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This dissertation, directed and approved by the candidate's committee, has been accepted by the College of Graduate and Professional Studies of Abilene Christian University in partial fulfillment of the requirements for the degree

Doctor of Education in Organizational Leadership

Dena Counts, Ed.D.

Dr. Dena Counts for
Dr. Nannette Glenn, Dean of
the College of Graduate and
Professional Studies

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School of Educational Leadership

Dispositional Gratitude at Work Predicts Job Satisfaction of Software Developers

A dissertation submitted in partial satisfaction
of the requirements for the degree of
Doctor of Education in Organizational Leadership

by

Jordan Gabriel Tate

May 2024

Dedication

This dissertation is dedicated to Jerry Ahmann, who demanded I either have fun or else quit.

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And finally, God gets the full credit for this.

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Abstract

Software developers can suffer from negative emotions at work and low job satisfaction. Less is known about how positive emotions at work impact software developers. Gratitude is one positive emotion that has predicted job satisfaction in other studies. The purpose of this quantitative correlational study was to explore how gratitude at work predicts job satisfaction among software developers. The broaden-and-build theory of positive emotions and the find-remind-and-bind theory of gratitude guided the study. Participants included 146 software developers who were recruited via LinkedIn using purposive sampling. Participants completed an online survey, including the Gratitude Questionnaire-Six Item Form and the Appreciation in Relationships scale. The results of a multiple regression analysis revealed that a model of five independent variables of gratitude at work statistically significantly predicted job satisfaction. Dispositional gratitude at work was the only individual statistically significant predictor of job satisfaction. The results align with previous studies that show gratitude at work can boost the job satisfaction of software developers. Recommendations for future research and for practitioners are included.

Keywords: gratitude, workplace gratitude, dispositional gratitude, receipt of gratitude, expression of gratitude, job satisfaction, broaden-and-build theory, software developer

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Chapter 1: Introduction

In present times, organizations exude a glaring irony. Technological advancements are rapidly revolutionizing organizations yet simultaneously hindering organizational flourishing. Morgan et al. (2017) pointed out that because of the constant connectivity, work is not a place anymore but instead a state of being. This has unforeseen consequences. Said another way, the information age is creating knowledge gaps about how to lead happy, healthy, and successful organizations. This irony is no more pronounced anywhere than in the case of software companies. Software developers are expected to improve technology; however, the problem of software developers' dissatisfaction has been an obstacle to their productivity at work (Ralph et al., 2020).

Organizational leaders of software development urgently require insight into regulating the emotional and psychological states of employees if they are to maximize job satisfaction, retention, and performance (Barsade & O'Neill, 2016; Darvishmotevali & Ali, 2020; Elfenbein, 2014; Fisher, 2019; Quinn, 2015). For instance, many people feel depressed at work, and this damages employee well-being as well as company finances (Rapp et al., 2021; Theorell et al., 2015). In a recent study conducted by the American Psychological Association (2021), 84% of adults said they experience prolonged negative emotions. In short, negative emotions lead to underperforming at work (Barsade & O'Neill, 2016). Leaders' lack of understanding of their software developers' emotions stands in the way of progress (Graziotin et al., 2018; Sánchez-Gordón & Colomo-Palacios, 2019; Storey et al., 2019).

One predictor of underperforming is a lack of gratitude or feeling appreciated in the workplace (Beck, 2016; Davis et al., 2021; Lanham et al., 2012; Ritzenhöfer et al., 2019). Grant and Gino (2010) explained that a lack of gratitude discourages productive teamwork by

increasing the group's negative emotions, such as resentment, uncertainty, and incompetence (Grant & Gino, 2010, p. 947). Unfortunately, most workers do not feel appreciated at work (Kaplan, 2012). According to the John Templeton Foundation's gratitude survey, only 10% of people express gratitude regularly, and 60% express gratitude to colleagues a mere once per year or less (Kaplan, 2012). More recent gratitude surveys reinforce these trends. For example, Novak (2016) found that U.S. workers want to be recognized more by their managers. The Conference Board (2021) found that in 2020, only 38% of workers were satisfied with the amount of appreciation and recognition they received at their jobs. Without showing appreciation for employees, or not enough, or in the most effective manner (Beck, 2016), organizational leaders are missing the opportunity to avoid employee destructive emotional distress (Stocker et al., 2019).

According to Robbins (2019), 53% of workers would have higher organizational commitment if they received more gratitude. Gratitude lowers stress (Valikhani et al., 2019). Also, gratitude is a powerful factor in turnover intent (Davis et al., 2021) and the well-being of employees (McCullough et al., 2002; Sawyer et al., 2022; Yoshimura & Berzins, 2017). Studies set in other industries have found a significant lack of gratitude in the workplace (Allen, 2018; Azman, 2021; Beck, 2016; Cain et al., 2019; McCullough et al., 2002). In the case of software businesses, no study has even measured gratitude levels nor its effects or connections to positive organizational outcomes. Gratitude is a positive emotion (Dickens & DeSteno, 2016; Fehr et al., 2017; Fredrickson, 2001; Wood et al., 2010). Concisely defined, the disposition and emotion of feeling grateful means having an appreciation for someone or something (Krysinska et al., 2015; McCullough et al., 2002; Morgan et al., 2017; Renshaw & Olinger Steeves, 2016). I contend that gratitude is worth exploring in the software developers' workplace setting.

Some professions or sectors may be more or less likely to receive gratitude at work. Therefore, it is important to study different sectors or professions separately. One profession with a high rate of turnover is software developers. Although there is scant research on the well-being of software developers, this is unfortunate since their work is embedded in nearly every aspect of life. Therefore, it is no surprise that Sánchez-Gordón and Colomo-Palacios (2019) called for the study of the emotions of software developers. This endeavor aligns with earlier positive psychology research. Studies have shown that positive emotions at work reduce stress and burnout, improve workplace culture, and increase the bottom line (Cameron, 2012; 2013; Diener et al., 2017; Fisher, 2019; Fredrickson, 2001; Quinn, 2015; Seligman & Csikszentmihalyi, 2000). Well documented, the experience of positive emotions such as happiness and gratitude strongly correlate with job satisfaction and performance (Allen, 2018; Armenta et al., 2017; Bakker & Oerlemans, 2012; Cortini et al., 2019; Gallagher & Lopez, 2019; Hoff et al., 2020; Kumar & Epley, 2018; Sauberer et al., 2017). Leaders need awareness of their employees' emotions (Barsade & O'Neill, 2016; Druskat & Wolff, 2001; Elfenbein, 2014; Goleman & Boyatzis, 2017). Hence, there are still near endless options for delving deeper into the well-being of software workers.

Statement of the Problem

Software developers often suffer negative emotions, including unhappiness, frustration, stress, and burnout (Choi, 2019; Furrow et al., 2021; Graziotin et al., 2014; Graziotin et al., 2018; Ralph et al., 2020; Stettina & Smit, 2016; Windeler et al., 2017). The emotional strain present in the software industry is causing problems such as software coding errors (Cataldo, 2010; Graziotin et al., 2014), lowered creativity (Choi, 2019; Graziotin et al., 2014), lowered confidence at work (Müller & Fritz, 2015), and decreased performance (Gupta et al., 2019;

Salgado et al., 2020). Therefore, to retain talented employees and improve performance, software business leaders need more understanding of employees' emotions (Choi, 2019; Gupta et al., 2019; Khan et al., 2011; Salgado et al., 2020).

Furthermore, evidence indicates software developers lack adequate job satisfaction. Özkan (2021) concluded that turnover intention of information technology (IT) professionals strongly linked to job satisfaction. Additionally, Sánchez-Gordón & Colomo-Palacios (2019) found a negative relationship between the emotional distress and job satisfaction of IT employees. When software developer job satisfaction increases, so does the company's talent attraction, retention, and productivity (Storey et al., 2019; Wickramasinghe, 2010). Software businesses must discover the reasons behind the low levels of job satisfaction if they are to flourish collectively.

Researchers have called for more empirical studies connecting software employees' emotions, well-being, job satisfaction, creativity, and productivity (Graziotin et al., 2018; Ralph et al., 2020; Sánchez-Gordón & Colomo-Palacios, 2019). One positive emotion shown to predict well-being and job satisfaction is gratitude (Chen et al., 2020; Chen et al., 2021; Cortini et al., 2019; Di Fabio et al., 2017; Lanham et al., 2012; McKeon et al., 2020; Waters, 2012). Considering existing evidence for the gratitude deficiency common in the workplace (Beck, 2016; Kaplan, 2012; Locklear et al., 2020), studying gratitude levels in the software world should take priority. Gratitude predicts job satisfaction (Cortini et al., 2019; Lanham et al., 2012; Ritzenhöfer et al., 2019), yet more work is needed. For example, Chen et al. (2021) pointed out that too few studies have approached the relationship between job satisfaction and gratitude. Correspondingly, Makowiecki et al. (2020), having established that gratitude at work improved well-being, stated there should be more studies on how gratitude impacts work. Currently,

limited peer-reviewed literature exists on the significance of gratitude in the software workplace (Butler & Jaffe, 2021).

Until researchers further address emotions (e.g., gratitude) among software workers, leaders may not solve for employees' negative feelings and low job satisfaction (Pfeffer, 2018; Ralph et al., 2020; Wetherell & Carter, 2014; Windeler et al., 2017) and the subsequent threat to the success of their organizations (Choi, 2019; Salgado et al., 2020).

Purpose of the Study

The purpose of this quantitative correlational study was to examine the relationships between gratitude at work (dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work) and job satisfaction among U.S.-based software developers. The study could provide leaders with insight into enhancing software developers' job satisfaction by fostering positive emotions at work. In turn, the research could have implications for gratitude interventions as a strategy for employee support, development, and retention. Broadly speaking, this study attempts to present an argument in favor of the relevance of positive emotions in organizations as posited by the positive organizational scholarship (POS) perspective. Within that, the narrowed scope of this study pertains to the presence of gratitude and its impact on job satisfaction among software worker populations. Results could affirm and extend previous findings in POS that gratitude interventions are a significant path to increasing organizational flourishing (Azman, 2021; Di Fabio et al., 2017; Grant & Gino, 2010; McKeon et al., 2020; Wood et al., 2010).

Research Question

One primary research question, with corresponding hypotheses, formed the foundation of this research study.

RQ1: How do dispositional gratitude at work, expression of gratitude at work to supervisors, receipt of gratitude at work from supervisors, expression of gratitude at work to colleagues, and receipt of gratitude at work from colleagues predict job satisfaction among employed U.S.-based software developers?

H1₀. Dispositional gratitude at work, expression of gratitude at work to supervisors, receipt of gratitude at work from supervisors, expression of gratitude at work to colleagues, and receipt of gratitude at work from colleagues are not statistically significant predictors of job satisfaction.

H1_A. Dispositional gratitude at work, expression of gratitude at work to supervisors, receipt of gratitude at work from supervisors, expression of gratitude at work to colleagues, and receipt of gratitude at work from colleagues are statistically significant predictors of job satisfaction.

Definition of Key Terms

These were the key terms referenced throughout this research study.

Benefactor. The benefactor is the person providing the gift or benefit to the person who then could feel gratitude toward the benefactor for the gift or benefit. In this pattern, the benefactor is also the person receiving gratitude in the dyadic expression of gratitude. The benefactor, as the receiver of gratitude, feels appreciated.

Beneficiary. This is the person who benefits from what was provided by the beneficiary. In this pattern, they would also be the person who then expresses gratitude for benefits received by the benefactor. The beneficiary feels grateful and expresses the appreciation that makes the original benefactor, now the receiver of expressed gratitude, feel appreciated.

Dispositional gratitude. This refers to grateful emotions as a personal trait or tendency of perceiving positive actions and impacts of benevolence then feeling thankful as the beneficiary of benefits (McCullough et al., 2002, p. 112).

Expressed gratitude. Expressed gratitude is when one person outwardly expresses gratitude to another; this could be verbal, nonverbal, and written forms that express thankfulness and appreciation for benefits received (Dunaetz & Lanum, 2021; Grant & Gino, 2010; Lee et al., 2019; Leong et al., 2020).

Flourish(ing). In this study, flourishing refers specifically to flourishing at work and flourishing as an organization. Bono et al. (2012) defined flourishing as the state of succeeding at work that features positive emotions, intrinsic motivation, and engagement at work.

Gratitude. Researchers refer to gratitude as an appreciation for people, places, things, and circumstances, including perceived undeserved or unearned benefits. Gratitude is seen as inherently positive and as a trait, emotion, or social expression (Emmons & McCullough, 2003; Krysinska et al., 2015; Morgan et al., 2017; Renshaw & Olinger Steeves, 2016; Tsang, 2006).

Job satisfaction. This refers to a person's overall assessment of the circumstances at work and the level of the positive emotion of satisfaction associated with their assessment of their job (Hoff et al., 2020; Locke, 1970).

Positive. In positive psychology, POS, and positive leaders, as with references to positive deviance and positive outcomes, positive means achieving beyond the ordinary or normal levels and into exceptional success; it also means strength-based, capabilities, potential, happiness, and good (Cameron et al., 2011).

Receipt of gratitude. Receipt of gratitude means a person, the benefactor, has been thanked, recognized, or shown appreciation for the beneficial contributions they make to beneficiaries (Davis et al., 2021; Lee et al., 2019; Makoweicki et al., 2020).

Satisfaction. Gallagher and Lopez (2019) define satisfaction as emotional well-being and happiness resulting from a pleasing and contented valuation of one's situation.

Software developer. A software developer is a person who has a job position that entails designing, writing, and overseeing software (U.S. Bureau of Labor Statistics, 2021). Several terms are frequently used interchangeably with software developer, such as software programmer, coder, designer, and engineer. Most studies referred to in this study used the term software developer, which was the term used to search for research in the literature review.

Upward spiral. An upward spiral refers to the concept that positive emotions beget more positive emotions in a cycle that boosts personal and social functioning, such as levels of productivity and mental and psychological resources for overall success in organizations and life (Cameron, 2012, 2013; Fredrickson, 2001; Garland et al., 2010).

Chapter 2: Literature Review

Software developers suffer from frequent negative emotions and lower job satisfaction, which precipitates other negative consequences (Choi, 2019; Furrow et al., 2021; Graziotin et al., 2014; Graziotin et al., 2018; Ralph et al., 2020; Stettina & Smit, 2016; Windeler et al., 2017). Researchers have focused on mitigating negative emotions but not boosting positive emotions like gratitude (Graziotin et al., 2018; Huq et al., 2020; Kuutila et al., 2017; Sánchez-Gordón & Colomo-Palacios, 2019). Positive emotions and positive work culture elements lead to positive outcomes, creating an upward spiral of flourishing (Cameron, 2012, 2013; Seligman & Csikszentmihalyi, 2000).

