which leads to loss of productivity which in turn leads to more technostress. Technostress is viewed more broadly by Tarafdar, Cooper, and Stich (2019) with the theoretical framework of *the technostress trifecta*. The trifecta refers to three elements of technostress which are techno eustress, techno distress, and information technology design. Technostress stems from the use of ICT and they are conceptualized as *triggers* (techno-stressors) to technostress experience. Their definition of technostress is based on the transactional model of stress and follows every pinnacle trait of the model. They define technostress as follows: *Technostress is a process that includes (1) the presence of "technology environmental conditions"; which are appraised as (2) demands or "techno-stressors" that are taxing on the individual and require a change; which set into motion (3) "coping responses"; that lead to (4) psychological, physical, and behavioral "outcomes" for the individual.* (Ibid. 8.)

The technostress trifecta acknowledges two different and separate technostress experiences. Techno eustress and techno distress. Techno distress includes negative appraisals like threat or potential loss, but eustress includes thrilling or challenging appraisals. (Tarafdar, Cooper & Stich 2019, 17–18.) The trifecta attempts to combine the transactional model and Selye's (1974) stress division to eustress and distress. The model also conceptualizes challenge techno-stressors which is similar to challenge stressors in the two-dimensional model of work stress. Challenge techno-stressors are considered stressful appraisals with potential gain or mastery of ICT in mind. The trifecta model does not apply any other aspects of the two-dimensional model beyond challenge stressors. However, challenge techno-stressors are conceptualized as appraisals that would lead to techno eustress (good outcomes). (Tarafdar, Cooper & Stich 2019.) This could be partly misleading since challenge stressors still have their negative impact based on the two-dimensional model (e.g. LePine, Podaskoff & LePine 2005). Another potential misleading element in the trifecta framework is that techno-eustress and techno-distress are depicted as separate constructs. This would suggest a dichotomous view of the stress process, where techno-stressors are appraised as either challenges or threats. Quick and Macik-Frey (2007, 43) do note, that in stress models, where eustress and distress are



conceptualized as separate dimensions, both dimensions can usually be experienced at the same time.

Salanova, Llorens, and Cifre (2013, 13) conceptualizes two main technostress dimensions that are strain and harmful addiction. Strains were constructed from four dimensions: anxiety, fatigue, skepticism, and inefficacy, which are expected to lead to harmful results in employees. Technostress creators inventory (TCI) from Ragu-Nathan, Tarafdar, Ragu-Nathan, and Tu (2008, 429–430) include five dimensions of technostress. These are overload, insecurity, invasion, uncertainty, and complexity. Overall technostress was found to be negatively linked to job satisfaction. All five of the mentioned dimensions create technostress experience and all of the dimensions are found to be negatively associated with job satisfaction (ibid. 429). Out of the five mentioned technostress dimensions, two will be reviewed more in detail. Techno-overload and techno-invasion.

*Techno-overload* is based on the notion that there are multiple different streams of information channels, where a person can communicate. Problems would arise when a person has trouble prioritizing communication or has to cope with limiting their availability. Techno-overload is hard to manage since organizations usually want their workers to be open to new information quickly and easily. Also, managing multiple information channels at the same time also means mastering the use and the skill to alternate between multiple uses of information channels. (Kupersmith 1992, 9.) Techno-overload is suiting to depict organizations that use multiple different social media applications (Yammer, Slack, Work by Facebook, MS Teams, etc.) that may easily lead to having too much to handle, too fast to process and too many outlets to master (e.g. ibid). Rennecker and Derks (2012, 32–33) argue that the term information overload is inadequate to describe the everyday life of email overloaded employees. They suggest that email related overload comes together with work overload and social overload. Information brings more work and messages from multiple sources evoke different roles (possible role conflict). Hence, the stressful experience from techno-overload might be entangled to other phenomena as well.

*Techno-invasion* refers to an experience of always being available. This opens workers to situations where they are reachable at almost any time, leading to a sense of responsibility to reply and also blurring the line between home and work (Tarafdar, Tu, Ragu-Nathan & Ragu-Nathan 2007, 315). Job-related stressors, such as techno-invasion, have clear associations with work-to-home conflict, which in turn, is partly associated with depression (Frone, Russell &

Cooper 1992). increased turnover intentions (Simon, Kümmerling & Hasselhorn 2004) and feelings of guilt (Judge, Ilies & Scott 2006). Overall technostress concept is identical to every pinnacle trait of the transactional stress process. The technostress trifecta recognizes challenge stressors, but they are exclusively placed under eustress experience. Techno-overload and techno-invasion are mostly considered to lead to distress experience (Ragu-Nathan, Tarafdar, Ragu-Nathan, and Tu 2008), which would partly undermine the effects of challenge stressors. Many technostress concepts including Brod (1982) and Salanova, Llorens & Cifre (2013) mainly consider technostress to describe distress. The two-dimensional model of work stress offers a different perspective through stressor types that move away from the labels of the *dark* and *bright side* of the overall technostress experience.

### **3.4 Curvilinear model of stress and productivity**

The curvilinear (quadratic) relationship in the shape of inverted U between arousal and performance comes from experiments conducted by Yerkes and Dodson (1908), called the Yerkes-Dodson law (YDL). Their finding originated through experiments with mice. They gave electric shocks to mice to see if they would learn to avoid them. The objective was not only to see if the mice would learn certain behavior but were also to find out the optimal degree of a shock for mice to learn to avoid shocks as *fast* as possible. Mild shocks often led to slowly increasing interest while as strong shocks impaired performance in mice. The key finding was that the optimal degree of arousal led to an optimal degree of performance. Hence, the relationship between arousal and performance is curvilinear (inverted U-shape).

Some studies support the curvilinear relationships of stress and productivity (e.g. Leung, Huang, Su & Lu 2011; Cowan, Sanditov & Weehuizen 2011). MacFadyen (2015, 187) describes stress as part of life with good and bad aspects. Also, she describes the relationship between stress and productivity based on YDL and concludes that stress can increase productivity to a certain point. The literature seems to be divided on the YDL and whether it should be applied in research or not. Robinson (2018, 338) states that the main problem with YDL is that it can explain everything. Hence, it explains nothing. Le Fevre, Matheny, and Kolt (2003, 727) stated that YDL would influence management practices at work in a way that organizations would try to maintain "optimal stress" instead of minimizing it. Corbett (2015) wrote an extensive paper arguing why applying YDL is a wrong path to examine the stress-to-

productivity relationship. He calls YDL a "folklore" with little empirical evidence and found out that more studies support the negative linear relationship of stress-to-productivity. However, he did little to compare stress definitions and their implications although he briefly mentions eustress to be good stress. He uses the term stress interchangeably when reviewing other studies and the main problem he sees in applying YDL is the same that Le Fevre et al. (2003) had: YDL encourages organizations to maintain and manage stress over attempts to diminish it (Corbett 2015, 746).

YDL related criticism presented above had not elaborated of what kind of stress is under review. There are general mentions of good and bad stress, but little effort is put into the examination of stressor types. For example, the study made by Lee, Lee, and Suh (2016) included a hypothesis that technostress would be negatively associated with productivity. The results were against their hypothesis and showed a positive association between technostress and productivity. They did not clarify the type of stressor or the type of stress in their study and their overall conception of stress was negative and vague. Technostress dimensions were described but they were deemed overall to mean distress. Their study is a great example of why a more extensive examination of different stages of the stress process might yield more accurate results. Also, the positive association of stress and productivity would be hard to explain if, in any condition, the YDL was not theoretically well-grounded. The findings of Lee, Lee, and Suh (2016) would especially encourage to maintain stress in workplaces since it showed a positive linear association.

One of the reasons for the conflict between linear and curvilinear models stems from the use of the term *stress*. The confusion of the term dates back to the beginning of the concept (e.g. Selye 1975). Previous studies worry that the YDL model promotes attempts to maintain stress. In cases where stress leads to beneficial outcomes, it is important to rationalize what kind of stress it is beyond the robust division of good and bad, and what other effects may appear for maintaining work-related stress in addition to increased performance. Nelson & Simmons (2003, 275) examine the curvilinear relationship of stress and performance together with challenge and hindrance stressors. They conclude, that the curvilinear effect could be best explained with eustress and distress. Low amounts of stress would translate to understimulation and boredom, which has harmful effects on health and performance. Moderate levels of stress would depict eustress and at the turning point of the curve, performance would

be at its highest. Excess amounts of stress or overstimulation would decrease health and performance. In the case of overstimulation, eustress would convert back to distress.

## 4. PROCRASTINATION

Procrastination is a complex concept. Some studies conceptualize procrastination as a personality trait (e.g. Schouwenburg & Lay 1995) others conceptualize procrastination as maladaptive coping (e.g. Ferrari, Johnson & McCowan 1995, 61). Procrastination is a popular phenomenon and it is vague in its definition and theoretical premises. There is no common consensus for a widely accepted theoretical background and this leads to challenges in measuring procrastination. (Steel 2002.) However, all definitions include a form of “*postponing, or putting off of a task decision*” at its core (Steel 2007, 66). Procrastination is approached as a form of *avoidance coping*. Hence, the next section will review coping models, followed by procrastination literature.