Researchers have called for more studies on the relationship between gratitude and job satisfaction in professional settings (Chen et al., 2021). In other populations, such as kindergarten teachers, nursing school faculty, mental health professionals, and workers in the fields of architecture, finance, and public administration, gratitude has predicted job satisfaction (Chen et al., 2021; Chen et al., 2020; Cortini et al., 2019; Lanham et al., 2012; Stegen & Wankier et al., 2018; Waters, 2012). At the same time, surveys have revealed that gratitude is lacking in organizations (Beck, 2016; Kaplan, 2012; Locklear et al., 2020). Gratitude at work has been found to lead to job satisfaction in various professions like teaching (Chen et al., 2021; Waters, 2012), university faculty (Stegen & Wankier, 2018), healthcare workers (Afulani et al., 2021), banking (Akram et al., 2022), public administration (Cortini et al., 2019), finance (Waters, 2012), heterogeneous professional participants (Wnuk, 2018), and a spectrum of other professions (Patil et al., 2018). However, it is still unclear how gratitude at work might predict job satisfaction among workers like software developers, the unseen architects of innumerable, and often vital, personal and societal functions today. Therefore, the purpose of this study was to

examine how dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work predicts the overall job satisfaction of software developers.

The structure of this chapter begins with the theoretical framework. After the theoretical framework, the review proceeds to software developers, gratitude, job satisfaction, and a review of studies on gratitude's impact on job satisfaction.

Literature Search Methods

This literature review relied primarily on the OneSearch feature provided by the online library resource of Abilene Christian University. I used Google Scholar frequently during the research. I also often looked through the references in peer-reviewed articles found during these searches, especially when the original or seminal articles were cited in the studies. I entered words and combinations of terms, including *gratitude*, *job satisfaction*, *software developers*, *thankfulness*, *trait*, *state*, and other terms, into search engines. Baltes and Ralph (2022) pointed out that this method of sampling texts works well in literature reviews. In their article, they analyzed the sampling methods of software developer studies for popularity and effectiveness (Baltes & Ralph, 2022). The more times I found the same article cited, the more I would note its role in the narrow field of research under which the present study is categorized.

I also set up Google Scholar alerts that were sent to me periodically via email when peer-reviewed articles about gratitude were published. For the sake of generalizability, many studies were based in the United States, but some research from other countries and were available in English was also added, especially when their subject matter (e.g., gratitude, job satisfaction, and software developers) were similar to the subject matter of the present study (dispositional gratitude at work, expression of gratitude at work, receipt of gratitude at work, and job satisfaction of software developers).

Theoretical Framework

The broaden-and-build theory of positive emotions (Fredrickson, 2001) and the find-remind-bind theory of gratitude (Algoe et al., 2008; Algoe, 2012; Yoshimura & Berzins, 2017) guided this study. The conceptualization of experiencing emotion must be discussed to understand both theories. Together, these two theories explain why gratitude matters and how it contributes to positive outcomes. The broaden-and-build theory of positive emotions (Fredrickson, 2001) accounts for gratitude's impact on personal resources and flourishing (i.e., the upward spiral; Chang et al., 2022; Chou et al., 2022; Fredrickson, 2001; Guan & Jepsen, 2020; Guzzo et al., 2022; Subramanian & Thakur, 2022; Xiang & Yuan, 2021), and has also been applied to job satisfaction research (Cho et al., 2021; Gabini & Salessi, 2019; Kalliath et al., 2019; Okros & Vîrgă, 2022), which were variables in this quantitative, nonexperimental, cross-sectional study. Additionally, the find-remind-and-bind theory (Algoe, 2012) indicates that relational gratitude improves relationships and satisfaction.

Broaden-and-Build Theory of Positive Emotions

Emotions. Before presenting the broaden-and-build theory of positive emotions (Fredrickson, 2001), it is important to clarify what emotions are and how they work. Emotions are multicomponent response tendencies eliciting physical, physiological, affective, and behavioral changes (Cabanac, 2002; Diener et al., 2020; Fredrickson, 1998, 2001; Naragon-Gainey & Watson, 2021; Tugade et al., 2021). Emotions, to name a few, include happiness, joy, surprise, awe, contentment, gratitude, anger, disgust, and fear (Bliss-Moreau et al., 2020; Cabanac, 2002; Fredrickson, 1998; Lazarus, 1991; Sekerka et al., 2012; Smith & Lazarus, 1990; Tugade et al., 2021). Emotions can be positive or negative (Fredrickson, 1998, 2001; Tugade et

al., 2021). There is a difference between how negative and positive emotions work (Fredrickson, 1998; Isen, 2003).

Negative Emotions. Prior to Fredrickson's (2001) broaden-and-build theory of positive emotions, which began in 1998, psychologists focused on negative emotions and their cognitive and behavioral effects (Fredrickson, 2013; Isen, 1987; Tugade et al., 2021). Examples of negative emotions include stress, shame, sadness, depression, worry, grief, fear, and anger (Ackermans et al., 2022; Behrendt & Ben-Ari, 2012; Caprara et al., 2022; Carpinelli & Savarese, 2022). At first, theories of emotion were based on only negative emotions, which focused on each negative emotion's action tendencies (Lazarus, 1991). To illustrate, an action tendency of anger (negative emotion) could tend to prompt the action of fighting, and fear (negative emotion) could prompt the action of running away (Fredrickson, 1998).

Negative emotions can lead to negative consequences mentally, socially, and physically. Compared to positive emotions, negative emotions are associated with pathology and health problems (Tugade et al., 2021). Moreover, negative emotions have a limiting effect on cognitive functions like focus because the person becomes preoccupied with relieving negative emotions (Harmon et al., 2022; Isen, 2003; Smith & Lazarus, 1990; Zhang et al., 2022). Negative emotions also can be psychologically harmful such as reducing well-being and satisfaction as well as triggering mental illness (Ackermans et al., 2022; Carpinelli & Savarese, 2022; Fidao et al., 2021; Fredrickson, 1998; Wang et al., 2022). Finally, physical health is impacted by negative emotions (Kubzansky & Kawachi, 2000). In their meta-analysis, Kubzansky and Kawachi found a significant connection between negative emotions and an increased risk of coronary heart disease.

Additionally, negative emotions can have negative social consequences that can impact personal relationships, school and job performance, and job satisfaction (Chao et al., 2015; Elfenbein, 2014; Emmons, 2016; Fredrickson, 1998, 2013; Isen, 1987, 2003; Moura et al., 2014; Nguyen & Le, 2021; Rottenberg, 2005; Zhang et al., 2022). Stress (negative emotion) at work leads to lower productivity, burnout, and turnover (Chao et al., 2015; Jin et al., 2020; Larner et al., 2017; Lubbadah, 2020; Salari et al., 2020).

In short, negative emotions are action-specific responses to threats that narrow one's thoughts (Fredrickson, 1998). In other words, negative emotions are multisystem responses to circumstances that people evaluate as bad for them (Fredrickson, 2013). Excess negative emotions can be counterproductive and lead to individual and societal suffering (Ackermans et al., 2022; Carpinelli & Savarese, 2022; Fredrickson, 1998; Pfeffer, 2018). However, positive emotions work differently and have positive effects (Fredrickson, 1998, 2013; Isen, 1987; Sekerka et al., 2012; Tugade et al., 2021).

Positive Emotions. Positive emotions work differently than negative emotions. Both kinds of emotions lead to affective-driven behaviors (Fisher, 2019; Fredrickson, 2001; Weiss & Cropanzano, 1996). However, negative emotions are typically responses to threats and thus narrow thought–actions for survival, but positive emotions are not defined only by specific action tendencies, do not narrow thought–actions, nor are they marked by unpleasantness (i.e., negative valence; Fredrickson, 1998; Sekerka et al., 2012; Tugade et al., 2021). Positive emotions include joy, pride, interest, happiness, elevation, love, happiness, hope, awe, amusement, contentment, satisfaction, and gratitude (Fredrickson, 1998; Isen, 1987; Sekerka et al., 2012; Tugade et al., 2021).

A common denominator of positive emotions is that they feel good (e.g., pleasant, pleasurable, warm glow, positive affect, positive valence; Diener et al., 2020; Fredrickson, 1998, 2001; Isen, 1987; Isen & Levin, 1972; Tugade et al., 2021). Positive emotions are positive when the feeling state is characterized as pleasant and life-giving (i.e., positive affect; Diener et al., 2020; Fredrickson, 2004; Ma et al., 2020). In other words, positive emotions are multisystem responses to circumstances that people evaluate as good, or potentially fortunate, for them (Fredrickson, 2013). Positive emotions involve pleasant sensations (i.e., positive valence, positive affect; Fredrickson, 1998; Isen, 1987; Tugade et al., 2021). The positive affect results from a person's subjective appraisal that a stimulus meets a need, want, or goal, or it remedies an unpleasant feeling or pleasantness (Tugade et al., 2021). Not only do positive emotions feel good, but they also do good.

In an early, seminal study of positive emotions, Isen and Levin (1972) experimented with inducing good moods to see if positive affect influenced a person's helping behavior. They predicted that feeling good would lead to more helping behaviors. They recruited 52 male college students for the experiment. They gave cookies to randomly selected participants to induce a good mood. Then, they asked participants to choose either to become a helper or a hinderer, and they repeated this session five times. They found that the participants who were given cookies before their choice to help or hinder chose significantly more to be helpers ($t = 1.96, p < .05$). Isen and Levin concluded that people who are experiencing positive emotions are more likely to exhibit helpful behaviors.

In a follow-up experiment, Isen and Levin (1972) wondered if positive feelings would lead to helping behaviors even when they were unsolicited. The experiment involved 24 female and 17 male adults who used specified public pay phones. In this experiment, they induced the

positive emotion by causing the randomly selected subjects to find a dime in the phone's return slot. The control was the subjects who were not left a dime to find. After finding or not finding the good-mood-inducing dime, helpfulness was measured whether the subject would help a person pick up their dropped papers that were in their subjects' path as they left the phone booth. Using a Fisher exact test, Isen and Levin (1972) determined that feeling good was significantly related to helpful behavior for both females ($p < .005$) and males ($p = .025$). Isen and Levin asserted that when people experience positive emotions, they are more likely to exhibit helping behaviors than when they are not experiencing positive emotions.

Studies such as the ones of Isen and Levin (1972) began to uncover the influence of positive emotions. As this happened, it became more apparent that positive emotions worked differently than negative emotions (Fredrickson, 1998, 2001, 2013; Isen, 2003; Isen & Levin, 1972). A growing body of research has uncovered how positive affect improves cognitive, social, and organizational functioning (Cameron, 2021; Fredrickson et al., 2017; Garland et al., 2010; Isen, 2003, 2009; Lan et al., 2022; Ma et al., 2020; Yang et al., 2015; Yoon et al., 2022).

Emotion theory, which had been based on negative emotions, was not an adequate framework within which positive emotions could fit (Fredrickson, 1998, 2001, 2013), as positive emotions are qualitatively different from negative emotions. They are not on opposite ends of the same continuum. A new theory emerged to explain the enhancing effects that positive emotions can have on people's thoughts, actions, and personal resources (Isen, 2003), called the broaden-and-build theory of positive emotions (Fredrickson, 1998). The next section explains this theory and how it applies to the present study.

The Broaden-and-Build Theory of Positive Emotions. To help explain why positive emotions are good and advantageous in the short and long term, Fredrickson (1998) posited the

broaden-and-build theory of positive emotions. According to Fredrickson (1998, 2001), positive emotions are good because they not only feel good, but they also do good by broadening a person's thought–action repertoire and building personal resources. The theoretical framing of this study relies on Fredrickson's broaden-and-build theory of positive emotions (Celestine, 2016; Fredrickson, 2001). The broaden-and-build theory of positive emotions (Fredrickson, 2004) comprises two major tenets: the broaden tenet and the build tenet (Fredrickson, 2013).

Broadening. The momentary broadening of one's thought–action repertoire occurs because the positive emotions have signaled to the brain that the environment is safe and pleasant (Fredrickson, 2004). This leads to time to reflect and expand one's thought–actions. The possible options for action that proceed the positive emotion are flexible and expansive (rather than the narrowing effect that negative emotions cause; Fredrickson, 2001; Tugade et al., 2021).

In other words, a person's stock (e.g., repertoire, range, breadth) of thoughts and actions increases. For example, the positive emotion of interest could lead to an urge to learn that could entail a range of exploratory thinking and choices of actions (Tugade et al., 2021). As another example, the positive emotion of joy has a widening array of thought–actions that come to a person's mind, such as an urge to think or act playfully, artistically, or adventurously (Fredrickson, 2001). As another example, the positive emotion of gratitude could lead to a desire to thank a benefactor, which could be acted upon in a multitude of ways (Cardon et al., 2021; Day et al., 2022; Dunaetz & Lanum, 2021). As a result of broadening the thought–actions in the moment, one also benefits in the longer term (Fredrickson, 1998, 2001), which is described in the second tenet of the broaden-and-build theory of positive emotions (Fredrickson, 2001), expounded upon in the immediately following subsection.

The actions that positive emotions broaden are actions that are positive, personally and communally (Fredrickson, 1998). For example, researchers found that positive feelings increase helping behaviors (Fisher, 2019, 2002; Isen, 1987; Isen & Levin, 1972; Tsai et al., 2007). Similarly, looking at specifically the positive emotions of satisfaction, researchers have found it led to increased citizenship behaviors (Barnes et al., 2013; Hennicks et al., 2022; Yu et al., 2021). These examples of positive outcomes from positive emotions convey that positive emotions lead not only to a broadening of possible actions but also actions that tend to be a net positive.

Building. Positive emotions are also building a lasting reserve of personal resources for future events (Fredrickson, 2004). This means that as a result of experiencing positive emotions, there is an increase in long-term personal resources carried forward: psychological (e.g., coping), intellectual (e.g., creativity), and social (e.g., social bonds). This second tenet of the theory means that people continue to receive the benefits of having felt a positive emotion long after the feeling is gone.

Because positive emotions do not just broaden thought–action but also build personal resources, positive emotions contribute to personal growth, development, and productivity (Cameron, 2012; Fredrickson, 2001; Garland et al., 2010; Kok et al., 2013; Sekerka et al., 2012). In a review of the literature on the broaden-and-build theory of positive emotions (Fredrickson, 2001), Garland et al. (2010) argued the theory had mounted a significant empirical foundation across multiple studies, which have indicated that positively valenced emotions lead to personal well-being. There are immediate and future benefits to experiencing positive emotions. In brief, the theory states that positive emotions catalyze human flourishing.