### 4.1 Coping

The transactional model mentioned previously has two distinctive labels of coping. Emotion- and problem-focused. Emotion-focused coping relies on anxiety-relieving techniques while problem-focused coping relies on proactive attempts on dealing with the stressor. (Lazarus & Folkman 1984, 44.) There are many overlapping models in coping research that has similar approaches to the concepts of coping. Coping research has its basis on defense mechanism models. However, defense mechanisms are perceived as strict and rigid concepts of defending the person's ego while coping concepts are more flexible and reality orientated. (Ibid.) In all essence, almost anything can serve as a coping style (Parker & Endler 1996, 9).

Division to emotion and problem coping are one of the early attempts to parse different coping styles. Additional coping division alongside problem-emotion is approach-avoidance. Roth and Cohen (1986) further developed the approach-avoidance model of coping. Approach and avoidance are the embodiment of proactive and emotional attempts to deal with stress to either approach or avoid the threat. Avoidance coping is effective for relieving stress and anxiety and this can be a powerful way to deal with stressors in the short term. Avoidance will keep the person from incapacitating themselves from stress and anxiety. However, in the long term, avoidance coping is not so sufficient, since it does not directly deal with the source of the stress. Approach coping is mostly considered as the appropriate response in most situations. It includes action and attempts to deal with the stressor directly in order to solve it. This provides the potential resolution to the stressor. (Ibid. 813.)

In approach strategies, if a person does not have sufficient resources to deal with stressors, this could lead to increased distress and feelings of nonproductivity. Avoidance coping on the other hand may disregard the potential to engage stressor to resolve it. The constant efforts to keep the stressor away from person awareness may lead to emotional numbness and disruptive behaviors. (Roth & Cohen 1986, 818.) Most literature in stress and in coping highlights the continuous nature of them. Same as stress, coping is also considered a process (Parker & Endler 1996, 10–11). Hence, the division of coping to two extreme styles is not the best way to describe the nature of coping as a process. The dichotomous view of coping oversimplifies the coping process and it is important to acknowledge when discussing coping styles. (Lazarus 2006, 108, 111–112.) The most effective and also the most likely coping styles will include both approach and avoidance. This can be regarded as adaptive coping (Roth & Cohen 1986, 818). In other words, adaptive coping does not only include problem-focused or approach strategies (usually deemed appropriate in most context) but a healthy mix of multiple coping strategies. Imagine a person facing an excessive workload. The most effective coping might include beneficial parts of both styles. Approach to a stressor to lessen the workload but also to distance himself at some point to avoid exhaustion.

The approach-avoidance model is similar to the problem-emotion model. Approach coping can be considered to be parallel to problem-focused coping since they both rely on dealing with the stressor. Avoidance and emotion-focused coping are similar since they both do not deal with the stressor directly. Zeindner and Saklofske (1996, 505–515) also present a coping model with adaptive and maladaptive coping. The core of adaptive coping can be described as "healthy" coping while "maladaptive" coping refers to unhealthy coping. These taxonomies, like approach-avoidance and problem-emotion models, are useful and they cover a vast amount of different coping styles.

Perspectives in coping have the same issues in concept as in transactional views of stress. Objectively we can strip down every human interaction to stress and coping. Think about routine tasks in the workplace. A minor and not challenging task would arouse a person to appraise and cope with it. It is safe to say that in everyday life a minor routine or perhaps boring work-related task is not appraised as a stressful event, even when theoretically, it could be depicted as stressful. Costa, Somerfield, and McCrae (1996, 45–46) depict coping as a special category of adaptation. In psychology, adaptation is a broad term used to describe that every psychological affair (e.g. motivation, learning, perception, emotion, etc.) is all involved in a

person's continuous interaction with the environment. Therefore, coping is defined as a special category of adaptation, meaning that it deals with *unusually* taxing events over time. (Ibid.) In other words, stressful events and the need for coping depicts unusually taxing events. Employees' "*business as usual*" type of workdays are not considered unusually stressful.

It is recognized that personality traits affect human functioning. As for stress research, the association of personality traits to appraisal and coping varies. Studies support the notion that coping (and stress) is heavily influenced by individual traits such as personality and personal tendencies (Somerfield & McCrae 2000, 623). Costa, Somerfield, and McCrae (1996, 48–51) display some of the major studies regarding personality traits and stress. Neuroticism and extraversion are popular traits that have been studied in stress context. For example, anxiety and neuroticism are associated with less use of problem-focused coping and increased use of avoidance coping.

Usually, employees are equipped to complete their tasks and organizations have their responsibilities in some possible workplace stressors. If an employee is hired to complete certain tasks, the assumption is that the organization provides reasonable resources and conditions for the employee to complete the task. In other words, organizations have certain responsibilities to have ways for employees to cope with stress. Organizations have the responsibility to encourage and empower their employees to engage in effective coping. (Callan 1993.) In an organizational setting, stress and coping impacts both employee and organization. Problem-focused (i.e. approach) coping is usually the most appropriate coping in organizational settings (Steel 2007).

Employees and managers tend to cope poorly for situations where they cannot apply their past experience. That is why organizational change is deemed to be a highly stressful event. (Cartwright & Cooper 1996, 209.) The responsibility of the organization is repeated. Stress and coping are a common objective to handle with both employee and organization. Also, the increased attempts to accommodate social media in workplaces might predispose organizations for constant change.

## 4.2 Procrastination

Steel (2007) conducted a comprehensive meta-analysis from procrastination literature and provides a general definition: procrastination is a *self-regulatory failure*. There are different procrastination concepts, but they are all defined through elements of postponing, delaying, or putting off a task or decision. It is also considered an irrational delay of behavior when the schedule for completing the task is voluntary. Procrastination's connection to productivity is complex. Overall studies support the negative effect of procrastination on productivity. However, some studies show positive effects, since in some cases procrastination helps individuals to gather their resources to deal with deadlines. (Ibid. 66, 70.) These inconsistencies in research might be explained by Steel's (2007) notion of the variety of different procrastination concepts in research.

Beneficial procrastination seems to be rare in literature. Ferrari (1993) acknowledges the potential beneficial side of procrastination. Procrastination can have a positive effect on productivity since it may include prioritizing certain tasks or waiting to get all the potential information before engaging in the task (Ibid. 265). Steel (2002) concluded that procrastination might have positive and negative effects on productivity. Procrastinators tend to have the ability to complete vast amounts of tasks before the deadline. This would lead to increased productivity. However, besides the end result, the overall performance is impaired by procrastination. The nature of work tasks also has a huge impact on the degree of procrastination. (Ibid.) Individuals who tend to procrastinate have an ability to cram incredible amounts of work before deadlines, but overall, they simply have less time to complete the tasks. (Steel, Brothen & Wambach 2001). It is a dual nature of having the ability to be highly efficient before the deadline and tendency to put off tasks until it is absolutely necessary to complete them.

A lot of similarities can be found from previously mentioned coping literature and Steele's (2007) findings. He states that there are strong connections for neuroticism and procrastination. Neuroticism is linked to traits like anxiety, worrying, low self-esteem, and self-handicapping. The previous chapter established that neuroticism is associated with low use of problem-focused coping and high use of avoidance coping. External reasons for procrastination had been theorized to be caused by things like task averseness and timing. (Ibid. 68–69, 75, 80.)



Procrastination has mostly negative effects in an organizational context. High procrastination is linked to low salaries, a high likelihood of unemployment, and low rewarding jobs (Nguyen, Steel & Ferrari 2013). Tice and Baumeister (1997) found that procrastination was linked to low levels of stress and illness in the short term but have an inversed effect in the long term. Steel (2007) states that procrastination mainly has negative effects on performance. Following Steel's (2007) statements about the core of most procrastination concepts, procrastination directs the attention away from the stressor and it is emotion-focused since it provides relatively immediate psychological relief and a false sense of control with the situation, without dealing with the stressor itself. Procrastination is also linked with maladaptive coping (Sirois & Kitner 2015, 440) which would suggest that it is an unhealthy coping style.

There is a need to contemplate the relationship between procrastination and coping. The previously mentioned literature shows how procrastination is a complex concept due to the inconsistent findings and lack of a widely accepted model. Also, coping literature is mixed on whether coping serves as a trait, style, or something else. Procrastination is a popular subject in personality related studies. Many studies consider procrastination as a personality trait and thus, try to place procrastination to the big-five personality model (e.g. Schouwenburg & Lay 1995). Steel (2007, 67) states that whether procrastination is considered as a personality trait, is an "*empirical question*". If procrastination holds its consistency over time and situation, it would provide the support that procrastination is a personality trait. Many studies seem to indicate that procrastination seems to be a trait (Ibid.). However, it is a matter of perspective. Procrastination has been referred to as a coping mechanism and some even consider procrastination as maladaptive coping (Ferrari, Johnson & McCowan 1995, 61, 80). Lazarus (2006, 103–104) describes a less used perspective of habitual coping, which highlights coping as a characteristic of an individual but still as a coping trait.

As mentioned above, the core of the concept involves *postponing, delaying, or putting off a task or decision*. This goes parallel to descriptions of avoidance coping. Procrastination is even referred to as avoidance coping by Pychyl and Flett (2012, 204). Similar to the "trait or style" debate regarding coping, Schouwenburg (2004) divides procrastination as a trait (trait procrastination) and as a situational behavior (state procrastination). This demonstrates that procrastination is a flexible phenomenon that can be conceptualized in different ways. It is also important to briefly distinguish the role of coping in the stressor-outcome relationship. There is overall support in the early transactional model of stress, that coping is seen as a moderator.

For example, successful coping may serve as a "buffer" to the stress-outcome relationship. (Cartwright & Cooper 1996, 203.) However, various studies use coping as a mediator and a moderator. The difference between moderator and mediator was best explained by Frese (2012, 184) with the following statements:

*“1. Coping serves as a mediator when it is related to both stressors and the stress reaction or, more specifically, when it links the stressors to the stress reaction. The causal impact of stressors on the stress reaction works via coping. Theoretically, this may mean that the stressor situation influences a certain type of coping response that, in turn, leads to psychological health or dysfunctioning.”*

*“2. Coping can function as a moderator when the relationship between stressors and stress reaction is dependent on whether a person is a “good” or “bad” copier. Here the relationship between stressors and stress reaction is increased or reduced by a third, independent variable.”*

There is some inconclusive literature about whether coping serves as a mediator or moderator. A study made by Jose and Huntsinger (2005) examined how well does coping (problem- and avoidance-coping) serves as a mediator and a moderator between stress and psychological outcomes. The results were complex. Problem- and avoidance-coping moderated the stress-strain effect on one demographic (Asian-American) but not on another (European-American). Avoidance-coping also served as a mediator for the same demographic but not on another. This would support Semmer’s and Meier’s (2009, 99) argument, that coping mechanisms form as a part of a subculture.

## 5. HYPOTHESES

The present thesis uses the concept of self-reported social media enabled productivity, called social media productivity (SM productivity). SM productivity follows the same pinnacle traits as the productivity literature mentioned earlier. It is the feeling of conversion efficiency of input and output which is impacted by social media to a degree. This includes certain tasks which are completely or partly done via social media.

Social media stress (SM stress) is conceptualized by combining aspects of the two-dimensional model of work stress (LePine, Podaskoff & LePine 2005) and technostress (Tarafdar, Tu, Ragu-Nathan & Ragu-Nathan 2007). SM stress describes two technostress dimensions that are relevant to the analysis (overload and invasion) and these are perceived to arise from challenge stressors. Overall overload and invasion experiences describe difficulties (too much and constant connectivity) instead of hindrances that would prevent completing tasks. Challenge stressors have an established positive association with productivity. Thus:

*H1: SM stress is positively associated with SM productivity.*

There are some inconsistent findings on procrastination's effect on performance. It might have a positive effect on some cases, but the main associations are consistently negative in an organizational context such as loss of productivity. (Steel 2007.) Thus:

*H2: Procrastination is negatively associated with SM productivity.*

The present study applies the curvilinear assumption of SM stress and SM productivity. The assumption of non-linearity of stress and productivity is not so unfounded based on the literature mentioned earlier. Still, curvilinear models are received with conflict in an organizational context. However, the present thesis clarifies a certain stressor type (challenge) to have a positive association with productivity. The following hypothesis is made to participate in the ongoing debate about the curvilinear model between stress and productivity. Thus:

*H3: Curvilinear (inverted U-shape) effect between SM stress and SM productivity is supported.*

Procrastination has strong associations with personality traits and avoidance coping. Procrastination is conceptualized as a *habitual coping* that highlights both trait and coping aspects (see Lazarus 2006, 103–104). Coping is also conceptualized and used as a moderator to the stress-strain relationship. The present thesis examines the tendency to engage in procrastination, which can be considered also as a form of avoidance coping. Thus:

H4: *The relationship between SM stress and SM productivity is moderated by the tendency to engage in procrastination.*

## 6. METHOD

### 6.1 Data

The present study utilizes the data from *social media at work in Finland survey* ( $N = 1817$ ). The survey was carried out online by Norstat. The survey was voluntary and in Finnish language. Also, participants were informed about the nature and purposes of the research project. It was conducted as a part of a Finnish project: *Social media and work engagement among young adults*. The project is led by a professor of social psychology Atte Oksanen and it is funded by the Finnish Work Environment Fund. The Academic Ethics Committee of Tampere region in Finland concluded that the project does not include any ethical issues. (Oksanen, Oksa, Savela, Kaakinen & Ellonen 2020.) As the title of the project suggests, the interests revolve around work-related wellbeing such as burnout, job engagement, technostress, and cyberbullying.

The survey consists of both part- and full-time employees. It includes a group of questions regarding the use of 21 specific social media and one open field question for participants to add any social media that they use in the workplace. For the purposes of this study, respondents who did not report using social media for work purposes and were not in full-time employment were left out. This led the data to  $n = 1136$ . Age ranged from 18-65 ( $M = 42.02$ ,  $SD = 11.68$ ). and 43% were females and 22% were in executive positions. Hirsjärvi, Remes & Sajavaara (1997, 178–180) encourage the further evaluation of the data sample regarding sample size and its generalizability. The final data sample has a relatively good division of male and female respondents. Other genders were not reported. Every respondent was employed at the time of the survey and they also used social media for work and leisure purposes diversely. The sample size is large and the survey was conducted nationwide, including various occupations. Overall the sample seems to be representative for full-time employees in Finland, aged 18–65, for males and females.

## 6.2 Variables

Before reviewing variables there is some need to discuss the assumption of normality regarding summarized variables. Variables have to be normally distributed for statistical analysis. Ghasemi and Zahediasl (2012) argue that in large data samples a violation of normality assumption should not cause problems. Some of the more standard normality tests such as Kolmogorov-Smirnov are problematic for large data samples because it is sensitive to small deviations. Another way to evaluate normality is to look at skewness (symmetry) and kurtosis (pointiness). In a perfectly normal distribution, skewness and kurtosis are both 0. A negative skewness implies a left-skewed distribution. A negative kurtosis means a flatter pointiness of the distribution. In very large samples skewness and kurtosis criterion should not be applied and in large samples ( $N = 200$  or more) criterion for skewness and kurtosis should be  $\pm 2.58$  to consider distribution as relatively normal. (Ibid.) Since the data in the present thesis ( $n = 1136$ ) is considered large, the normality of the variables is reviewed to the criteria of not exceeding  $\pm 2.58$  skewness and kurtosis.

The summarized variables' inner consistency was measured using Cronbach's alpha ( $\alpha$ ). The alpha value ranges from 0–1, whereas 0 indicates no internal consistency, meaning that the items do not correlate each other to a degree where they measure the same construct and 1 where items perfectly correlate with each other (Bland & Altman 1997, 572). There is some discussion about the cut-off value of alpha in the research literature. A fixed cut-off value is often unnecessary, but values of 0.7–0.8 and above are considered as satisfactory (ibid).

There are four different types of variables. Nominal, ordinal, interval, and ratio. Nominal variables are assigned numeric values to represent different levels of the variable and that is the only function of the numeric value. It does not mean an increase in the observed value. The present study utilized gender as a nominal variable. Females and males are assigned a numeric variable to represent their gender, respectively. Ordinal variables describe the order or sequence of observed variables, but not the distance between them. Interval and ratio are similar and in addition to the order, they also include the same distance between observed value. (Urdan 2010, 4.) SPSS does not differentiate the interval and ratio variables. It only identifies nominal, ordinal, and scale. Scale can be considered to represent both interval and ratio variables in the present study. Hence, variables that utilize interval scales like the Likert scale, are considered as scale in SPSS.

*Social media productivity* holds three items (e.g. “*Social media helps me improve the quality of my work*”). The questionnaire was adapted from Tarafdar, Tu, Ragu-Nathan & Ragu-Nathan (2007) work regarding technostress and productivity. They ensured validity by reviewing the original questionnaire and by conducting a pre-pilot study. The original techno-productivity held 4 items and was based on *task productivity* questionnaire from Torkzadeh & Doll (1999). Items were measured on a 7-point scale ranging from 1 “*fully disagree*” to 7 “*fully agree*”.

*Social media stress* consists of two dimensions. Overload and invasion. Original techno-overload holds five items and techno-invasion holds four. In the present study, both dimensions were reduced to three items each. Questions related to technostress was modified to apply to social media to further single out the social media side of technostress (e.g. “*I am forced by this technology to work much faster*” was changed to “*I am forced by this social media to work much faster*”). Items were measured on a 7-point scale ranging from 1 “*fully disagree*” to 7 “*fully agree*”. Social media overload and social media invasion dimensions were summarized to represent SM stress.

*Procrastination* was measured with two items describing the overall perceptions of individual tendency to avoid initiating task performance. (e.g. *Do you have a tendency to spent the time on other things in order to avoid your work-related tasks*). Items were measured on a 7-point scale ranging from 1 “*never*” to 7 “*all the time*”.

Demographic variables include *age* and *gender*. Gender was dummy coded for 0 to represent males and 1 for females. The nominal variable requires to be dummy coded to be used in OLS regression models. More about dummy-coding in chapter 6.3.2.

Table 1 summarizes the variables and their descriptive statistics. SM productivity and SM stress have relatively low mean scores. All summarized variables have satisfactory Cronbach's alpha and all of them are within the criteria of  $\pm 2.58$  skewness and kurtosis. Skewness in SM productivity, SM stress, and procrastination are positive, which indicates a right-skewed distribution. Variable distribution for SM productivity and SM stress is shown in Figures 1 and 2. They both have clear right skewness. Although the distribution is not ideal, they do not create any major concerns for analysis due to the large sample and not exceeding the  $\pm 2.58$  criteria in skewness and kurtosis.