Application to the Positive Emotion of Gratitude. One such powerful, highly positive, other-focused emotion is gratitude (Batool et al., 2022; Chang et al., 2022; Emmons & McCullough, 2003; Fredrickson, 2013; Xiang & Yuan, 2021). Fredrickson (2013) used the positive emotion of gratitude as an example to explain how positive emotions build personal resources as they broaden thought–actions. Feeling grateful broadens thought–action tendencies by, for instance, promoting creative prosocial behaviors as the emotion is present. Such actions then build personal resources for future circumstances by, for instance, accruing social skills like expressed compassion, relationship bonding, and loyalty to others (Fredrickson, 2013).

In gratitude research, gratitude is perceived as a positive emotion, and it leads to a plethora of personal and social benefits (Algoe et al., 2013; Armenta et al., 2017; Emmons & McCullough, 2004; Lin, 2019; McCullough et al., 2002; Tang et al., 2022). The theoretical framing of this study relied on Fredrickson’s broaden-and-build theory of positive emotions (Celestine, 2016; Fredrickson, 2001).

Software Developers’ Emotions. Researchers have argued that emotions are a factor in employees working in software development (Khan & Saleh, 2021; Sánchez-Gordón & Colomo-Palacios, 2019). It is a job that is defined by its software and computer outputs (U.S. Bureau of Labor Statistics, 2022a, 2022b); society can overlook that humans and human emotions exist behind the making of the ubiquitous technology of our modern day life. However, software developers’ emotions at work have been detected in the artifacts of their work (Murgia et al., 2014). The presence of both negative and positive emotions presents an opportunity to apply the broaden-and-build theory of positive emotions (Fredrickson, 2001) to software developer workplaces.

Negative Emotions and Software Developers. Studies examining the negative emotions of software developers have revealed a close relationship between software developers' feelings of stress, pressure from supervisors, and otherwise unhappiness led to lowered creativity, a necessary skill in achieving quality software solutions, which is the purpose of software developers (Chen et al., 2020; Graziotin et al., 2018). Negative emotions like unhappiness, sadness, and emotional exhaustion lead to unwanted outcomes such as lower motivation at work (Kachorowski et al., 2018), performance (Murgia et al., 2014), well-being (Sánchez-Gordón & Colomo-Palacios, 2019), and job satisfaction (Kowalski et al., 2022; Storey et al., 2019).

Positive Emotions and Software Developers. Positive emotions are critical among software developers (Anany et al., 2019; Girardi et al., 2022; Girardi et al., 2020; Graziotin et al., 2018; Graziotin et al., 2014, 2015; Kurian & Thomas, 2022, 2023; Liu et al., 2021; Masood et al., 2022). However, the influence of positive emotions on software developers has been left largely unexplored (Girardi et al., 2022). The broaden-and-build theory of positive emotions (Fredrickson, 2001) can provide a theoretical framework for further exploration of software developer positive emotions like gratitude in the software developer's workplace. Positive emotions like gratitude at work could be shown to broaden the thought–action repertoire and build personal resources as it has so consistently in other populations and workplaces (Fredrickson, 2013; Garland et al., 2010; Subramanian & Thakur, 2022; Tugade et al., 2021).

Find-Remind-and-Bind Theory

The broaden-and-build theory of positive emotions (Fredrickson, 2001) explains how gratitude benefits individuals in general by broadening thoughts and actions and building personal and professional resources. The find-remind-and-bind theory (Algoe, 2012) explains how gratitude further works by building and maintaining relationships. The find-remind-and-

bind theory states that gratitude fosters binding relationships between the beneficiary (i.e., the one receiving a gift or benefit) and the benefactor (i.e., the one responsible for the benefit) with lasting benefits (Algoe, 2012). The theory assumes gratitude promotes bonds with others and all the secondary benefits associated with healthy social functioning (Algoe et al., 2008). In this theory, experiencing gratitude helps people find good relationships (i.e., find), sustain good relationships that already exist (i.e., remind), and enhance interpersonal relationships (i.e., bind; Algoe, 2012; Locklear et al., 2020). Both the benefactor and beneficiary of gratitude receive psychological rewards in their strengthening dyadic relationship, and the expression of gratitude further bolsters these positive outcomes (Algoe et al., 2013; Algoe et al., 2016; Chang et al., 2021; Davis et al., 2021; Dunaetz & Lanum, 2021; Gordon et al., 2022; Gordon et al., 2011; Kumar & Epley, 2018; Lee et al., 2019; Yoshimura & Berzins, 2017).

This theory gives a well-rounded perspective of gratitude; relational (i.e., social, dyadic, expressing, and receiving) gratitude is different from a person simply feeling gratitude (Algoe et al., 2013). That is, this theory encapsulates the interpersonal implications of gratitude, conveying how expressed and received gratitude between people fosters high-quality relationships and satisfaction (Locklear et al., 2023). Therefore, this theory pairs well with the broaden-and-build theory (Fredrickson, 2001) as a theoretical framework for the present study of dispositional and relational gratitude at work.

Zhu et al. (2022) iterated the validity of the find-remind-and-bind theory of gratitude. The purpose of Zhu et al.'s study was to determine if a person's gratitude toward a benefactor would influence the beneficiary's favoritism and unjust bias toward the benefactor. They conducted a behavioral experiment on 69 university students in which they induced gratitude by having confederates become benefactors by choosing to absorb the electric shock for the beneficiary.

Thirty-four recruits were in this gratitude group. The control group of 35 participants was told that the rule was for their partner (confederate) to share the shock, thus lessening the pain; following the rules of absorbing the shock for the recruit would mean there was nothing for which to be grateful. In the next phase of the experiment, they kept participants with their same partners in a third-party coin allocation game. Participants had a chance to protect or punish their partner's (benefactor from the electric shock experiment) unfair token distributions. The gratitude group exhibited more gratitude toward their partners than the control group [$F(1,67) = 81.60, p < .001$]. As well, the gratitude group did not take away as many of their partner's tokens in the second phase [$F(1,67) = 22.67, p < .001$]. They found that the binding effects of gratitude—induced by their partner's (benefactor) choice to absorb the partner's (beneficiary) electric shock—made it more likely that participants would be protective of, and lenient on, their partner's (benefactor's) unjust coin distributions. Importantly, Zhu et al. (2022) asserted that their findings were evidence of the find-remind-and-bind theory of gratitude (Algoe, 2012). Namely, through the lens of this theory, gratitude fostered relationship building between the participants and the persons toward whom they felt grateful. People were revealing favoritism toward the benefactors, which supports the find-remind-and-bind theory.

Furthermore, evidence has recently emerged that the find-remind-and-bind theory (Algoe, 2012) could apply to more than just dyadic encounters. Tsang (2021) questioned if Algoe's (2012) theory was limited to dyadic relationships. It became part of the purpose of the study—to determine if group-level gratitude would increase prosociality. If prosociality did increase among participants, Tsang (2021) reasoned, then the find-remind-and-bind theory (Algoe, 2012) might also work in group-level relationships. Tsang's (2021) experiment demonstrated that group-level benefits from a benefactor elicited group-level gratitude among

122 university students. Tsang concluded that the results did affirm the theory and that gratitude was important for not only dyads but also groups.

Accordingly, leaders could consider group-level benefits as a means to cultivating gratitude, especially if studies like the present one continue to uncover the organizational advantages of gratitude at work. Specifically, the present study examined relational gratitude at work among supervisors and colleagues. These are dyadic, thus certainly within the bounds of Algoe's (2012) theory. However, studies like Tsang's (2021) that infer a collective benefit to gratitude help stress not only the potency of gratitude but also the need for the present study. Indeed, workplace gratitude obtains positive outcomes as gratitude works in multi-levels to enhance relationships and social functioning in work communities (Chhajer & Dutta, 2021; Fehr et al., 2017; Komase et al., 2022; Locklear et al., 2023; Morgan et al., 2017; Müceldili et al., 2015; Waters, 2012).

In short, this theory grounds the study of gratitude by connecting gratitude to positive outcomes, thus why gratitude is inherently desirable. Moreover, this theory supports the idea that expressed gratitude leads to life and social satisfaction (Algoe, 2012). Therefore, the theory is well-suited for the present study since the purpose was to explore expressed and receipt of gratitude at work and its link to job satisfaction.

Broaden-and-Build and Find-Remind-and-Bind Theories

Taken together, the broaden-and-build theory of positive emotions (Fredrickson, 2001) and the find-remind-bind theory of gratitude (Algoe et al., 2008; Algoe, 2012; Locklear et al., 2020; Yoshimura & Berzins, 2017) establishes a theoretical foundation for addressing the effects of gratitude in the workplace. By considering this theory couplet, researchers can expect to uncover correlations between gratitude and positive work outcomes. Indeed, though the subject

is still waxing, the literature suggests that gratitude predicts job satisfaction (McKeon et al., 2020; Waters, 2012). To further confirm, more work is needed, especially among various populations and work settings. The present study addressed this connection among software developers. Gratitude could impact dyads (find-remind-and-bind) enough to broaden and build software developers' job satisfaction.

These theories can also work well in gratitude studies when combined (Locklear et al., 2020). In fact, as Fredrickson (2013) delved deeper into the broaden-and-build theory of positive emotions (Fredrickson, 2004), Fredrickson cited Algoe (2012), the foundational article of the find-remind-and-bind theory, to explain gratitude. Completing a cycle of this complementary relationship between theories, Algoe (2012) cited Fredrickson's (1998, 2001) theory as an elemental premise that led to the find-remind-and-bind theory (Algoe, 2012). There is an undeniable partnership between the two theories. The broaden-and-build theory of positive emotions (Fredrickson, 2004) explains that the thought–action tendency of gratitude is the enhanced desire to be prosocial (Fredrickson, 2013). Conversely, the find-remind-and-bind theory (Algoe, 2012) portrays gratitude as a way to broaden social opportunities and build stronger dyads (Algoe, 2019).

Recently, Locklear et al. (2020) applied both the broaden-and-build theory of positive emotions (Fredrickson, 1998) and the find-remind-and-bind theory (Algoe, 2012) to their study of workplace gratitude. The intervention was for participants to keep a gratitude journal for 10 days in two field experiments, the first with 147 participants and the second with 204 participants. The journal included prompts written by Locklear et al. (2020) from an adaptation of previous gratitude studies for the participants randomly selected to be in the gratitude intervention group (Emmons & McCullough, 2003; Kaplan et al., 2014, as cited by Locklear et

al., 2020). One example of a prompt in the journal was “Write down on the lines below the events that you are grateful or thankful for and why” (Locklear et al., 2020, p. 1321). At the end of 10 days of journaling, participants were given a survey that measured prosocial motivation, relationship closeness, self-control resources, incivility, and control variables. For a manipulation check on the gratitude journal, they used CAT scanner software that counted instances of gratitude using a dictionary of words qualifying as gratitude, such as 18 variations of the words gratitude (e.g., grateful, gratefulness), appreciation (e.g., appreciative, appreciated), and thanks (e.g., thankful, thanking, thanked; Locklear et al., 2020, p. 1322).

Their field gratitude interventions resulted in positive outcomes that confirmed these theoretical bases. For example, the study showed that expression of gratitude in the workplace was self-perpetuating socially. The high frequency of gratitude expression created the normalization of expressing gratitude in the work environment. Witnessing gratitude seemed to compel more people to join in expressing gratitude. This organic generating of gratitude from gratitude renders evidence of emotional contagion for others who express gratitude. As gratitude grew among participants, relationships were strengthened, which enacted the find-remind-and-bind theory. Locklear et al. (2020) even pointed out that they tested and confirmed the find and remind parts of the theory (p. 1327). Finding and reminding functions of gratitude had previously received the least attention by researchers (p. 1327). Furthermore, the broaden-and-build theory helped explain why gratitude journaling, the administered gratitude intervention in the study, built the personal resource of self-control and social functioning (e.g., improved civility and reduced gossip). Considering the broaden-and-build theory, these resulting resources were not only explained but expected.

Likewise, the current study applied both the broaden-and-build and find-remind-and-bind theories of gratitude to hypothesize connections between gratitude and job satisfaction among software developers. In short, both theories posit that gratitude is connected to positive outcomes.

Summary

The broaden-and-build theory of positive emotions (Fredrickson, 2001) underpins the present study's hypothesis that dispositional gratitude at work might predict job satisfaction. Meanwhile, the find-remind-and-bind theory of relational gratitude (Algoe, 2012) underpins the present study's hypothesis that expression and receipt of gratitude at work with one's supervisor and colleagues might predict job satisfaction. Therefore, it made sense to investigate these three forms of gratitude against software developer job satisfaction to see what positive results could be uncovered and instruct software company leaders in addressing gratitude in their workplace culture.

The Field of Software Developers

Definition of a Software Developer

A software developer is defined as a person who creates software that functions as part of computer hardware, operating systems, and networks (U.S. Bureau of Labor Statistics, 2022a, 2022b). Developers could have a wide range of job descriptions, depending on where they work and which specific role they have in software development (Beecham et al., 2008; Eckhardt et al., 2016; U.S. Bureau of Labor Statistics, 2022a, 2022b; Zhang et al., 2020). According to the U.S. Bureau of Labor Statistics (2022a), applications software developers, software engineers, systems software developers, and information technology (IT) project managers are all examples of jobs that fall under the category of software development. For example, software development

can mean designing video games, planning the scope and plan of a software project, or building user interfaces or entire operating systems used in smartphones, vehicles, or manufacturing machinery (U.S. Bureau of Labor Statistics, 2022a, 2022b). In brief, the job of a software developer is to design, deliver, and improve computer science and software systems.

Software Developer Problems

High Turnover Rate. The software development sector experiences high employee turnover that impedes business productivity (Bass et al., 2018; Booz, 2018; Smite et al., 2020) while continuing to be one of the highest demanded jobs (U.S. Bureau of Labor Statistics, 2022a, 2022b). Data from 500,000 professionals collected by LinkedIn revealed that the technology and software industry has a 13.2% turnover rate, the highest of any other field (Booz, 2018). Even as more companies have begun offshoring their software projects to save money and speed up production, turnover persists to complicate software development (Smite et al., 2020). The globally shared problem of software worker turnover decelerates software quality (Bass et al., 2018). Choi (2019) asserted that because of the fluctuation of the markets and the evolution of technologies, the software industry is especially vulnerable to the kind of turnover that leads to company failure. The turnover problem is especially problematic in the CIT (computer integration technologies) world because turnover precipitates knowledge loss, making it difficult for software-related occupations to replace due to the highly technical and nuanced nature of software work (Robillard, 2021).

A software developer develops software that, as the creator, is the expert of their own work. When that person leaves the company, the knowledge leaves with them. Robillard (2021) claimed that the high turnover is causing significant knowledge loss since software development is extremely specialized and project specific. Bass et al. (2018) asserted that low retention among

software developers is negatively affecting companies' productivity and product quality. Thus, the high turnover factor further compounds the urgent need to address the well-being of software employees.