Table 1. *Variables (n=1136).*

Variable	$\alpha$	M	SD	Range	Skewness	Kurtosis	Items
<b>DV:</b>							
SM productivity	.939	2.75	1.56	1-7	.54	-.73	3
<b>IVs:</b>							
SM stress	.887	2.22	1.21	1-7	.99	.42	6
Procrastination	.864	4.66	2.18	1.5-10.5	.52	-.42	2
<b>Demographic variables:</b>							
Age		42.02	11.68	18-65	-.02	-1.05	
Gender:							
Female (43%)							
Male (57%)							

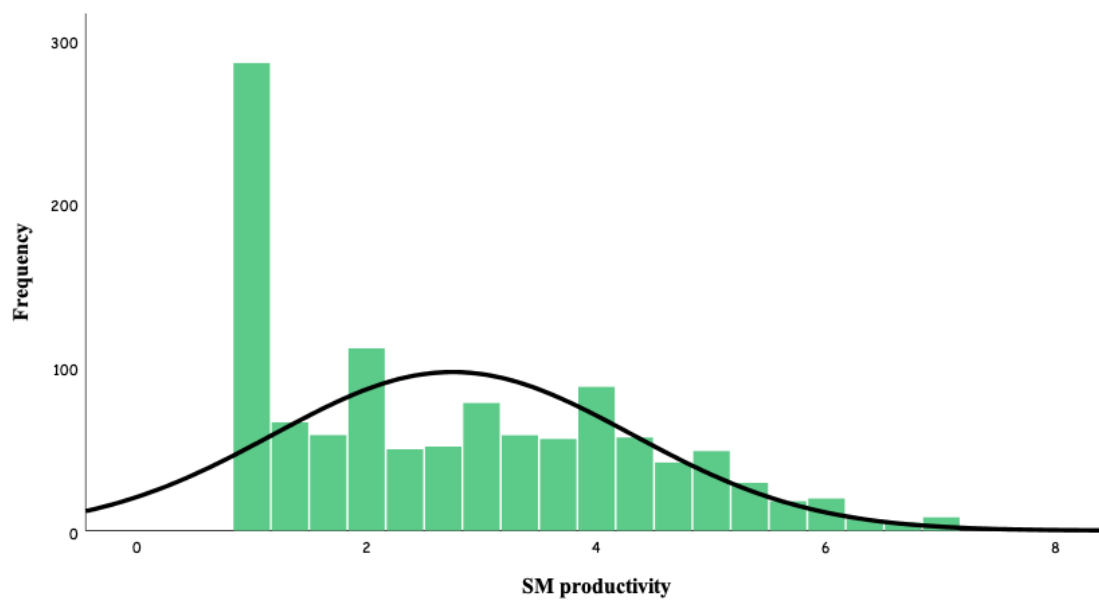


Figure 1. *Variable distribution of SM productivity.*



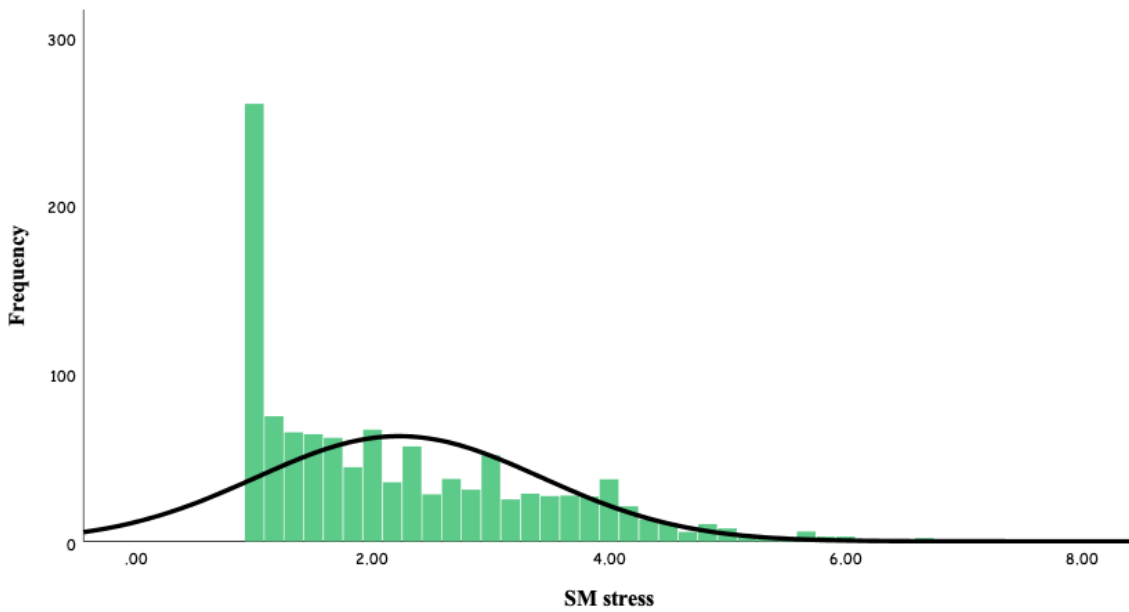


Figure 2. *Variable distribution of SM stress.*

### 6.3 Statistical methods

IBM SPSS Statistics (v25) was used to conduct statistical analysis. Also, a macro by Ahmad Daryanto was used to test some of the requirements for OLS regression. Weight was applied to the data to correct any bias in the data. Also, one out of the 22 social media related questions had 294 missing data inputs. This refers to the optional open field question where respondents could write down any additional social media that were not mentioned in the survey. The missing data was most likely due to the question being optional. There are multiple solutions to replace missing data (or ignore it altogether). The present thesis applies zero imputation method, where missing data is replaced by 0. (Wei, Wang, Su, Jia, Chen, Chen & Ni 2018.) This chapter is divided into five parts to describe the steps used in the analysis. First, a correlation coefficient is conducted to examine the associations between variables. Second, hierarchical OLS regression is used to examine the relationship between SM stress, procrastination, and demographic variables to SM productivity. Third, the quadratic term is computed and applied to examine curvilinear effect. Fourth, the interaction term is computed and applied to examine moderation effect. Finally, the requirements for successful OLS regression is introduced.

### **6.3.1 Pearson correlation**

Pearson correlation ( $r$ ) is one of the most used correlation coefficients and it is carried out to review the strength of linear association between variables. It is a bivariate statistical method which means the main interest lies in the relationship of two variables. It can have values ranging from -1 to +1 where 0 indicates no linear relationship, -1 indicates a perfect negative linear relationship and +1 indicates a perfect positive relationship. (Tabachnick & Fidell 2013, 2, 56.) By calculating Pearson  $r$ , a sense of the linear strength can be interpreted between variables. This means we get a sense of how strongly variables are related. Combining correlation analysis together with multiple regression analysis will form a comprehensive picture on how variables are related (Bewick, Cheek & Ball 2003.) Correlation between a nominal and scale variable is usually referred to as Point-Biserial correlation. Pearson correlation is quite handy since it can calculate correlation coefficients for both nominal to scale, and scale to scale variables. (Howell 2010, 295.) Pearson correlation is not dependent on measurement scales since it converts variable scores to standard scores (Tabachnick & Fidell 2013, 56). Hence, there is no need to worry about different measurement scales between variables. Correlation analysis is conducted partly to satisfy one of the regression analysis requirements that have to do with the linear assumptions of variables in the model.

### **6.3.2 Hierarchical OLS regression**

OLS regression stands for ordinary least squares regression and it is used to create regression models to test our hypotheses. OLS regression provides an answer to the question “*Which is the most important predictor of the outcome?*” (Osborne 2017, 197). It requires at least one independent variable (IV) and one dependent (DV) variable. IV(s) can be nominal or scale, but the DV must be scale. Models with a nominal DV are known as logistic regression. Nominal IVs must be dummy coded before adding it to a model. By the process of dummy coding, each category in the variable is made into its own variable that can only have values 0 or 1 (0 meaning the observation does not belong to set category and 1 meaning that the observation belongs to set category). (Nummenmaa 2010, 309.) This was done to the gender-variable as mentioned before. Simple regression analysis includes only one IV while models with multiple IVs are called multiple regression analysis. This study uses the latter and for the present thesis, it is referred to as OLS regression. In theory, there can be countless IVs in a multiple regression

model, however, practical limitations may occur if there are excessive amounts of IVs. By using more IVs, the model gains more accuracy in predictions and explanatory power. (Ibid. 315.) The present thesis does not have a concern about having excess amounts of IVs.

OLS regression is related to correlation analysis but in many ways is more informative. Unlike in correlation analysis, OLS regression distinguishes a *predictor* (IV) and *outcome* (DV) variable. One of the main benefits of OLS regression is its predictive power. By knowing the value of a predictor, an outcome value can be predicted. The prediction is made, based on a linear *regression line* that is fitted in the data. The best fit has the smallest sum of squares. In other words, the best fit is the one with the least errors in predictions. The regression line fitted through the data does not always land on every data point. There usually is some deviation between a prediction and an observed data point. The distance between the line and the data point is squared. Each distance for datapoints is squared and summed together to represent *the sum of least squares* (hence, the name ordinary least squares). The line that has the smallest sum of least squares is applied to be the best fitting regression line. (Urdan 2010, 145–150.) In other words, the best-fitting regression line has the least errors in its predictions. Even if there are multiple IVs, a single overall regression line can be calculated. As mentioned, the prediction based on the regression line is not always accurate. The error of the prediction and actual data point is also called residual. Residuals are what the regression equation cannot explain. (Keith 2015, 52.)

OLS regression is a broad analysis and has multiple different steps which each provide useful information. It runs an F-test in ANOVA (analysis of variance) to determine if the regression model fits the data. It tests the significance of the regression equation and if the result is significant ( $p < .05$ ) we can presume that the model fits the data with a 95% confidence interval. (Keith 2015, 7; Weisberg 2005, 28.) Also, it runs a F-test for the change of the models to see if the variables added in the next model gains significant explanatory power (F-change). In the present thesis, the F tests in ANOVA was significant ( $p < .05$ ) in all the models in OLS regression, so we can presume that OLS regression fits the data well. OLS regression also provides two sets of R-values which represent the correlation of IVs and DV. A squared R-value ( $R^2$ ) represents how well does IVs predict the DV. However, in the case of multiple IVs, or in cases of large data, the  $R^2$ -value is usually higher than intended. Hence, adjusted R square (adj.  $R^2$ ) is used to accurately describe how IVs in models explain the variance of DV. Adj.  $R^2$  ranges from 0-1, with 0 describing that the IVs in the model explain 0% the variance of DV

and 1 meaning that IVs in the model explain 100% of the variance. Commonly in social sciences, an adj.  $R^2$  of 0.1 - 0.2 could be considered satisfactory. (Gaur & Gaur 2009, 109.) Similar to R-values, the model also provides two sets of regression coefficients (beta values) for each IV in the model: unstandardized beta (B) and standardized beta ( $\beta$ ). Beta value is simply the slope of the regression line. It tells us how much does DV increases or decreases when IV increases. Beta values can range from -1 to 1. A negative beta suggests that DV decreases as IV increases and positive beta suggest an increase of DV when IV increases. (Ibid.)

IVs might have different scaling and thus makes comparing the explanatory power if IVs difficult. That is why  $\beta$  is used to interpret the relative importance of the IVs in the model. By standardizing beta, it turns all variables (IVs and DV) in the same metric (z scores with  $M = 0$  and  $SD = 1$ ). Hence, it is easier to interpret and compare IVs when interpreting  $\beta$ . Standardized beta describes how much does DV increases or decreases when IV increases by one standard deviation. (Keith 2015, 36–37.) The statistical significance of the regression coefficient is evaluated using a t-test. “*T-tests are used to see if the slope for each predictor variable is significantly form zero*” (Urdan 2010, 156). This means that if the t-test for IV is significant ( $p < .05$ ), the IV is a statistically significant predictor of DV for a 95% confidence interval.

The OLS regression model in the present study is done hierarchically. This is called a hierarchical OLS regression analysis. IVs are entered into the model in a predetermined order for theoretical reasons (Gaur & Gaur 2009, 117–118). After each entry, we can observe if adj.  $R^2$  changes significantly or if the individual  $\beta$  value changes when more IVs are entered in the model. The significance of adj.  $R^2$  change is tested by F-test. Demographic variables are entered first. This means age and gender are statistically controlled when exploring the effects of SM stress and procrastination on SM productivity. (Keith 2015, 35.) Tabachnick and Fidell (2013, 138–139) suggest one way to form a hierarchical regression by adding the "nuisance" variables first. This helps us to view the changes in the model when age and gender are accounted for. In the first step (model 1.), demographic variables are entered. In the second step (model 2.), SM stress and procrastination are added to explore what it adds to the model over demographic variables. In the third step (model 3.), the quadratic term is entered to observe any curvilinearity. In the final step (model 4.), an interaction term is added to examine moderation.

Before elaborating on quadratic and interaction terms, there is a major debate in statistical literature about mean centering. Some deem it a necessary step before computing product terms for curvilinear and moderation analysis (Osborne 2017), some say it is optional (Hayes 2013, 282–283), and some argue that it is completely redundant (Kromery & Foster-Johnson 1998). Mean centering variables is recommended to partly to fix tolerance and VIF values. Because the quadratic term and interaction term are both cross-product variables from the same variables that are already in the model. This would lead to low tolerance and high VIF values. Low tolerance and high VIF value would suggest multicollinearity, which could distort some estimates and lead to increased standard errors. However, multiple works of literature support the claim that mean centering does nothing to mitigate multicollinearity. Mean centering might be useful for other hierarchical models but not in OLS regression. (Ibid.) Variables will not be centered before computing cross-product terms. Thus, low tolerance and high VIF values are expected in models with cross-product terms (quadratic and interaction).

### 6.3.3 Quadratic term

To examine curvilinearity, a quadratic term is computed from SM stress to form a regression model that treats the relationship between SM stress and SM productivity as non-linear. As mentioned in the previous chapter, OLS regression fits a *linear* regression line. This means that the relationship between IVs and DV is modeled to follow a linear pattern. Quadratic represent a non-linear relationship with one inflection point (turning point). The relationship can be a U-shaped or inverted U-shaped. (Osborne 2017.) Keith (2015, 172–173) states that if there is a strong theoretical reason for curvilinearity, a quadratic term should be added to OLS regression to see if the model improves. By simply observing SM stress in the regression model, the relationship between SM stress and SM productivity is modeled as a linear relationship. By adding a quadratic term alongside SM stress, it models the relationship as curvilinear. The quadratic term is formed by squaring SM stress (SM stress<sup>2</sup>). To examine curvilinearity, both SM stress and the quadratic term is needed in the model. Osborne (2017, 168) also encourages to examine any possible cubic effect (two inflection points), but there is no theoretical basis for examining such effects. Quadratic and cubic are the most common forms of curvilinear relationships in social sciences since there are rarely datasets in social sciences that are accurate enough to map more complex relationships over cubic (ibid, 165).

The unsquared variable (SM stress) indicates the trend of the regression line and the added quadratic term indicates the shape of the regression line. A positive regression coefficient for SM stress would suggest an upward trend and negative would suggest a downward trend. A positive regression coefficient for the quadratic term would suggest a U-shaped curve and a negative would suggest an inverse U-shaped curve. (Keith 2015, 177.) Each term is a part of the same effect. Thus, to examine the curvilinear effect does not stem from comparing SM stress and quadratic variables, but from comparing the regression models. Model 2 of the hierarchical OLS regression analysis only includes SM stress and the model represents the results if only the trend is modeled (linear). The quadratic term is added in model 3 to represent the results when the shape of the trend is considered. Only the most recently added SM stress variable is interpreted in each model. This means that in model 2 (linear model), SM stress  $\beta$  is adequate to describe its effects on SM productivity. However, in model 3 (curvilinear model) we are only seeking for a significant (or non-significant) curvilinear effect. In model 3, SM stress  $\beta$  does not provide any useful information besides if it is positive/negative or significant/insignificant. (Osborne 2017, 169, 174.) To clarify, model 3 is only used to test whether there is a *significant curvilinear effect*. Model 2 is used to examine and compare IVs to the DV. There are other ways to further examine and test curvilinearity but for the purposes of the present thesis, the mentioned test for curvilinear effect is sufficient enough to provide an answer to H3.

For a statistically significant curvilinear effect (inverted U-shape) between SM stress and SM productivity to be supported, the following criteria must be met. First, SM stress  $\beta$  must be statistically significant and positive in model 2 and in model 3 (it would be redundant to test curvilinear effect if SM stress would not be significant in model 2). This would represent a positive upward trend. Second, the quadratic term  $\beta$  must be negative and statistically significant in model 3. This would represent the inverted U-shape of the relationship. Finally, the change in adj.  $R^2$  from model 2 to model 3 must be statistically significant (F-change must be statistically significant). This would suggest that model 3 (curvilinear model) has more explanatory power compared to model 2 (linear model). (Osborne 2017, 157–183; Keith 2015, 177.) Otherwise, there is no reason to suspect the inverted U-shaped curve over a linear relationship. To be clear, model 3 is only for testing if there is a significant curvilinear effect (i.e. if the relationship is curvilinear). For the purposes of examining associations of IVs on DV, model 2 is the appropriate model to be used for interpretations.

#### 6.3.4 Interaction term

An interaction term is computed to examine moderation effect. There are slight differences in the literature whether it is called moderation or interaction. It is used interchangeably in most literature (e.g. Hayes 2013). For the purposes of this thesis, it is referred to as moderation examination done with an interaction term. A cross-product (interaction) term is created from SM stress (X) and procrastination (M) to examine their combined effect in SM productivity (Y). This interaction term is formed by multiplying SM stress and procrastination variables and then added to the hierarchical OLS regression. The moderation analysis contains three elements: 1) the direct effect of SM stress, 2) the direct effect of procrastination and 3) the nonadditive effect (interaction term). (Osborne 2017, 223.)

Moderation analysis examines how different levels of procrastination moderates the effect between SM stress and SM productivity. Figure 3. demonstrates the conceptual model and three pathways to examine in moderation analysis. *b1* and *b2* pathways are called unconditional effects. It simply means that changes of X on Y are not dependent of M. Same could be said from changes in M on Y is not dependent from X. *b3* is called a conditional effect, meaning that effect of X on Y is dependent (conditional) on M. In other words, interaction tells us how one unit increase of X effect Y, given the value of M. (Hayes 2013, 208–209, 212–215.) The present study hypothesizes that the relationship between SM stress and SM productivity is moderated by the tendency to procrastinate. The tendency to procrastinate is viewed as a conditional effect. This would mean that we are interested if the relationship between SM stress and SM productivity changes depending on if the tendency to procrastinate is low or high. If the interaction term is statistically significant, that would suggest that the tendency to procrastinate moderates the relationship between SM stress and SM productivity.