The Emotion-Based Problems: Stress and Burnout of Software Developers. A high level of work stress in the software business threatens the emotional well-being of software developers (Sánchez-Gordón & Colomo-Palacios, 2019). Stress refers to a person's response, characterized by mental and physical destabilization, to real or perceived, present or future antagonistic stimulus to one's well-being (Ulrich-Lai & Herman, 2009).

High-stress work environments burden organizations and their constituents by causing turnover, absenteeism, financial loss, and harm to people's health (Pfeffer, 2018; Thomas et al., 2022). For example, 50% of voluntary turnover is a result of job stress (Seppälä & Cameron, 2015). Furthermore, Pfeffer (2018) estimated the market's cost of stress per year is 120 billion. Additionally, sustained feelings of stress lead to emotional burnout, defined as emotional exhaustion, cynicism, and unhappiness toward one's job and oneself (Maslach & Jackson, 1981). In 2020, the technology field saw a 35% increase in employee burnout (Furrow et al., 2021). Undoubtedly, such levels of stress and burnout pervading the software industry correlate to the turnover rate. Thus, leaders must reduce the stress of their constituents.

Researchers have called for more data on how emotions influence software developers at work. In 2014, Graziotin et al. emphasized the need for more empirical research into the affective state of software developers and the outcomes. Graziotin et al. (2018) and Graziotin et al. (2015) underwrote this position in following years. A recurring theme of Graziotin et al.'s (2018) work has been that software development, not being created in a vacuum by artificial intelligence (AI) but instead by human beings, has a human factor that matters (Graziotin et al.,

2018; Graziotin et al., 2014, 2015). The point is that emotional states and organization-wide collective emotional culture may either negatively or positively influence production; the ideal state of software development happens when software workers are happy versus unhappy. To date, the empirical research on software developers' emotions and how they impact them, their organizations, and the end user of software remains extant. More should be inspected. Since gratitude appears to be a vital part of life and job satisfaction (Di Fabio et al., 2017; Peng et al., 2022; Pfister et al., 2020; Portocarrero et al., 2020; Stocker et al., 2019; Unanue et al., 2021; Zhao et al., 2022), gratitude should be part of the research into software workers and their emotions.

Analogously, Zhang et al. (2020) mentioned a need for future examination of psychological states and feelings among software workers. The opportunity for a myriad of different human emotions could be paired with multiple outcomes such as creativity, performance, engagement, stress levels, burnout, turnover, and job satisfaction. In this study, the emotion of gratitude was paired with job satisfaction.

Software Developers and Gratitude. Little empirical data about gratitude and software developers exist (Butler & Jaffe, 2021; Li et al., 2022; Patil et al., 2018). However, some limited evidence indicates that gratitude bears a significantly positive impact on software developers (Butler & Jaffe, 2021) and a crossover profession, information technologists (Li et al., 2022; Patil et al., 2018).

I found a significant discrepancy in my review of gratitude literature as well as studies targeting software workers. Namely, software development affects everyone in that reliance upon software cannot be overstated, yet little research has been conducted to explore how leaders could help software developers feel and perform their best. Additionally, while some researchers

have argued that positive emotions are critical to software developers' well-being and satisfaction (Anany et al., 2019; Girardi et al., 2022; Graziotin et al., 2018; Müller & Fritz, 2015; Murgia et al., 2014; Sánchez-Gordón & Colomo-Palacios, 2019), there is a lack of evidence for how positive emotions like gratitude might broaden-and-build their job satisfaction.

Notwithstanding the infrequency of software developer studies, software developers have been included in studies targeting IT professionals more broadly (Li et al., 2022; Patil et al., 2018). Patil et al. (2018) surveyed IT professionals, an umbrella industry term that includes software development workers (U.S. Bureau of Labor Statistics, 2022a, 2022b), to investigate the positive impacts of expression of gratitude on employee morale. Similarly, Li et al. (2022) included the technologist profession among a cross-section of multiple professions in their study.

Fortunately, a small slice of studies have addressed the gratitude of the software developer populations only (Butler & Jaffe, 2021; Ford et al., 2021; Kurian & Thomas, 2022, 2023; Zolduoarrati & Licorish, 2021; Zolduoarrati et al., 2022). These studies all included a software developer population but varied in how much attention was given to gratitude.

In most cases, gratitude is merely mentioned (Ford et al., 2021; Kurian & Thomas, 2022; Zolduoarrati & Licorish, 2021; Zolduoarrati et al., 2022). In one form or another, these researchers explored the work outcomes of software developers' emotions. Gratitude is listed as a positive emotion, among other emotions. Though gratitude appears as little more than a footnote, it bears a significant implication. Namely, gratitude at work could benefit software developers and their organizations. However, these studies could be considered more on the periphery of gratitude research.

On the other hand, two recent studies of software developers centered on gratitude (Butler & Jaffe, 2021; Kurian & Thomas, 2023). Kurian and Thomas (2023) studied gratitude's

impact on software developers' stress levels, and Butler and Jaffe (2021) studied job attitudes. The present study would become the third study of gratitude's impact on software developers at work.

Parallel in subject matter to the present study, Butler and Jaffe (2021) examined gratitude's impact on software developer satisfaction. The similarity in topic is three-fold: gratitude, its connection to satisfaction, and the work of software development. The present study examined dispositional and relational gratitude at work and how it predicts software developers' job satisfaction. The methodologies are different, yet Butler and Jaffe (2021) provided the germination of evidence for gratitude's positive influence on software developer satisfaction. Because of the similarities in the topic, I will explain their study in more detail.

Butler and Jaffe (2021) investigated the experiences of 435 software developers upon their transition from working in the office to working from home due to the COVID-19 pandemic. For 10 weeks, participants were instructed to journal at night their daily experiences, thoughts, and feelings. These nightly diaries given to participants included open text sections, which were put through thematic analysis. Themes about the daily challenges associated with working from home and their jobs in general emerged (e.g., overworked, lack of motivation, difficulty focusing, too many remote meetings, anxiety, and depression). The participants were also reporting their level of satisfaction. Notably, Butler and Jaffe (2021) found a relationship between reported daily challenges and reported daily levels of satisfaction. Specifically, developers were 24% less likely to report feeling satisfied when they reported challenges.

The diaries of these work-from-home (WFH) developers were filled with more than their daily challenges. A theme of gratitude also surfaced (Butler & Jaffe, 2021). On days they reported feeling grateful, they were 22% more likely to report feeling satisfied. These results

imply that gratitude could significantly positively influence software developers' level of job satisfaction. As Butler and Jaffe (2021) found, the practice of gratitude "impacted software engineers' satisfaction in a statistically significant way" (p. 363). Their findings established their study as a paramount precursor to the goals of the present study.

Butler and Jaffe's (2021) study, however, examined only a limited angle of gratitude. They looked for gratitude in participants' journal entries. Gratitude is multifaceted, often even measured as such (Fehr et al., 2017; Morgan et al., 2017). Gratitude studies could discuss feeling grateful, expressing gratitude, and feeling appreciated (Cardon et al., 2021; Gordon et al., 2022; Gordon et al., 2012; McCullough et al., 2002; McCullough & Tsang, 2004; Percival & Pulford, 2019). This study lacked an evaluation of potential influences of dispositional and relational gratitude between supervisors and one's colleagues. That was the purpose of the present study.

In another study, Kurian and Thomas (2023) questioned if gratitude could alleviate software developers' stress and fatigue. Employing a nonexperimental, cross-sectional, quantitative design, they surveyed 421 software workers to test their hypotheses that gratitude correlates with lower levels of stress ($r = -0.47$, 95% CI = [-0.55, -0.38]) and fatigue ($r = -0.36$, 95% CI = [-0.45, -0.27]; p. 3). The results provide leaders with just cause to incorporate gratitude practices. As Kurian and Thomas (2023) recommended, one way to foster gratitude, which protects against stress and fatigue, is for leaders to offer employees professional learning about the importance and practice of gratitude at work. Though their study was informative regarding gratitude's positive repercussions on software workers, their study was in India, whereas the present study targeted U.S.-based companies. Also, like Butler and Jaffe's (2021) study, Kurian and Thomas (2023) did not take a comprehensive view of the various forms of gratitude. Kurian and Thomas (2023) used Morgan et al.'s (2017) multi-component gratitude scale. It is a self-

reporting survey scale that measures one's level of emotion and gratitude behaviors. In contrast, the present study measured dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work.

In conclusion, the current body of literature on gratitude's positive impact on software developers is still in its embryonic state. Fortunately, the present study offers more empirical evidence. The present study will be the first to measure how dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work predict job satisfaction of software developers. By doing so, the present study melds with existing evidence that positive emotions, including gratitude, are good for software workers and their work (Butler & Jaffe, 2021; Ford et al., 2021; Girardi et al., 2022; Graziotin et al., 2015; Kurian & Thomas, 2022, 2023; Masood et al., 2022; Zolduoarrati et al., 2022). In turn, the present study's implications for practitioners and organizational leaders is that fostering a culture of gratitude is a prudent way to improve employee satisfaction and the associated positive outcomes for individuals and organizations.

Gratitude

Gratitude in Its Different Forms

Defining Gratitude. Gratitude is considered a virtue and a moral emotion (DeSteno et al., 2019; Emmons & McCullough, 2004; Liang et al., 2021; McCullough & Tsang, 2004; Morgan et al., 2017; Tudge et al., 2022). Though researchers have no consensus on a single definition of gratitude (Emmons et al., 2019; Morgan et al., 2017; Tachon et al., 2021; Watkins & McCurrach, 2021; Youssef-Morgan et al., 2022), the present study's definition of gratitude was grounded in positive psychology and positive organizational scholarship. Gratitude is defined as a positive emotion (Emmons et al., 2019; Emmons & McCullough, 2003;

Fredrickson, 2001, 2013; Watkins & McCurrach, 2021) characterized as thankfulness and appreciation that results from recognizing benefits (and responding to those benefits) received from the actions of others (Emmons & McCullough, 2003).

This study focused on gratitude as a positive emotion that has relational components (Algoe et al., 2013; Emmons et al., 2019; Gordon et al., 2012; Grant & Gino, 2010; Watkins & McCurrach, 2021), which boost positive outcomes like well-being and job satisfaction (Chen et al., 2021; Cortini et al., 2019; Lanham et al., 2012; Portocarrero et al., 2020; Waters, 2012; Wood et al., 2010). Therefore, this definition of gratitude was well-suited for the present study.

Experiencing Gratitude is a Two-Step, Cognitive–Emotional Process. Feeling grateful requires two cognitive–emotional steps: a person first recognizes a benefit they have received, and they are attributing it to a source such as another person (Emmons & McCullough, 2003, 2004; Tesser et al., 1968). The two parts to feeling grateful are embedded in the definition. As mentioned earlier in the definition of gratitude, according to Emmons and McCullough (2004), gratitude is feeling thankful for recognized benefits perceived to come from a source other than the self.

First, a person must deem something as a gift, benefit, or something that is positive and life-giving in some way (Emmons & McCullough, 2003, 2004; Tesser et al., 1968). The recognized benefit (recognized by the person feeling grateful) could be a gift they have received, a general appreciation for someone or something, or a gesture or action of another person (Emmons & McCullough, 2003, 2004). The person recognizing the benefit is considered the beneficiary. Second, the beneficiary is attributing the gift to a benefactor other than oneself (Emmons & McCullough, 2003, 2004; Tesser et al., 1968). The outside agent that is the source of the gift or benefit could be another person, a group, God, or another general undefined other

agent (Emmons & McCullough, 2004). Ultimately, this two-part process results in the positive emotion of appreciation of the benefit, not to mention appreciation of the benefactor (Emmons & McCullough, 2003, 2004; Gordon et al., 2012; McCullough et al., 2002; Tesser et al., 1968). As such, gratitude is considered to be an emotion that is virtuous, moral, other-oriented, and prosocial (Emmons & McCullough, 2003; Grant & Gino, 2010; Greenbaum et al., 2020; Liang et al., 2021; McCullough & Tsang, 2004; Morgan et al., 2017; Tudge et al., 2022).

Many Forms of Gratitude. Different than the two parts that make up gratitude mentioned in the previous subsection, gratitude also takes many forms. For example, Fehr et al. (2017) proposed that gratitude has three forms based on the frequency and group level in which it occurs: episodic gratitude (i.e., moments) turns into persistent (i.e., a string of moments) that eventually becomes evident at the collective group level (i.e., characteristic of the whole community). Most fundamentally, though, forms of gratitude include state, trait (dispositional), and relational (i.e., socially expressed and received) gratitude (Algoe, 2012; Emmons & McCullough, 2004; Gordon et al., 2012; Lin, 2019; McCullough et al., 2002). Researchers have also described gratitude in terms of levels. However, the present study focused on two forms of gratitude in the work context: dispositional gratitude at work and relational (expressed and receipt) gratitude at work. Those forms of gratitude are more extensively covered in later sections, but the immediately following paragraphs establish definitions of state, trait, and relational gratitude, as they are essential to understanding gratitude.

State Gratitude. State gratitude is the activated cognitive–emotional, momentary state of feeling grateful (Emmons & McCullough, 2003, 2004). State gratitude denotes feeling the positive affect of gratitude in a given moment (Emmons & McCullough, 2003, 2004) rather than a personality trait or the action of expressing gratitude. Wong et al. (2017) noted that state and

trait gratitude differ in timeframe. That is, state gratitude is feeling grateful in the short-term, and trait is the tendency for gratitude recurrence over longer timeframes of life. State gratitude was not used as a variable in the present study. The present study was more concerned with recurring experiences of feeling and expressing gratitude.

Trait (Dispositional) Gratitude. Gratitude is a trait (McCullough et al., 2002).

McCullough et al. (2002) referred to this as dispositional gratitude and defined it as the tendency to experience state gratitude. If a person is high in dispositional gratitude, they may experience the positive emotion of gratitude with more frequency and intensity than those who do not have this personality trait. To compare, a person experiencing a discrete sense of gratitude is experiencing state gratitude; the person's tendency to recurrently feel state gratitude is dispositional gratitude. An affective trait is subordinate to an emotional state or mood (Rosenberg, 1998). Dispositional gratitude supersedes an intense, brief emotional state of gratitude (McCullough et al., 2002). Several researchers have noted that dispositional gratitude at work has not been explored but not enough (Kersten et al., 2021; Unanue et al., 2021; Wang et al., 2020; Zhao et al., 2022).