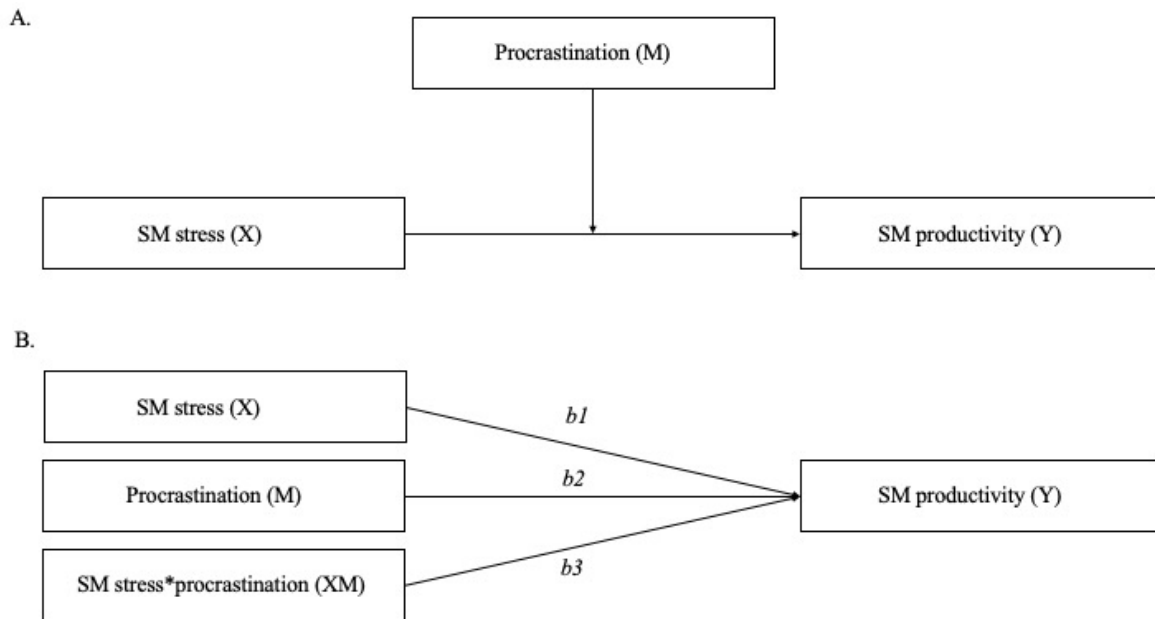


Figure 3. *Simple moderation model as a conceptual (A.) and statistical (B.) diagram.*  
*(Altered from Hayes 2013, 215).*

### 6.3.5 Requirements for OLS regression

For a successful hierarchical OLS regression, there are few requirements to consider, to ensure an accurate model. 1) IVs have a linear connection with DV, 2) variables do not correlate too much with each other, 3) data has no outliers, 4) residuals are homoscedastic and normally distributed. (Keith 2015, 188–195.) These requirements can all be reviewed statistically. Also, the overall OLS regression has to be well-grounded theoretically.

The linear connection between IVs and DV is the most important assumption of OLS regression (Keith 2015, 201). This is observed with Pearson correlation. All variables have a statistically significant correlation to DV excluding gender. Gender serves as a control variable and hence, was left in the model. Multicollinearity occurs when IVs are correlated too highly with each other. It is problematic since it reduces the beta values' significance by increasing standard errors of the variables. (Gaur & Gaur 2009, 109.) The present thesis addresses multicollinearity in two ways. First, Pearson correlation coefficient cannot exceed over  $\pm 0.9$  as mentioned earlier. Second, the Tolerance value cannot be lower than 0.1, and variance inflation factor (VIF) cannot exceed 10 (Miles 2014). Tolerance can range from 0-1 and a large value indicates



that the independent variable does not overlap with other independent variables. An overly large (over 10) VIF value indicates that the standard errors of the variable are increasing to a point where there is a problem. (Keith 2015, 202.) However, there will be a violation to the VIF and tolerance in models with cross-product terms since they are variants of already existing variables. For example, it is assumed that SM stress would be highly correlated to the quadratic term (SM stress<sup>2</sup>). Thus, the following variables are not expected to follow VIF and tolerance criteria: 1) SM stress and quadratic term in model 3, 2) SM stress, quadratic term, procrastination and interaction term for model 4. Besides these notions, VIF and tolerance for other models and variables do not raise any concern (Appendix 1).

Unusual and problematic data points are called outliers. Outliers are data points that are so far away from the regression line that it could be considered an extreme case. They are problematic since they can influence statistical analysis. Outliers can be either univariate (an extreme variable) or multivariate (a combination of variables). Outliers can be present in IV, DV, nominal, or scale variables. Also, outliers might affect the curvilinear analysis by either concealing the potential curve or creating a false curve. (Osborne 2017; Tabachnick & Fidell 2013, 72.) Mahalanobis distance is considered one of the easiest methods to detect outliers. It uses a chi-square distribution to calculate a p-value for outliers with a 99% confidence interval. (De Maesschalck, Jouan-Rimbaud & Massart 2000.) Mahalanobis distance was calculated for the regression model and 28 possible outliers were detected (2.46%). After further evaluation, the 28 outliers were removed from the data. This left the remaining data at  $n = 1108$  for the hierarchical OLS regression.

As mentioned before, the residuals represent the variance that the model cannot explain. The residuals from the hierarchical OLS regression must be homoscedastic. This means that the errors in prediction must be consistent in different stages of the independent variable. Otherwise, they are heteroscedastic, which would create some issues to the standard errors in the model leading to possible errors in the statistical significance in the model. (Keith 2015, 192.) Heteroscedasticity is usually caused by non-normality with one of the variables in the model or errors in some IVs measurements. (Tabachnick & Fidell 2013, 85.) For the residuals to be homoscedastic, they should be scattered fairly consistently around the X-axis in the residual scatter plot. Residuals can be also considered homoscedastic when their distribution follows a normal curve. Also, residuals are normally distributed if they follow the linear line in residual probability-probability plot (P-P plot). (Keith 2015, 219.)

A visual examination of the scatter plot, histogram and P-P plot raises some concerns about heteroscedasticity. In the scatter plot (Appendix 2), residuals are scattered fairly consistent without any fanning of the residuals. However, the plot has some skewness in it. The distribution of residuals (Appendix 3) are fairly normal, but it does have a clear deviation. A deviation can also be observed in the P-P plot (Appendix 4). An SPSS macro was used to test homoscedasticity. Macro was developed by Ahmad Daryanto and it includes Breusch-Pagan and Koenker test with default H0: *heteroscedasticity not present*. The model passed Koenker test ( $p > .05$ ), but not Breusch-Pagan test ( $p < .05$ ). Hence, there are reason to suspect heteroscedasticity of the residuals which could affect the accuracy in calculating the significance of IVs in the regression model. To address heteroscedasticity, robust standard errors (RSE) will be used to correct the standard errors in the model. Robust standard errors are less sensitive to the effects of heteroscedasticity. This is an effective way to reduce the problems created by heteroskedasticity. (Hayes & Cai 2007, 710–712.) SPSS (v25) calculates Huber-White estimators as robust standard errors.

To summarize the statistical literature mentioned above, hierarchical OLS regression analysis is conducted in four steps. Standardized and unstandardized regression coefficients ( $B$  and  $\beta$ ) will be reported together with robust standard errors (RSE) for each variable. An adj.  $R^2$  -value is reported for each model to represent how much the model explains the variance of SM productivity. F-statistic is presented in model 1 to describe if the adj.  $R^2$  was statistically significant. F-change was presented in model 2 and 3 to represent if the change of adj.  $R^2$  from the previous model was statistically significant.

## 7. RESULTS

### 7.1 Pearson correlation

The results from Pearson correlation are in Table 2. The strongest correlation was found with SM stress and SM productivity ( $r = .469$ ). Against assumptions, Procrastination had a statistically significant and positive correlation with SM productivity ( $r = .154$ ) while gender had no statistically significant correlation with SM productivity. Procrastination was positively correlated with SM stress ( $r = .263$ ) suggesting that they are positively associated. Age was negatively correlated with SM productivity ( $r = -.180$ ) and with SM stress ( $-.220$ ) suggesting that low age was associated with low SM productivity and low SM stress. None of the correlation coefficients raise any concern for multicollinearity (all correlations below  $r = .90$ ).

Table 2. *Pearson correlation of SM productivity, SM stress, procrastination, age and gender (n = 1108).*

Variables	1.	2.	3.	4.
1.SM productivity	-			
2. SM stress	.469*	-		
3. Procrastination	.154*	.263*	-	
4. Age	-.180*	-.220*	-.054	-
5. Gender	-.001	.030	-.065*	.053

Gender: 0 = Male, 1= Female. \*  $p < .05$  (2-tailed)

## 7.2 Hierarchical OLS regression

The results for hierarchical OLS regression are shown in Table 3. Model was created in four blocks. First, demographic variables were added (age and gender) to control their effects. Second, SM stress and procrastination were added to examine their direct effects. Third, quadratic term was added to create a model to examine the curvilinear effect of SM stress. Four, interaction term was added to examine possible moderation effect. Interaction term in model 4 was not significant. Hence, procrastination did not have a statistically significant moderating effect of SM stress to SM productivity. Also, model 4 did not gain any additional explanatory power (adj.  $R^2$ ) by adding the interaction term. Thus, H4 was not supported and model 4 was discarded.

Table 3. *Hierarchical OLS regression (n=1108).*

Variable	Model 1.			Model 2.			Model 3.		
	B	RSE	$\beta$	B	RSE	$\beta$	B	RSE	$\beta$
Age	-.024	.0039	-.180***	-.011	.0037	-.080***	-.009	.0037	-.072**
Gender	.025	.0908	.008	-.027	.0828	-.009	-.050	.0828	-.016
SM stress				.624	.0367	.443***	1.267	.1866	.900***
Procrastination				.023	.0209	.032	.026	.0208	.037
Quadratic term							-.126	.0357	-.466***
<b>adj. <math>R^2</math></b>		<b>.031</b>			<b>.224</b>			<b>.233</b>	
		<b>F</b>			<b>F-change</b>			<b>F-change</b>	
		<b>(18.546)***</b>			<b>(139.099)***</b>			<b>(12.624)***</b>	

Gender: 0 = Male, 1 = Female. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .00$

The first model contains Age and gender as demographic variables. Age was a statistically significant predictor ( $\beta = -.180$ ) while age had no significant association. SM productivity decreases as age increases. The F-test for model 1 was significant, and the model explains 3.1% of the SM productivity variance. SM stress and procrastination are added in the second block. Age still remained its statistical significance ( $\beta = -.080$ ). However, SM stress is the most significant predictor ( $\beta = .443$ ) and the association was positive. Thus, H1 was supported. When SM stress increases by one standard error, SM productivity increases by .443. Procrastination did not have a significant association with SM productivity. Thus, H2 was not supported. The F-test for the change of adj. R2 from model 1 to model 2 (F-change) was significant. The second model gained more explanatory power compared to model 1, now explaining 22.4% of SM productivity's variance.

In model 3, quadratic term was added. SM stress was positive and significant (in model 2 and 3), and quadratic term was negative and significant. Model 3 (curvilinear model) explains 23.3% of SM productivity variance, which is higher compared to model 2 (linear). The difference is not huge (0.9%) but the F-test for the change was significant. Model 2 represents the upward trend of the relationship and gains more explanatory power when taking the downward trend (model 3) into account. These results would suggest a significant curvilinear effect. Thus, H3 was supported. Visual representation of the curve is presented at Figure 4.

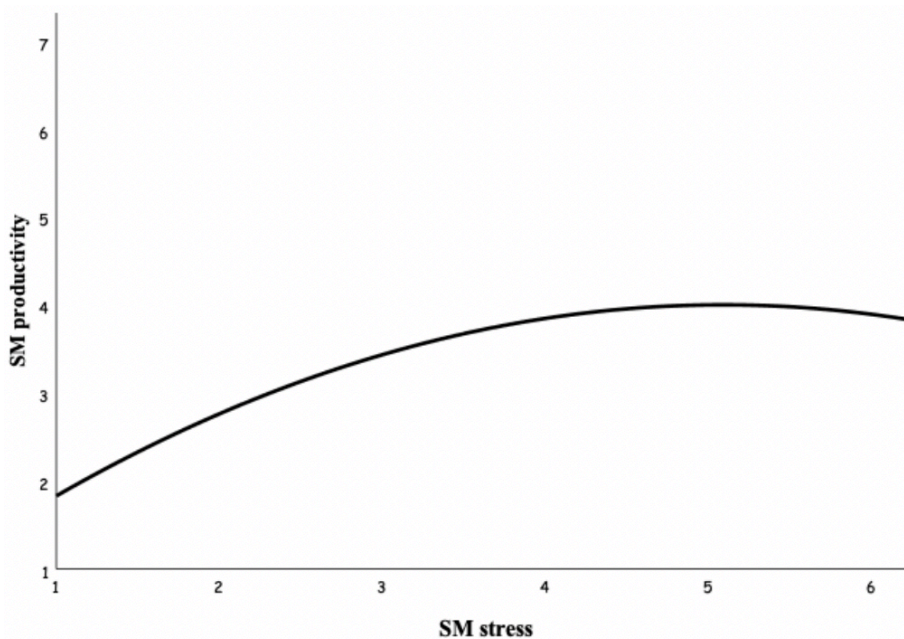


Figure 4. *Curve estimation between SM stress and SM productivity.*

## 8. DISCUSSION

### 8.1 Summary

The purpose of this study was to expand on existing technostress and the overall stress research and its effect on work-related productivity. SM stress was operationalized to include techno-overload and techno-invasion. These dimensions were interpreted to be initiated by challenge stressors, providing a more complex image of the stress as a process and distancing itself from the more dichotomous view of "good" and "bad" stress. The objective is to examine the grey area of stress, to see how *good kind of bad stress* is manifested in the occupational surrounding. The positive association of stress is explained with challenge stressors that simultaneously have both negative and positive effects. In addition, due to the increasing utilization of technology and social media in organizations, this study attempts to examine the modern organizations by limiting the perspective to only include the social media side of productivity and stress. To further expand the process of stress, the tendency to engage in procrastination was included. The present thesis also addresses the current debate of curvilinear relationships of stress-outcome. It is important to include individual factors such as traits and coping to have a more accurate picture of the interplay of stressor and outcome. Hence, the present thesis examined the moderating effect of the tendency to engage in procrastination. Procrastination was conceptualized as a form of avoidance coping.

Hierarchical OLS regression was utilized to answer the hypotheses. Models were specified to answer different hypotheses. Heteroscedasticity was taken into account by using robust standard errors. However, the interaction term was not significant suggesting no moderating effect of procrastination. The present thesis had four distinctive hypotheses regarding the interplay of SM stress, procrastination, and SM productivity. SM stress was positively associated with SM productivity and procrastination did not have a statistical association with SM productivity. Curvilinear effect of SM stress and SM productivity was supported, and no significant moderation effect was found.

## 8.2 Limitations

One of the main limitations to concern is the cross-sectional setup. Since the transactional model of stress is a process (Lazarus & Folkman 1984), it indicates that experiences might alter over time depending on various factors in changes in workplace, stressor, appraisal, or coping. Frese (2012, 201–204) demonstrated how moderating effects of coping are more consistent in longitudinal setups when studying stress and outcome. It could be that the possible moderating effect of procrastination is concealed by the cross-sectional study. As Tice and Baumeister (1997) stated, procrastination is harmful in the long term hence, a longitudinal perspective of procrastination might be more elaborative compared to a cross-sectional study. Also, procrastination measure in the present thesis was not a validated measure. The questions only measured the overall tendency to procrastinate. The literature review suggests personality traits are intertwined with the experience of stress and coping. A more cohesive picture of stress and its outcomes would come from including personality traits (Vollrath 2001). The additional value of personality types was not included in the present thesis.

The scope of social media stress was narrow. The concept of stress was built on techno-overload and techno-invasion dimensions. Other dimensions were left out. Stressors for social media stress were conceptualized as challenge stressors and other types of stressors were left out of the study. Also, challenge stressors have established associations to increased productivity, it also has associations to negative phenomena, for example, exhaustion (LePine, Podaskoff & LePine 2005). The negative impact of challenge stressors is left out.

The curvilinear effect between SM stress and SM productivity was confirmed. However, the model comparison is not the most extensive test for curvilinearity. The present thesis merely scratched the surface of the curvilinear examination. The curvilinear methods did create some concern for multicollinearity between SM stress and the quadratic term. However, to examine curvilinearity in OLS regression, it includes the use of a variable and its cross-product term that has a high correlation to its original variable. Mean centering was not conducted due to extensive literature suggesting that it does not fix anything regarding multicollinearity in regression analysis (Kromery & Foster-Johnson 1998). The present thesis applied Hayes (2013) thoughts about mean centering being optional and did not exercise that option.

### 8.3 Conclusion

Few words about research ethics. Oliver (2010) provides some themes to consider while conducting research. There were no major concerns about research ethics in the present thesis. The data was provided by a research project that included an ethical perspective during the survey collection. The data was anonymous, and the use of the data was permitted. Limitations were addressed above, and results are presented without bias.

The results supported the hypothesis that SM stress experience was positively associated with SM productivity. This was explained with challenge stressors. This finding followed the two-dimensional model of work stress (Podaskoff, LePine & LePine 2007) and indicated that challenge stressors have beneficial outcomes in an occupational context. The results also help explain some of the inconsistencies found in some technostress research (e.g. see Lee, Lee & Suh 2016). Results encourage to consider stressor types when examining stress-outcome relationships. The positive connection was indicated by the Pearson correlation and the hierarchical OLS regression. Challenge stressors do seem to initiate a stress process with possible beneficial outcomes. However, increased productivity might not be the only outcome from challenge stressors. Literature suggests that there are also harmful outcomes and they should not be overlooked. For future implications, it would be interesting to study the variety of outcomes that would stem from challenge stressors. Challenge stressors have versatile effects on employees and provoke to wonder, how much stress can a person endure for the sake of potential gain. This *good kind of bad stress* highlights the complex nature of stress.

The present thesis conceptualized two technostress experience that would arise from challenge stressors: invasion and overload (Ragu-Nathan, Tarafdar, Ragu-Nathan, & Tu 2008). These two dimensions were summarized to represent overall stress experience that is initiated by challenge stressors. For future implications, it would be interesting to test and compare different technostress dimensions and labeling them after specific stressor types. Comparing different stressor types and technostress dimensions would further show the diverse effects that stress has on work-related productivity. The study of the interplay of stressor types, stress dimension, and outcomes, benefits the overall holistic view of stress and expand the conception of stress over the dichotomous view of good and bad stress.