Relational Gratitude. Gratitude can be felt, expressed, or received (Araz & Erdugan, 2017; Dunaetz & Lanum, 2021; Grant & Gino, 2010; Lee et al., 2019; Walsh et al., 2022). Gratitude could also be observed; a person could witness gratitude being expressed from one person to another person other than this witness (Algoe et al., 2020; Walsh et al., 2022). This is gratitude occurring in relationships. Moreover, labeling the expression and receiving of gratitude as relational denotes that this outward manifestation of gratitude builds relationships. Relational gratitude is the kind of gratitude to which Algoe's (2012) find-remind-and-bind theory refers—

that socially expressed and received gratitude fosters finding and strengthening high-quality relationships.

Conclusion. In their systematic review of gratitude literature, Locklear et al. (2023) proposed that the three basic forms of gratitude appear to be trait, state, and expressed gratitude. Expressed gratitude is relational gratitude that has two sides due to it being both expressed and received in a dyad (Algoe, 2012; Chen et al., 2022; Emmons & McCullough, 2004; Walsh et al., 2022). The present study examined trait and expressed gratitude in the work setting using relational gratitude scales modified to be specifically about the workplace. The other manifestation of gratitude that Locklear et al. (2023) asserted, state gratitude, was outside of the scope of the present study and thus will be only briefly explained in this review.

Gratitude as Appreciation. Researchers have often used the word appreciation explicitly in their definition of gratitude (Emmons & McCullough, 2003; Fehr et al., 2017; Lavelock et al., 2016; Wood et al., 2010). Appreciation could be noticing and valuing any positive in the world (Wood et al., 2008b). In addition to defining gratitude, scholars use appreciation as a synonym for gratitude (Davis et al., 2021; Dunaetz & Lanum, 2021; Gordon et al., 2012; Kumar & Epley, 2018; Lin, 2019; Randolph, 2017). This method has had staying power in the literature. One reason is that more recent gratitude scholars have continued to use previous researchers' definitions of gratitude. For example, Arnout and Almoied (2021) cited three other researchers' definitions of gratitude to make their own definition. They studied how gratitude impacted counselors ($N = 610$) and did so by asking them items on a Likert scale, such as "The appreciation of others for my work increases my success in it" (Arnout & Almoied, 2021, p. 475). Arnout and Almoied found that the regression weight was significant ($\beta = 0.962$) for gratitude in predicting resilience in counselors. Taken together, this illustrates that

appreciation helps define gratitude, describes how it feels to be grateful, and how it is expressed in relationships.

As a logical alignment to this definition of gratitude, appreciation appears on gratitude measurement scales for gratitude when surveying participants in gratitude studies (de Medeiros et al., 2019; Emmons et al., 2019; Gordon et al., 2012; Jans-Beken et al., 2015; McCullough et al., 2002; Morgan et al., 2017; Tachon et al., 2021; Unanue et al., 2021; Youssef-Morgan et al., 2022). For example, to measure gratitude in relationships, Gordon et al. (2012) used appreciation to signify gratitude, even calling the scale they developed the Appreciation in Relationships scale (AIR). This case is relevant to this study because AIR was part of the survey used to measure expression and receipt of gratitude. However, this method of measuring expressed and receipt of gratitude has not yet been applied to relationships at work with colleagues and supervisors, as does the present study to measure relational gratitude at work.

Outcomes of Gratitude

Gratitude—the idea of habitually feeling thankful (dispositional gratitude), showing thanks (expression of gratitude), and feeling appreciated (receipt of gratitude)—is a cornerstone of all major religions, and, culturally, a universal virtue (Watkins & McCurrach, 2021). A proliferation of peer-reviewed data had tightly linked gratitude to numerous positive physical, psychological, and social benefits (Alspach, 2009; Chou et al., 2022; Lambert et al., 2010; Lavelock et al., 2016; Loi & Ng, 2021; McNulty & Dugas, 2019; Pati & Mahapatra, 2022; Peng et al., 2022; Portocarrero et al., 2020; Taylor et al., 2021; Tsang, 2021; You et al., 2022). Seemingly, the advantages of exercising gratitude are boundless. With few exceptions, positivity has dominated gratitude studies. For that reason, the current study pursued how dispositional and relational gratitude at work might predict job satisfaction in a population thus far left out:

software developers. This section will explicate the value of gratitude as judged by its integral role in flourishing.

Well-Being. Subject well-being refers to a person's net evaluation of their emotional experience, positive affect, and satisfaction (Diener et al., 2017). It is a more scientific term for happiness, which is less precise. However, happiness can also be used synonymously with well-being (Diener, 2009; Diener et al., 2017). Since the beginning of positive psychology studies, gratitude's ability to improve well-being has been central to justifying gratitude practices to positively influence oneself and others (Portocarrero et al., 2020). Abundant empirical data has shown that gratitude relates to well-being (AL-Hashimi & Al-Barri, 2017; Corona et al., 2020; Emmons & McCullough, 2003; McCullough et al., 2002; Nguyen & Le, 2021; Portocarrero et al., 2020; Stocker et al., 2019; Taylor et al., 2021).

In their review of decades of studies of dispositional gratitude and well-being, Portocarrero et al. (2020) determined that dispositional gratitude was a significant predictor of well-being. In their meta-analytic review of 144 publications and over 100,000 adult participants, Portocarrero et al. (2020) suggested that dispositional gratitude moderately predicted well-being, with a correlation ranging from 0.40 to 0.48.

Emmons and McCullough (2003) focused on gratitude practices and their impact on well-being. In their experiment, they assigned a gratitude condition to 65 of the 192 undergraduate participants, 64 people to what they called the hassle group, and 67 in the events condition. The 65 participants in the gratitude condition were asked to fill out a weekly form for 9 weeks in which they listed five things they were grateful for in life. The hassle group wrote about hassles, and the events groups wrote about significant events. The survey also asked participants about their well-being, which was a section that all three groups had to fill out. Well-being was

assessed in the survey by asking participants about their weekly affects (e.g., excited, happy, joyful, stressed, angry, energetic), physical health (e.g., headaches, exercise), and social support (e.g., accepted sympathy from another person, received help and advice). Emmons and McCullough (2003) then analyzed the weekly written answers. They aggregated gratitude words that came up: grateful, thankful, and appreciative. Emmons and McCullough (2003) calculated well-being using a mean of the 9-week composites of positive and negative affect words they selected, and participants' ratings of their physical health, exercise, perceived social support, and life appraisals. The gratitude group reported fewer physical problems, more exercise, and a more positive outlook on their lives. Emmons and McCullough (2003) determined that participants in the gratitude condition experienced more well-being than the hassle and events groups.

Lin (2016) studied how gratitude and well-being were related among 486 female and 264 male adults ages 18–22. In this quantitative study, Lin (2016) relied on a self-reported survey. The survey measured gratitude using the Inventory of Undergraduates' Gratitude scale (Lin & Yeh, 2011), social support using the Inventory of Social Support scale (Lin, 2016), coping style using the Inventory of Coping Style scale, and well-being using the Inventory of Well-Being scale. In Lin's (2016) data analysis of the direct path coefficient from predictor to criterion, Lin found that gratitude significantly predicted well-being ($\beta = .75, p < .001$) even before factoring in the other variables as mediators. In a partially mediated model using social support and coping style, gratitude remained a significant predictor of well-being ($\beta = .43$).

Physical Health. Gratitude improves physical health. In their meta-analysis of 42 articles on the health benefits of gratitude, Lavelock et al. (2016) found that gratitude promotes positive health outcomes that complement healthy behaviors, mental health, and stronger relationships with other people. Studies have revealed that gratitude could improve heart health (Cousin et al.,

2020; Jackowska et al., 2016; Kok et al., 2013; Rash et al., 2011; Redwine et al., 2016) and brain health (Fox, 2019; Henning et al., 2017; Hori et al., 2020).

Studies have found an association between gratitude practices (e.g., gratitude journaling) and improved various heart conditions. For example, Redwine et al. (2016) conducted a gratitude journal intervention on 70 participants for 8 weeks. Redwine et al. (2016) concluded that journaling was associated with an improvement in the biomarkers of heart failure. Heart health can improve from practicing gratitude, even for a brief period. Jackowska et al. (2016) conducted a study in which participants were given a 2-week long gratitude intervention that resulted in lowered diastolic blood pressure, a condition for good heart health. Similarly, Rash et al. (2011) claimed that gratitude improved heart rhythm coherence. Moreover, in their study of positive emotions and physical health, Kok et al. (2013) included gratitude as one of the primary positive emotions being measured when they found that positive emotions improved vagal tone (Kok et al., 2013). Vagal tone served as a gauge for physical health in the study, as vagal tone assesses heart function. Furthermore, patients with stage B heart failure may even take their heart medication more consistently and accurately (Cousin et al., 2020). Research has propounded that gratitude is not only good for the heart but helps the heart in multiple ways simultaneously.

In addition to the heart, gratitude has a positive effect on the brain. Henning et al. (2017) found that gratitude stimulated the social reward center of the brain. They suggested that the brain's mu-opioid system gets activated from gratitude, which leads to a positive loop that increases positive impacts from gratitude (Henning et al., 2017). In other words, these pleasure-driving, homeostasis-inducing brain patterns from gratitude lead to lowered stress and increased well-being and social function. This is the physiological view of the broaden-and-build theory of positive emotions (Fredrickson, 2001). Comparably, Hori et al. (2020) employed brain imaging

methods. In the form of hearing someone read a gratitude letter, receipt of gratitude caused more brain activation than neutral letters, and negative mood decreased as well (Hori et al., 2020).

Mental Health. Gratitude is a positive emotion that contributes to mental health. As Fredrickson's (2001) broaden-and-build theory of positive emotions posits, positive emotions counteract the pathology associated with experiencing negative emotions. For example, gratitude can buffer against stress (Nguyen & Le, 2021; Valikhani et al., 2019; Wolfe, 2021; Wood et al., 2008a). Furthermore, there is evidence for gratitude's ability to lower levels of anxiety (Cregg & Cheavens, 2021; Pati & Mahapatra, 2022; Petrocchi & Couyoumdjian, 2016; Shah et al., 2021; Wang et al., 2020). To give an example of a specific type of anxiety, death anxiety is feeling anxiety about one's mortality, a near-death experience, or general worry about death (Pati & Mahapatra, 2022). In their systematic review of gratitude literature, Pati and Mahapatra (2022) determined that gratitude significantly negatively predicted a person's level of anxiety about death. More related to the present study, Wang et al. (2020) examined gratitude among workers and concluded that as work-related gratitude increased, work-related anxiety decreased. The present study measured gratitude in the work setting.

Emotional disorders could decrease as gratitude increases. In a study of 182 women with a trauma history, gratitude levels negatively correlated with symptoms of posttraumatic stress disorder (Vernon et al., 2009). Similarly, Van Dusen et al. (2015) suggested gratitude could be a lifeline for posttraumatic stress disorder (PTSD) as well as depression, particularly gratitude interventions or therapies. One group of people who struggle significantly with PTSD, military veterans, also have been found to improve many areas of their mental health by practicing gratitude (McGuire et al., 2021).

Many other studies have confirmed that gratitude also helps with depression (Feng & Yin, 2021; Liang et al., 2020; Lin, 2015; Petrocchi & Couyoumdjian, 2016; Wolfe, 2021). For example, Feng and Yin (2021) used the Gratitude Questionnaire (GQ-6; McCullough et al., 2002) with front-line medical workers. Findings indicated that gratitude negatively correlated with levels of depression (Feng & Yin, 2021). The negative influence that gratitude has on stress was also revealed in Lee et al.'s (2021) study of nurses during the COVID-19 pandemic. Since nurses during this time experienced above average levels of stress (Yuan et al., 2020), gratitude seems to have significant connections to above average stress reduction.

However, gratitude could alleviate emotional disturbances connected but even worse than depression. Studies have indicated suicide ideation can also be reduced by gratitude (Krysinska et al., 2015; Stockton et al., 2016). As Kleiman et al. (2013) put it, gratitude is a powerful tool in suicide prevention because gratitude is so highly malleable. People can learn to be more grateful (AL-Hashimi & Al-Barri, 2017; Wood et al., 2010). Taken together, gratitude seems to positively influence mental health, perhaps even more so if mental health is already at risk for individuals.

Intrapersonal Benefits. Gratitude leads to intrapersonal benefits like creativity (Arnout & Almoied, 2021; Chen et al., 2020; Pillay et al., 2020), motivation (Armenta et al., 2017; Azman, 2021; Brady et al., 2021; Iwai & de França Carvalho, 2022; Kindt et al., 2017; King & Datu, 2018; McCullough et al., 2001; Watkins & McCurrach, 2021), and life and job satisfaction (Armenta et al., 2022; Chou et al., 2022; Di Fabio et al., 2017; Lambert et al., 2009; Peng et al., 2022; Sood et al., 2015; Subramanian & Thakur, 2022; Unanue et al., 2021; Xiang & Yuan, 2021). The intrapersonal benefits of gratitude are personal resources that, according to

Fredrickson (2001), are fostered by experiencing positive emotions. Additionally, intrapersonal benefits convert to social benefits.

Experiencing the positive emotion of gratitude can increase a person's creativity (Pillay et al., 2020). Fredrickson (2001) listed creativity as a personal resource that improves with positive emotions, which is illustrated in the broaden-and-build theory of positive emotions. Creativity is a personal resource that can be used at work. For example, innovation, driven by creativity, is essential to software developers (Choi, 2019). However, less is known about the connection between dispositional gratitude at work and relational gratitude at work and how it predicts job satisfaction among software developers, which was addressed in the present study.

Another intrapersonal benefit of gratitude is life satisfaction (Armenta et al., 2022; Chou et al., 2022; Emmons & McCullough, 2004; Reyes et al., 2022; Sood et al., 2015; Unanue et al., 2019; Unanue et al., 2022; Xiang & Yuan, 2021). Life satisfaction is vital to well-being and flourishing (Diener, 2009; Diener et al., 1985; Diener et al., 2017). Therefore, gratitude's impact on life satisfaction is important.

In the creation of the self-reported measurement for dispositional gratitude, the GQ-6 (McCullough et al., 2002), life satisfaction was measured for the discriminant validity of the dispositional gratitude. McCullough et al. (2002) measured life satisfaction using the Satisfaction with Life Scale (Diener et al., 1985). This study consisted of 1,228 adults, at least 80% of who were women, who took the survey by clicking on a link on websites where it was posted, such as www.spiritualityhealth.com. McCullough et al. (2002) found that dispositional gratitude as measured by the GQ-6 was moderately positively related to life satisfaction with a correlation of .53 ($p < .01$). The results of their study were important to this study in two ways. First, the present study used the GQ-6 (McCullough et al., 2002) to measure dispositional gratitude.

However, the present study modified the questions so that they pertain to only the workplace. Secondly, McCullough et al.'s (2002) finding that life satisfaction was related to dispositional gratitude gave reason to conduct the present study to examine how another form of satisfaction, job satisfaction, might be predicted by dispositional gratitude at work.

More recently, Unanue et al. (2022) addressed gratitude's impact on life satisfaction. Since McCullough et al.'s (2002) study, as Unanue et al. (2022) emphasized, a substantial amount of evidence now exists that gratitude predicts life satisfaction. The purpose of Unanue et al.'s (2022) longitudinal study was to explore psychological processes that might mediate the relationship between gratitude and life satisfaction. They hired a web-based research company to obtain an end total of 487 Chilean adult participants online. The survey included the GQ-6 (McCullough et al., 2002) to measure gratitude and the Satisfaction with Life Scale to measure life satisfaction (Diener et al., 1985) all three times at 6-month intervals. Part of Unanue et al.'s (2022) findings was that gratitude had a direct, significant, and positive influence on life satisfaction (direct effect = 0.18, $SD = 0.04$, $p < .001$; [95% CI 0.11, 0.25]; p. 6). Unanue et al. (2022) argued that gratitude is fundamental to a person's well-being since feeling grateful predicts how a person perceives their life. However, this study was specific to life satisfaction, whereas the present study addressed satisfaction at work specifically. Moreover, the population of the present study was also more specific. Whereas Unanue et al. (2022) recruited adults in a city, the present study recruited only adult software developers.

Social Function. Social function (i.e., interpersonal relationships, prosociality) is an essential part of well-being, life satisfaction, and flourishing (Algoe, 2012; Seligman, 2012; Seligman & Csikszentmihalyi, 2000), and positive emotions are an essential part of social function (Algoe, 2012; Algoe et al., 2020; Keltner & Haidt, 1999; Mazidi et al., 2023;

Niedenthal & Brauer, 2012). According to Fredrickson (2013), gratitude is a powerful positive emotion that broadens one's thought–action repertoire by, among other ways, creating an urge to be prosocial. The consistency of gratitude's positive impact on prosociality can be explained by Algoe's (2012) find-remind-and-bind theory of gratitude: gratitude expressions help people find people they perceive worthy with whom to form a relationship, enforce relationships, and strengthen those relationships.

Gratitude is a highly social emotion (Algoe, 2012; Feng & Yin, 2021; Williams & Bartlett, 2015) that promotes social support (Feng & Yin, 2021; Valdez et al., 2022; Wood et al., 2008a). Certainly, one reason gratitude can be considered a social emotion is because of its social benefits. For example, gratitude improves relationships when expressed and reciprocated (Algoe, 2012; Algoe et al., 2008; Algoe et al., 2020). Not only does gratitude promote the more personal, intimate relationships (Algoe, 2012; Barton et al., 2023; Brady et al., 2021; Eyring et al., 2021; Gordon et al., 2012; Gordon et al., 2011; Lambert & Fincham, 2011; Leong et al., 2020; McNulty & Dugas, 2019; Park et al., 2019; Zoppolat et al., 2020), gratitude also improves workplace relationships and other positive outcomes at work (Akram et al., 2022; Cardon et al., 2021; Ford et al., 2018; Harrison et al., 2022; Hori et al., 2020; McKeon et al., 2020; Stocker et al., 2019; Zhao et al., 2022).

In a recent study, You et al. (2022) recruited 877 adolescent middle school students ages 10–12 to examine gratitude's impact on social functioning. Using quantitative survey methods, they measured participants' gratitude using the GQ-6 (McCullough et al., 2002) and problem behaviors using the Child Behavior Checklist (You et al., 2022). Using structural equation modeling (SEM), You et al. (2022) assessed structural relationships between the latent variables. They used bootstrapping methods to determine the mediating effects of variables, such as the

mediating effects of social support on the relationship between gratitude and prosocial behavior (You et al., 2022). The bootstrap method is a statistical technique for estimating quantities about a population by averaging estimates from multiple small data samples. Among their findings, You et al. (2022) determined that gratitude significantly influenced prosocial behaviors ($M = .69$, $F = .65$, $p < .05$) and social support ($M = .62$, $F = 60$, $p < .05$). You et al. (2022) asserted that gratitude improves these social functions because when people experience gratitude, they are more likely to recognize positive actions of others, which fosters prosocial behaviors like being supportive, collaborative, and interactive.

You et al.'s (2022) study measured dispositional gratitude's social benefits. The present study also examined the influence of gratitude in a social setting. However, whereas You et al.'s (2022) study's participants were adolescents in a school setting, the present study's recruits were adults at least 18 years of age in the setting of their jobs. Additionally, even though You et al.'s study addressed the social benefits of gratitude from several angles in their measures (e.g., prosocial behaviors, social support, social health), the present study focused on job satisfaction, which has been a variable associated with social benefits at work essential to workplace social functioning like well-being, organizational citizenship, responsibility, and performance (Akram et al., 2022; Barnes et al., 2013; Bowling & Sessa, 2021; Brayfield & Rothe, 1951; Hennicks et al., 2022; Judge et al., 2001). Finally, the present study extended gratitude measured from just dispositional gratitude to include relational gratitude, which is a social form of gratitude (Algoe, 2012; Gordon et al., 2012).

People benefit from interpersonally expressed gratitude. Gordon et al. (2011) found that expressing gratitude to one's marital partner could be increased by spending time to notice and feel thankful for the good things occurring around them. Then, Gordon et al. (2011) determined

that the receiver of gratitude expression would tend to feel more gratitude. That exchange would seem to perpetuate gratitude in a cycle of cause and effect. The receiver of gratitude would feel more grateful, and feeling more grateful increased one's expression of gratitude, and that process would then move to the partner. Gordon et al. (2011) supported Algoe's (2012) find-remind-and-bind theory of gratitude when they showed that the perpetuation of gratitude in the marriage led to more satisfaction and happiness in the marriage.

Dispositional Gratitude

Dispositional gratitude is an affective state that lowers one's threshold for experiencing grateful emotion (McCullough et al., 2002). People higher in dispositional gratitude are more likely to feel thankful for things in general, perceive things as gifts and benefits, and more likely to see and emotionally acknowledge others' benevolence and the positive consequences of benevolence (Cortini et al., 2019; Di Fabio et al., 2017; Locklear et al., 2023; McGuire et al., 2021; Watkins & McCurrach, 2021). Dispositional gratitude means aptness for experiencing gratitude emotionally (McCullough et al., 2002). As opposed to measuring a temporary moment of feeling gratitude, dispositional gratitude represents overall familiarity and depth of emotional gratitude experienced by the individual (McCullough et al., 2002). Dispositional gratitude means habitually appreciating the positive aspects of life through a heightened sense of awareness of these positive aspects (Emmons & McCullough, 2003; McCullough et al., 2002; McGuire et al., 2021; Voci et al., 2019; Wolfe, 2021).

As was stated in an earlier section, gratitude is a cognitive–emotional process that attributes something good to an other-agent, or a benefactor (Emmons & McCullough, 2004). Dispositional gratitude not only means having a higher propensity to feel grateful but also to attribute any positive outcomes one perceives to another agency (McCullough et al., 2002;

Weiner, 1985). Researchers suggest that dispositional gratitude is measurable and beneficial (Leong et al., 2020; McCullough et al., 2002; Portocarrero et al., 2020; Valikhani et al., 2019). Dispositional gratitude is one specific type of gratitude that has shown to broaden and build personal resources that help people flourish (Cho, 2019; Locklear et al., 2023; McGuire et al., 2021; Portocarrero et al., 2020; Reyes et al., 2022; Unanue et al., 2022; Voci et al., 2019; Wolfe, 2021; Wood et al., 2010; Wood et al., 2008b; Xiang & Yuan, 2021).

The seminal work on dispositional gratitude is credited to McCullough et al. (2002); they established a reliable and valid scale for measuring dispositional gratitude, the GQ-6. It is a six-item self-reported survey on a 7-point Likert scale that includes questions like “I have so much in life to be thankful for” (p. 127). This scale has been the most used scale for measuring dispositional gratitude (Portocarrero et al., 2020). Across four studies, McCullough et al. (2002) found that positive constructs such as including prosocial behaviors, positive affect, spirituality, well-being, and satisfaction, significantly and positively correlated with dispositional gratitude. McCullough et al.’s (2002) study highlighted dispositional gratitude, which they defined as a tendency to respond with grateful emotion. They argued that dispositional gratitude is an affective trait that is discriminant from other personality traits. Researchers have rarely disputed McCullough et al.’s (2002) definition of dispositional gratitude nor its relationship with a multitude of positive outcomes. According to Portocarrero et al. (2020) and Card (2019), dispositional gratitude has been the most studied, and it is the most defined and measured form of gratitude.

Using the broaden-and-build theory of positive emotions (Fredrickson, 2001) as a theoretical framework for their study, Xiang and Yuan (2021) sought to better establish how dispositional gratitude builds personal resources. In their quantitative study, Xiang and Yuan

(2021) investigated relationships between dispositional gratitude and four other variables: life satisfaction, mindfulness, benign envy, and malicious envy. Benign envy causes people to invest more effort to be as successful as the other person. In contrast, malicious envy motivates people to level the other person down. Distinguishing between benign and malicious envy allows for disentangling different motivational and behavioral consequences of envy. They surveyed 991 undergraduate participants using a random cluster sampling method of distributing the survey among college classrooms in China (Xiang & Yuan, 2021). To measure dispositional gratitude, they used the GQ-6 (McCullough et al., 2002), malicious and benign envy using the Benign and Malicious Envy Scale, mindfulness using the Mindful Attention Awareness Scale, and life satisfaction using the Satisfaction With Life Scale (SWLS; Xiang & Yuan, 2021). They analyzed the results for mediation effects using a structural equation model in Analysis of Moment Structures (AMOS) to first determine how well indicators represented the latent variables and then built a structural model when the measurement model was satisfactory. Using item-to-construct balance, they built two parcels for all of the variables except mindfulness, for which they built three parcels. To evaluate good fitness of model, they used root-mean-square error of approximation, standardized root-mean-square residual, and comparative fit index (Xiang & Yuan, 2021). Xiang and Yuan (2021) found that the relationship between dispositional gratitude and life satisfaction was mediated by envy and mindfulness. Their study served as a precursor to the present study. Even though Xiang and Yuan (2021) focused on dispositional gratitude and life satisfaction, the present study focused on dispositional gratitude at work specifically as well as on satisfaction in one specific aspect of life, that being satisfaction at work (job satisfaction).

In another study, McGuire et al. (2021) explored dispositional gratitude's relation to mental disorders among United States military veterans using quantitative, cross-sectional

methods. McGuire et al. (2021) recruited 3,157 U.S. veterans to take an online survey. It included the GQ-6 (McCullough et al., 2002) to measure dispositional gratitude and various other psychosocial and life quality variables, including PTSD, social phobia, alcohol abuse disorder, lifetime suicide ideation and attempts, perceived social support, vitality, optimism, and spirituality (McGuire et al., 2021). They scored participants' level of dispositional gratitude as low, moderate, and high gratitude based on their score on the GQ-6 (McCullough et al., 2002) portion of the survey (McGuire et al., 2021).

One of the study's goals was to determine if any demographic and mental condition variables correlated with the veterans' level of dispositional gratitude (McGuire et al., 2021). They analyzed the responses by conducting a chi-square and ANOVA analysis, binary logistic regression, a series of multivariable analyses of covariance, and multinomial logistic analysis. McGuire et al. (2021) determined that high dispositional gratitude was present more often among veterans who were older, married, retired, more educated, and had higher incomes. They also found that dispositional gratitude was associated with less psychiatric morbidities and pathologies, more resilience behaviors, and positive psychosocial traits. One limitation of the study was that only one question from the GQ-6 (McCullough et al., 2002) was used to measure dispositional gratitude (McGuire et al., 2021). They did this to reduce participants' survey fatigue. However, the present study used the full GQ-6 (McCullough et al., 2002) to maximize validation. Furthermore, the present study explored how dispositional gratitude might predict job satisfaction rather than measuring correlations among several variables. Finally, McGuire et al. (2021) did not explore other kinds of gratitude, whereas the present study addressed various types of gratitude (dispositional gratitude at work, expression of gratitude at work to supervisors,

receipt of gratitude at work from supervisors, expression of gratitude at work to colleagues, and receipt of gratitude at work from colleagues).

Xiang and Yuan's (2021) findings support the broadening and building effect of dispositional gratitude, which provided a reason to explore other possible positive outcomes of dispositional gratitude. Recounting studies I discussed earlier, McCullough et al. (2002) and Unanue et al. (2022) linked gratitude and life satisfaction, and You et al. (2022) discovered prosocial benefits to dispositional gratitude. All three used quantitative, self-reporting survey methods to measure dispositional gratitude of their participants. However, each study found a relationship to different benefits. Like these studies, the present study's theoretical framework was based on the broaden-and-build theory of positive emotions (Fredrickson, 2001). However, the present study contributes to this research by investigating work-specific dispositional gratitude and how it predicts the positive outcome of job satisfaction (Waters, 2012) among software developers.

The Need for More Dispositional Gratitude Studies. The latest gratitude research appears to have more questions than answers regarding gratitude (Chen et al., 2020; Komase et al., 2022; McKeon et al., 2020; Portocarrero et al., 2020; Sawyer et al., 2022; Zhu et al., 2022). Portocarrero et al. (2020) wrote that more quantitative studies are still needed to measure dispositional gratitude's positive effects. Mahudin and Azman (2021) showed that dispositional gratitude leads to happiness and resilience, yet they admitted a limitation of the study was that it only included young adults. Mahudin and Azman (2021) suggested a study that applied to more diverse populations, such as older adults, was needed. These less-studied populations include software developers in the workplace, which was the target population of the present study.

Relational Gratitude: Expression and Receipt of Gratitude

Find-Remind-and-Bind Theory of Gratitude. Algoe's (2012) find-remind-and-bind theory of gratitude functioned as the theoretical framework for the present study. Gratitude catalyzes social bonds when it manifests socially (Algoe, 2012; Algoe et al., 2016; Emmons & McCullough, 2004; Grant & Gino, 2010; You et al., 2022). The theory addresses the positive effects of behavioral gratitude in dyadic relationships. Guided by this theory, the present study examined gratitude expressed and received in dyads at work. The present study refers to the double-sided benefactor–beneficiary transfer of gratitude in relationships as relational gratitude.