Interestingly enough, procrastination had a significant positive correlation with SM productivity. However, this effect did not carry itself to the hierarchical OLS regression. Extensive literature has shown mainly negative associations between procrastination and performance (Steel 2007; Sirvastava, Chandra & Shirish 2015). Tice and Baumeister (1997, 455) do acknowledge some scenarios where procrastination might increase productivity by gathering strength and information before doing the task. Avoidance coping is also an effective anxiety reliever in the short term, and in the event where the situation is uncontrollable, avoidance coping might be better in contrast to approach. (Roth & Cohen 1986.) However, the positive association with procrastination and productivity is limited in the literature and the present thesis only showed a significant positive relationship in the correlation analysis.

The procrastination measure used in the present thesis is operationalized to be a *form* of avoidance coping. Hence, it might not cover every aspect of avoidance coping. Avoidance coping might include more than just procrastination. Also, a cross-sectional study might conceal the full extent of procrastinations effect since it has different effects in the short and long term (Steel 2007). Procrastination would be interested to also study in a social media context. A concept where social media enabled procrastination might yield some interesting results since social media is heavily tied to increased procrastination (Hinsch & Sheldon 2013). Procrastination is a complex, and interesting phenomenon with the potential to have a diverse effect and encourages further research.

The curvilinear relationship between SM stress and SM productivity gained support. The results suggest a model where low SM stress would lead to boredom, mediocre stress would lead to engagement and high stress would lead to incapacitation. Although the assumption is curvilinear, we cannot assume that the turning point of the curve would be the same across individuals. Hence, a *proper* or *optimal* amount of stress is usually hard to define. This finding extended the two-dimensional model in a sense, that excess amount of challenge stressors would decrease the assumed beneficial effect on productivity in addition to the existing link to exhaustion. The difference with this study compared to various others, which includes a curvilinear perspective, is that the stressor type was acknowledged. This contributes to the ongoing debate about the YDL application in research, by stating that some stressor *types* might increase performance. It is still debatable whether "optimal" stress, in general, would increase productivity since the word "optimal stress" is ambiguous. Also, it is hard to find a consensus on an "optimal level" that would be universally accepted in different cultures and subcultures.

The results do suggest that an "optimal level" of stress might exist in a practical sense, but it would be equivalent to *playing with fire* for organizations' that attempt to maintain employees' stress.

Challenge stressors also have a strong connection to harmful effects on employees, even when productivity increases. In contrast to YDL criticism about encouraging organizations to maintain optimal stress, in no way is attempts to maintaining challenge stressors recommended. The negative effect of challenge stressors needs to be kept in mind even when the beneficial outcomes might be appealing. However, challenge stressors have some room to work with by trying to mitigate negative effects with sufficient coping and still attempting to keep the positive effects. Organizations have the responsibility to provide effective coping measures and accounting individual differences if they wish to utilize challenge stressors. Although the stress-productivity relationship might be curvilinear in some cases, the turning point of the curve can be assumed to be vastly different depending on individuals.

The moderating effect of procrastination was not found. Similar thoughts could be mentioned here as mentioned earlier about procrastination and limitations. A measure that specifically measures an avoidance coping as a strategy could provide more insightful results. Also, coping moderators takes time to develop hence, cross-sectional studies might conceal the possible moderation effect (Frese 2012, 201–204). The effects of procrastination might be revealed later when the stress process unfolds over time.

Overall the present study successfully depicted the benefits of challenge stressors and hopefully participates in the effort to change the unilateral picture of stress. Procrastination leads to more questions than answers, and curvilinearity was supported and explained in a way, that there is no safe way to maintain stress in hopes of increased productivity. The manifold image of stress in the research literature is a welcomed perspective in common discourse. Stress is a complex process that is often oversimplified in everyday conversation. How does stress affect performance at work? It depends. It depends on the stressor type, the amount of stress, appraisal, coping, and many other different elements. Much like in Dwight's case in the story introduced at the beginning of the present thesis.

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## APPENDIX 1.

### Collinearity statistics from the hierarchical OLS regression.

Table 4. *Collinearity statistics for hierarchical OLS regression (DV: SM productivity). Model 2 variables: Age, Gender, SM stress and Procrastination. Model 3 variables: Age, Gender, SM stress, Procrastination and Quadratic term.*

Variables	Model 2.		Model 3.	
	Tolerance	VIF	Tolerance	VIF
Age	.948	1.055	.940	1.063
Gender	.990	1.011	.984	1.017
SM stress	.885	1.130	.040	25.025
Procrastination	.925	1.081	.923	1.083
Quadratic term	-	-	.040	24.816

## APPENDIX 2.

### Residual scatter plot from the hierarchical OLS regression.

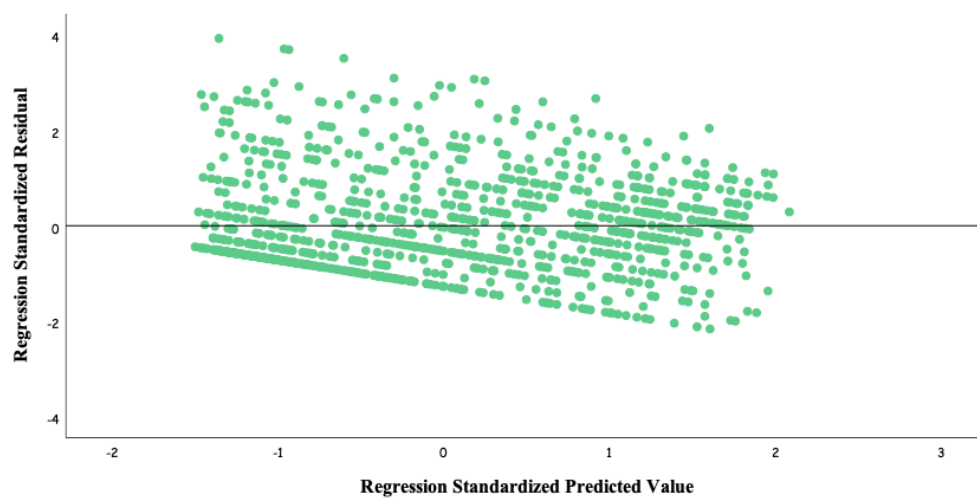


Figure 5. *Residual scatter plot.*

### APPENDIX 3.

Residual histogram from the hierarchical OLS regression.

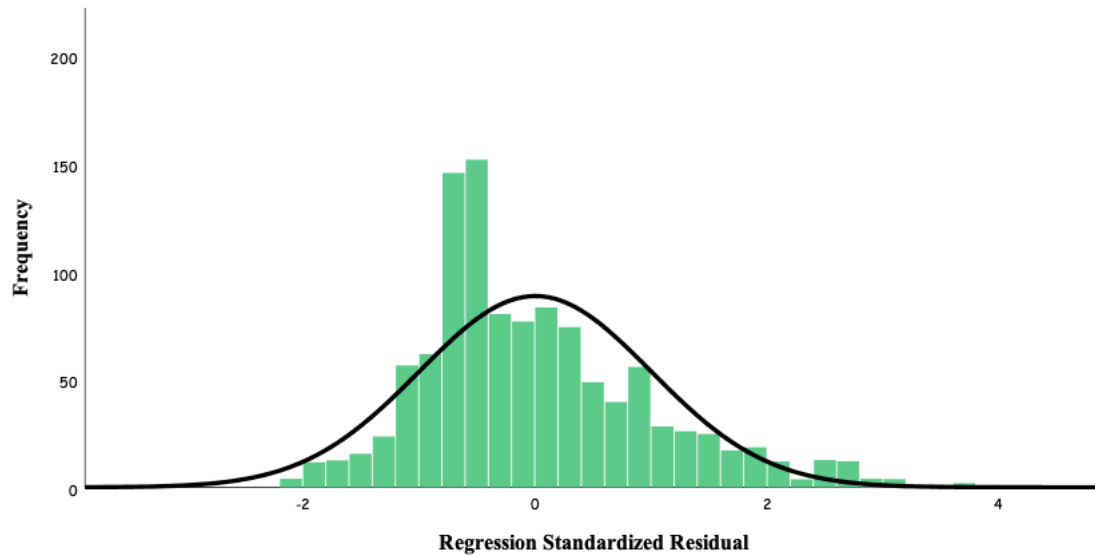


Figure 6. *Residual histogram.*

### APPENDIX 4.

Residual P-P plot from the hierarchical OLS regression.

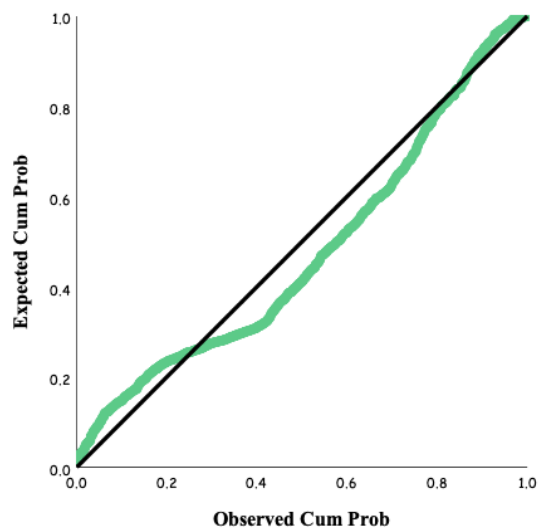


Figure 7. *Residual P-P plot.*