Relational Gratitude. Emmons and McCullough (2003) explained gratitude as recognizing a positive outcome and its altruistic other agent of origin. Gratitude can be a relational emotion in that gratitude is experienced once a person attributes the positive outcome to an external origin. Relational gratitude is defined by the two sides of interpersonally exchanged gratitude in dyadic relationships: gratitude is expressed by the beneficiary and received by the benefactor (Algoe et al., 2016). As Davis et al. (2021) pointed out, gratitude is a positive emotional response between people that must be understood in two parts: expression of gratitude and receipt of gratitude. In other words, relational gratitude is an external, behavioral manifestation of gratitude in social relationships (Chang et al., 2022). Social relationships are mental structures fashioned by bonds between people in which partners tend to the others' welfare and share resources (Simão & Seibt, 2014). In the case of gratitude, the social response centers around feelings of appreciation (Davis et al., 2021) that were initiated by the benefactor's motivation to benefit the welfare of others (Simão & Seibt, 2014).

Since gratitude is a social emotion (Emmons & McCullough, 2003, 2004; Grant & Gino, 2010; Wood et al., 2008a), gratitude is more fully experienced when a person not only has an

internal experience of it but also then transforms it into an outward expression directed toward the benefactor (Algoe & Zhaoyang, 2016; Davis et al., 2021; Lambert et al., 2010). In the social exchange of thankfulness, gratitude that is expressed could be received (or not). Expressed and received gratitude are two distinct angles with which to view relational gratitude, affecting both members of a dyad (Chang et al., 2021; Patil et al., 2018).

The mechanics of relational gratitude—expression and receipt—were treated as separate independent variables in the present study. Relational gratitude has shown prosocial and organizational benefits (Chang et al., 2022; Di Fabio et al., 2017; Grant & Gino, 2010; Harrison et al., 2022; Tang et al., 2022; Wood et al., 2008a). However, studies often focus on either the expressions of gratitude or receiving of gratitude. The following subsections discuss each separately and why the present study focused on both one's expressions and receptions of gratitude at work.

Expression of Gratitude. Gratitude is expressed by one person to another for benefits received; simultaneously, that expressed gratitude is received by the benefactor (Dunaetz & Lanum, 2021; Grant & Gino, 2010; Lee et al., 2019; Leong et al., 2020). Some researchers have referred to this as expressed gratitude (Algoe et al., 2016; Gordon et al., 2011; Locklear et al., 2023). Expressing gratitude should be treated as a distinct construct from the cognitive–emotional experience of gratefulness (Algoe & Zhaoyang, 2016; Bock & Thomas, 2021; Gordon et al., 2011; Leong et al., 2020; Ritzenhöfer et al., 2019; Thomas et al., 2022; Yoshimura & Berzins, 2017). In other words, one must consider feelings of gratitude and expressions of gratitude as two different gratitude constructs. Expression of gratitude is situated within what can be socially observed. The find-remind-and-bind theory of gratitude directs researchers to the fact

that the expression of gratitude positively impacts relationships of all types, intimates and strangers alike (Algoe, 2012).

In a series of two experimental manipulation studies, Algoe et al. (2016) examined the effects of expressed gratitude. The purpose of Algoe et al.'s (2016) study was to test the remind and bind tenets of the find-remind-and-bind theory of gratitude by looking for indicators of positive relational outcomes after an other-praising expression of gratitude. The specific variables measured in a self-reported survey before and after the gratitude expression included the benefactor's perception of the gratitude expressor's responsiveness, positive emotions, felt love, and global relationship satisfaction among participants. Study 1 included couples in sexual relationships ($N = 146$), and Study 2 included couples that had been together for at least 1 year (Algoe et al., 2016). In lab sessions, one member of the dyadic was asked to express an other-praising behavior, and this was recorded for the researchers' observation. Global relationship satisfaction was measured using the Global Relationship Satisfaction Scale (7 items; Algoe et al., 2016). Responsiveness in the relationship was measured using an 18-item scale involving various aspects of the partner's behaviors (Algoe et al., 2016). Positive emotions that resulted specifically from the expression of gratitude of their partner were measured using an 11-item scale on a 6-point Likert scale that asked about feelings of warmth, appreciation, peace, amusement, love, gratitude, pride, and inspiration. Expressions of gratitude were measured by importance level on a scale from 0 (*not at all important*) to 6 (*extremely important*). There was a range of items for which the gratitude expressor gave thanks to their partner, including little things like making dessert and more significant acts like caring for the beneficiary during times of illness. These were rated by two teams of four coders. Coders rated the intensity of the expression of gratitude on a 5-point scale from 1 (*no or minor use of the behavior*) to 5 (*excellent*

example or major use of the behavior), which referred to how much the expression of gratitude praised the partner and explained the behavior's benefits to the expressor.

Algoe et al. (2016) concluded that expressions of gratitude in a dyad involved other-praising behaviors that led to benefactors seeing the grateful person as more responsive, and the recipients of these gratitude expressions created positive emotions, including love in the benefactor toward the thankful partner. Algoe et al. (2016) argued that the results of the two studies demonstrated that expression of gratitude in dyadic relationships led to stronger bonds in the relationship. Algoe (2012) used the find-remind-and-bind theory to explain the positive outcomes of relational gratitude. This study was vital to forming the present study because Algoe et al. (2016) showed that relational gratitude improves satisfaction in relationships. While this study examined satisfaction in relationships of intimate couples, it did not examine job satisfaction in work relationships, which the present study addressed. Furthermore, Algoe et al.'s (2016) study focused on other-praising behavior in a lab environment, whereas the present study explored software developer employees' expression and receipt of gratitude at work.

Literature indicates that relational gratitude fosters high-quality relationships at work (Chhajer & Dutta, 2021). Chhajer and Dutta focused on the workplace outcomes of expressed gratitude. They hypothesized that expressed gratitude at work, through their gratitude intervention, would positively correlate with aspects of high-quality relationships (HQCs), including subject experience of mutuality, positive regard, and relationship vitality. In an experimental study by Chhajer and Dutta (2021), 179 participants working at a textile firm in India were exposed to a gratitude initiative. The procedure involved setting up chalkboards in the factories with colored chalks provided. They used gratitude boards on which the participants were encouraged to express gratitude to one another. The board was the medium for the

exchange of relational gratitude. In these dyadic social exchanges between colleagues and their supervisors, the person writing on the board was expressing gratitude, and the person they wrote about was receiving gratitude. Therefore, both sides of the gratitude exchanges were made part of the experiment. Importantly, those writing on the board were expressing gratitude.

Expressions of gratitude on the board included showing appreciation to colleagues and supervisors for help, mentorship, and collaboration. In another part of the procedure, participants took a survey to measure gratitude, HQCs, and job performance. In this study, gratitude at work was measured using four items from Cain et al.'s (2019) Gratitude at Work Scale (Chhajer & Dutta, 2021). The scale was self-reported and on a 7-point Likert scale, including questions like "I feel grateful for the support I receive from my co-workers [sic]" with a Cronbach's alpha of .91.

Chhajer and Dutta (2021) found that gratitude correlated with mutuality ($\beta = .56$), positive regard ($\beta = .43$), and relationship vitality ($\beta = .39$) in personal connections at work, which correlated with task and contextual work performance ($\beta = .18, .28$). Notably, the scale did not measure expression of gratitude, but rather feeling grateful at work for aspects of work during an expression of gratitude intervention. While Chhajer and Dutta's (2021) study demonstrated that relational gratitude was positively related to aspects of HQCs at work, one limitation was that their study induced expressions of gratitude among staff for the experiment rather than exploring relational gratitude at work in a nonexperimental way. The present study took a nonexperimental approach to exploring expressions of gratitude at work. Also, unlike Chhajer and Dutta (2021), the present study measured expression to colleagues and supervisors separately and receipt of gratitude from colleagues and supervisors.

However, it is important to know more about the positive impacts of feeling appreciated and showing appreciation at work. The mechanics of relational gratitude—expression and receipt—were treated as separate independent variables in the present study. Limited research addresses this topic among the population of software developers and their satisfaction at work. The rest of this section will further elucidate relational gratitude studies about expressing gratitude and receiving gratitude.

Receipt of Gratitude. Receipt of gratitude means a person (i.e., the benefactor) has been thanked, recognized, or shown appreciation for the beneficial contributions they make to the beneficiaries (Davis et al., 2021; Lee et al., 2019; Makoweicki et al., 2020). A person could receive expressions of gratitude from one's supervisors, associates, or customers. Receipt of gratitude has a less extensive history in literature than other forms of gratitude. Few studies examine the quantity, quality, and manner in which gratitude is received from others at work. Yet, some articles do question participants about receiving gratitude (Beck, 2016; Davis et al., 2021; Hori et al., 2020; Kindt et al., 2017; Komase et al., 2022; Lee et al., 2019; McKeon et al., 2020; Walsh et al., 2022).

Hori et al. (2020) observed how showing and receiving gratitude increases employees' well-being and job performance by observing brain activity during the gratitude exchanges between coworker and supervisor dyads. Hori et al. (2020) used a brain imaging machine to observe changes in the brain while participants received gratitude letters face-to-face from colleagues and supervisors. The 20 participants (10 coworker dyads: four coworker–coworker dyads and six coworker–superior dyads) read their letters in sessions that lasted over 50 minutes while the receiver of gratitude (benefactor) wore a near-infrared spectroscopy (NIRS), a device that measures brain activity. They also had a neutral discussion so the researchers could compare

those brain image results with the gratitude letter session. The brain images captured neural activity, and they measured mood state before and after the sessions using a self-reporting survey in which participants rated their mood on a 5-point scale. Mood states surveyed things like friendliness, vigor, anxiety, and fatigue. To analyze the results, Hori et al. (2020) used ANOVA with the factors of experimental vs. control and listening in the session vs. their baseline. The tool used for the statistical tests was SPSS statistics software. They determined that receipt of gratitude significantly decreases negative moods. To summarize, the study was evidence that not only does feeling and expressing gratitude matter, but receivers of gratitude experience positive emotion.

However, Hori et al. (2020) used experimental methods to induce relational gratitude exchanges, while the present study used nonexperimental self-reporting methods to survey participants about how much gratitude they receive at work. Furthermore, even though Hori et al. (2020) found that receipt of gratitude (and expression of gratitude) in coworker and supervisor dyads can reduce negative moods, the study did not address how receipt of gratitude might improve positive emotions. For example, a positive outcome at work less explored is one's feeling of satisfaction at their job, which the present study explored. Finally, Hori et al.'s (2020) study was valuable to the present study because it was one of the few studies that explored receipt of gratitude in both colleague–colleague and colleague–supervisor dyads. Nonetheless, the results were limited to how one instance of relational gratitude exchange affected participants, whereas the present study addressed participants' overall level of receiving gratitude at work.

Receipt of gratitude in organizations has served as a positive force (Cardon et al., 2021; Converso et al., 2015; Kaplan, 2012; Makowski et al., 2020). First, people want to be thanked.

A survey conducted by Beck (2016) asked 876 employees to rank on a 5-point Likert scale how important receiving gratitude (for their work) was to them. The average of all participants' ranking was 4.45 ($SD = .73$), which on the Likert scale indicated that participants ranked receiving gratitude as significantly important. The results imply that workers want to be thanked for their job performance. Receiving gratitude at work matters to people.

Expression and Receipt of Gratitude. Taken together, relational gratitude involves a beneficiary expressing thanks and the benefactor receiving the thanks. The expression could be verbal, written, or some other way of directly delivering thanks and appreciation to the other benefactor (Beck, 2016; Gordon et al., 2012; Walsh et al., 2022). Some studies have focused on a person's expressing as well as their receiving of gratitude.

Walsh et al. (2022) explored the effects expressing gratitude had on a person and also the receiver of that gratitude. In a sample of 269 undergraduates and 247 of their parents, Walsh et al. (2022) used an experimental method that induced a relational gratitude event. The students wrote gratitude letters to their parents. Not all students were instructed to write about gratitude. Students were assigned one of four conditions: write a gratitude letter but do not share it with the parent; write a gratitude letter and share it with the parent; write a letter that is not about gratitude but do not share it with the parent; write a letter that is not about gratitude and share it with the parent. During and after the experiment, both the student and their parent completed surveys to measure state gratitude, mood and satisfaction, positive and negative affect, life satisfaction indebtedness, elevation, connection, and relationship closeness. Walsh et al. (2022) ran a regressed change analysis predicting scores for the students. Their results showed that students who wrote gratitude letters reported higher feelings of gratitude (partial $r = .15$, $p = .006$) and satisfaction (partial $r = .11$, $p = .038$). Additionally, those students who shared the

gratitude letter reported significantly higher increases in gratitude (partial $r = .16, p = .002$), mood (partial $r = .12, p = .025$), positive affect (partial $r = .13, p = .013$), elevation (partial $r = .16, p = .003$), and relationship closeness (partial $r = .1, p = .019$). From this, Walsh et al. (2022) argued that expressing gratitude has more benefits than if a grateful person recalls but does not express their gratitude to their benefactor.

In their study, Walsh et al. (2022) simultaneously measured the impact the students' gratitude letters had on the parents receiving the letters. Analyzing the same self-reporting survey to measure the variables for the parents, Walsh et al. (2022) found that those parents receiving gratitude had a significantly higher boost in state gratitude (partial $r = .14, p = .031$), elevation (partial $r = .16, p = .019$), and indebtedness (partial $r = .15, p = .023$). The implications of receiving gratitude in this case would be that both parent and child have increased positive life experiences and likely also improved relationships.

Algoe's (2012) find-remind-and-bind theory explains that this kind of relational gratitude strengthens bonds between people. Walsh et al.'s (2022) study affirms that the theory is at work in parent-child dyads when gratitude is expressed and received. The letter from the child was an expression of gratitude, and the parent received it. Walsh et al.'s (2022) study was important to the present study because it helped establish that expressing gratitude and receiving gratitude increases positive emotions for both members in the dyad. Nevertheless, the study did not address both for the same person, thus leaving in question, for example, how the students might have benefited from being thanked themselves. In contrast, the present study examined both expression of gratitude and receipt of gratitude for the same person.

Researchers have investigated relational gratitude by asking each participant about both their expression and receipt of gratitude in their relationship. This has allowed researchers to

explore both ends of gratitude, how a person shows appreciation as well as how much they feel appreciated. For example, Gordon et al. (2012) measured the expression and receipt of gratitude. Gordon et al.'s (2012) quantitative study surveyed participants using the AIR scale. Measuring the two has not always been clear in other studies, but Gordon et al.'s (2012) study serves as an example of a more comprehensive way to explore the possible benefits of thanking and feeling thanked in relationships. Gordon et al. provided empirical evidence that, in intimate dyadic relationships, receiving gratitude was positively linked to relationship maintenance behaviors such as a partner's responsiveness and commitment to the relationship. Gordon et al. (2012) investigated each partner's expression and receipt of appreciation (i.e., gratitude). They did so by developing a quantitative scale that surveyed each marriage partner's level of appreciation for and from their partner. Further, Gordon et al. (2012) argued that the perceived reception of gratitude so directly influences relationship satisfaction that one could not be happy with their partner without it.

Therefore, the present study used Gordon et al.'s (2012) scale to measure both expression of gratitude at work and receipt of gratitude at work among software developers. By doing so, the study measured how gratitude in relationships at work with coworkers and supervisors could predict job satisfaction. The present study uniquely measured both expression and receipt of gratitude at work in supervisors and colleagues as self-reported by software workers. By asking participants about how they appreciate and feel appreciation, the present study uniquely measured relational gratitude of software developers at work as Gordon et al. (2012) did with intimate relationships.

Gratitude in Organizations

A Lack of Gratitude at Work. Unfortunately, there is a lack of gratitude in the workplace today. Surveys of people in the workforce show that employees do not feel they are thanked enough (Kaplan, 2012). The often-cited gratitude survey conducted by the John Templeton Foundation revealed that the workplace is where people are the least likely to express their gratitude to others. Of employees surveyed ($N = 2,000$) about expression of gratitude at work, 60% of participants express gratitude annually to never. Further, the levels of receiving gratitude at work are equally abysmal. For example, 70% wanted to receive more gratitude from their boss and that, if the bosses did, the people would feel better about themselves. Kaplan (2012) noted the gratitude discrepancy between how much people value, want, and even feel gratitude versus how often they express and receive it in social settings. The gap persists in the job-related items in the survey. For example, 51% said they think of gratitude daily, yet only 10% regularly express any gratitude to their colleagues and a mere 7% to their supervisors. Poignantly, 94% believe grateful people flourish, and 76% are grateful to others for work-related work achievements, yet just 39% of these same respondents said they felt grateful for their current job.

Employees' Gratitude. In the context of a person's job, gratitude links to individual and organizational outcomes. Researchers have found positive links between gratitude and positive outcomes such as increased creativity (Pillay et al., 2020), organizational commitment (AL-Hashimi & Al-Barri, 2017; Baker, 2011; Cain et al., 2019; Negintaji et al., 2018; Sood et al., 2015; Zhao et al., 2022), and job satisfaction (AL-Hashimi & Al-Barri, 2017; Chen et al., 2021; Cortini et al., 2019; Stegen & Wankier, 2018; Waters, 2012; Wnuk, 2018). Gratitude has been shown to improve relationships and productivity (Di Fabio et al., 2017; Emmons & McCullough,

2003; Fehr et al., 2017), work engagement (Kim & Oh, 2020; Komase et al., 2022), and boost the overall performance and health of organizations (Al-Hadrawi & Al-Zulfi, 2022; Di Fabio et al., 2017; Khan et al., 2022). Furthermore, gratitude serves as a buffer against work burnout (Guan & Jepsen, 2020), turnover (Apostel et al., 2018), job stress (Lee et al., 2021; Lee et al., 2018; Nguyen & Le, 2021; Wnuk, 2018; Wood et al., 2008a), and materialism (Lambert et al., 2009; Unanue et al., 2021).

Leaders' Gratitude. Leaders' gratitude is beneficial to organizations. For example, regarding the importance of a supervisor's gratitude, Di Fabio et al. (2017) contended that organizational leaders should consider gratitude an essential component for optimal levels of employee well-being and overall success. This conclusion was determined by their meta-analysis of gratitude literature.

Studies have involved the impact leaders' expression of gratitude have on job satisfaction. Ritzenhöfer et al. (2019) hypothesized and found in three separate studies that when supervisors expressed gratitude to their followers, it led to followers viewing their supervisors as less selfish. Among their three studies with varied methods and participants, leaders' expression of gratitude also led to turnover intention and higher satisfaction with leaders, and higher job satisfaction. In the first study, Ritzenhöfer et al. (2019) used an experimental vignette design. Participants in the first study were 261 students at a German university. They were given vignettes that described verbal (e.g., the leader stated they were grateful) and nonverbal (e.g., shaking hands with followers after a success at work they attribute to the follower) expressions of gratitude. Two other conditions, one for pride expressions and neutral expressions, were randomly assigned. The measures included five items on a 7-point scale for selfishness, three items for job satisfaction, and one item on a 6-point Likert scale (1 = *not at all*, 6 = *very*

strongly) for the participant's perception of leaders' expression of gratitude toward followers in the vignettes, and the same 6-point scale for leader pride. The authors applied ANOVA to analyze differences across expressions and used the least significant post hoc tests as comparisons between each of the three conditions. Ritzenhöfer et al. (2019) also conducted a confirmatory factor analysis for mediators and the outcomes post gratitude and pride emotion manipulations. Ritzenhöfer et al. (2019) discovered that the participants' perceived that leader gratitude expressions significantly reduced perceived leader selfishness compared to the pride and neutral vignettes. Additionally, the authors determined that gratitude had a marginal direct effect as an indirect but significantly positive effect on satisfaction with the leader. This study served as evidence that leaders' expressions can lead to positive effects on followers, particularly on the levels of satisfaction.

Ritzenhöfer et al.'s (2019) experiment provided the reason for the present study examining how supervisors' (i.e., leaders at work) expressions of gratitude might lead to software developers' receipt of gratitude and how that might predict job satisfaction. However, as opposed to Ritzenhöfer et al.'s (2019) experiment, wherein leaders did not direct expressions of gratitude to participants, the present study surveyed those employees receiving gratitude expressions from their leaders at work. By doing this, the present study contributes to the literature in a unique way.

In another study by Ritzenhöfer et al. (2019), this time a field study, they recruited 294 adult professionals from more than 10 major industries. The participants were asked about the frequency of gratitude expressions they received from a leader at work. The measurement was a self-reported item on a 5-point scale (1 = *rarely or never*; 5 = *very often*; $\alpha = .90$), and the same method was used to measure leaders' expression of pride and selfishness. Three items on a 7-

point Likert scale were used to measure satisfaction with the leader, intention to leave and job satisfaction. Using similar methods, Ritzenhöfer et al. (2019) also measured organizational commitment behavior (OCB) and intention to leave the leader and organization. To analyze the data, the researchers used regression analysis, including control variables. Among the findings, the frequency of leader expressions of gratitude was negatively related to participants' perceived leader selfishness and participants' satisfaction with the leader and job. Ritzenhöfer et al. (2019) argued that leaders should express gratitude to employees to improve relationships between them, reduce turnover intention, and foster job satisfaction. That being the case, the study was vital to the present study.

However, the present study explored the expressed gratitude among workers in more detail. Ritzenhöfer et al.'s (2019) study measured the frequency of followers' perceived leader expressions of gratitude. The present study addressed followers' receipt of leader expressions of gratitude, their coworkers' expressions, and the followers' expressions reciprocally. The aim of the present study was to measure how expressions of gratitude at work and receipt of gratitude at work with supervisors and their colleagues might influence followers' job satisfaction.

The population was not the same for the present study. In their study, only 7% of the participants were from the information technology industry (Ritzenhöfer et al., 2019). The broadness of the population was a limitation. In contrast, the present study focused exclusively on employees working in software development, a specific job within information technology.

Although these studies provide important findings, gratitude at work and relational gratitude at work remains vastly unexplored, especially among the software worker populations. The present study measured software developers' dispositional gratitude at work and their level of expression and receipt of gratitude from colleagues and supervisors to see how each might

predict job satisfaction. Job satisfaction is covered in the next section, followed by a section about how gratitude predicts job satisfaction.

Job Satisfaction

Defining Job Satisfaction

Job satisfaction is the measure of a person's positive attitude, specifically toward and during their job (Brayfield & Rothe, 1951). Said another way, job satisfaction is the level of positive affect resulting from one's appraisal of their job overall (Taylor, 2008). In addition to its affective component, job satisfaction also has cognitive and behavioral aspects (Topino et al., 2021). The appraisal is cognitive, so job satisfaction has both cognitive and affective components, which are interconnected (Judge et al., 2021). There is also a behavioral component, or how an individual will act at and toward their work, which is a main reason for valuing and studying job satisfaction (Bowling & Sessa, 2021). In short, job satisfaction is a person's positive attitude and feelings of contentment about their job (Judge & Bono, 2001; Judge et al., 2000; Judge et al., 2001; Judge et al., 1998; Locke, 1970; Thoresen et al., 2003; Topino et al., 2021; Weiss, 2002).

Overall Job Satisfaction (OJS). Another important consideration in defining job satisfaction is that job satisfaction can be a global or a facet-based construct (Judge et al., 2021; Tsang & Martin, 2019). The global (i.e., overall) construct of job satisfaction was used in the present study. Using Brayfield and Rothe's (1951) definition of job satisfaction, Judge et al. (1998) explained that job satisfaction is a construct that is parallel to life satisfaction, which can be another way to describe well-being, at work. As further defined by Locke's (1970) seminal work, job satisfaction refers to the level of one's assessment of the overall value of one's job. When a person considers all aspects of one's job situation, the resulting positive emotional

response toward their job represents their level of job satisfaction. Noteworthy, the assessment of value is relative to one's perception of a hierarchy of their value system. In other words, when an individual perceives their job situation as desirable relative to what they believe constitutes a valuable job, the individual feels a sense of satisfaction toward their job experiences. As Brayfield and Rothe (1951) believed when designing the self-reporting measuring tool, the Index of Job Satisfaction, the feelings a person has about their job are quantifiable.

Motivation-Hygiene Theory. The motivation-hygiene theory explains that job satisfaction results from factors at a job that a person finds positive and motivating (Herzberg, 1959). Herzberg (1959) described job satisfaction in terms of the motivation-hygiene theory. Motivational factors refer to events and aspects of the job that make the individual feel satisfaction. Herzberg (1959) found that factors for job satisfaction included achievement, recognition, work tasks, responsibility, and advancement. Hygiene factors are events and aspects, or standard requirements, of the job that make the individual dissatisfied if not met, thus commonly referred to as maintenance factors. Herzberg (1959) found that factors for job dissatisfaction that appeared most commonly in participants were company policy, supervision, supervisor relations, work conditions, peer relationships, and personal life. Herzberg (1959) asserted that a person's feelings about their job equate to a level of job satisfaction, and that the opposite of job satisfaction is no job satisfaction, rather than job dissatisfaction.

The motivation-hygiene theory (Herzberg, 1959) played a factor in the development of the present study. Through the lens of the motivation-hygiene theory, gratitude at work could be a motivating factor for job satisfaction. It might potentially predict job satisfaction among the software developer population, which was the subject of the present study. Though not explicitly named, the gratitude construct is not far off from Herzberg's (1959) original list of motivation

factors for job satisfaction. In their seminal book, Herzberg (1959) determined that recognition was a first-level job attitude factor. Herzberg defined recognition as noticing and praising employees for their contributions. In a near inextricable connection, Emmons and McCullough (2004), in their seminal book on gratitude from a positive psychology standpoint, used recognition to define gratitude. Emmons and McCullough (2004) asserted that the positive emotion of gratitude is the experience of recognizing benefits received from others. Expression of gratitude at work and receipt of gratitude at work entails recognizing and giving recognition (Algoe et al., 2013; Azman, 2021; Grant & Gino, 2010; Robbins, 2019). In fact, in the first study to examine how gratitude at work predicted job satisfaction, Waters (2012) conceptualized institutional gratitude as conveying appreciation and recognition to each other.

Researchers have found a significant relationship between gratitude and job satisfaction (Chen et al., 2021; Cortini et al., 2019; Effendi et al., 2021; Lanham et al., 2012; McKeon et al., 2020; Pfister et al., 2020; Ritzenhöfer et al., 2019; Stegen & Wankier, 2018; Waters, 2012; Wnuk, 2019). However, researchers have thus far largely ignored gratitude in software developers. I found no research exploring different kinds of gratitude at work together to see what type of workplace gratitude might predict job satisfaction among software developers, as does the present study. In the following sections, I discuss the importance of job satisfaction and the research on gratitude as an antecedent to job satisfaction, which the present study explored.

Enduring Relevance of Job Satisfaction

Job satisfaction has been most researched among other job attitude constructs aiming at employee performance, well-being, and efficiency (Bowling & Sessa, 2021; Giauque et al., 2014; Judge et al., 2021; Wright, 2006). Because of the proliferation of job satisfaction research and the associated work benefits, I chose job satisfaction as the dependent variable for the

present study of gratitude at work. If forms of gratitude at work predict job satisfaction, then important implications for both gratitude at work and job satisfaction could be drawn.

Job satisfaction has been tested as a predictor of other positive organizational outcomes. As explained by AL-Hashimi and Al-Barri (2017), job satisfaction is among the most significant indicators of work attitudes that employers should watch. Leaders should want employees to experience high job satisfaction because it has been shown to benefit organizations. Therefore, many studies have examined the relationship between job satisfaction and other variables. The following section explains, in more detail, the outcomes of job satisfaction, then antecedents to job satisfaction, like gratitude, are discussed.

Outcomes of Job Satisfaction

Job satisfaction has a positive impact on desirable work outcomes including increased job performance (Cho et al., 2021; Gabini & Salessi, 2019; Katebi et al., 2022; Petty et al., 1984) and productivity (Bakker & Oerlemans, 2012; Judge et al., 2021) and lowered burnout and turnover (Cho et al., 2021; Leider et al., 2016; Srimindarti et al., 2017). Because job satisfaction predicts so many other organizational benefits (Judge et al., 2021), leaders have an opportunity to embrace myriad positive outcomes by turning their attention to the job satisfaction of their workers.

Job Satisfaction and Job Performance. Job satisfaction matters because satisfied workers outperform dissatisfied workers (Bono et al., 2012; Diener et al., 2017; Judge et al., 2001; Judge et al., 2017; Locke, 1970). In a meta-analysis of over 250 studies, Judge et al. (2001) calculated a correlation of .30 between job satisfaction and job performance. This suggests that employees are better workers when they have levels of job satisfaction. The question as to how the two variables link, which one causes the other, has been explored. Judge

et al. (2001) noted in their literature analysis that in the job satisfaction–job performance correlation, job satisfaction is more often causal than vice versa. As such, good performance is the outcome of job satisfaction.

Job Satisfaction Decreases Stress, Burnout, and Turnover. Moreover, job satisfaction among employees has been shown to combat the problems of stress, burnout, and turnover (Ahmad et al., 2010; Chao et al., 2015; Lanham et al., 2012; Mullen et al., 2018; Rothmann, 2008; Wu et al., 2021). For example, higher job satisfaction is correlated with lowered burnout (Cheng & O-Yang, 2018; Rothmann, 2008; Scanlan & Still, 2019), which is a prevalent, psychologically destructive state of emotional exhaustion and cynicism at work (Maslach & Jackson, 1981).

Job Satisfaction Decreases Withdrawal. When an employee is satisfied with the job overall, they are less likely to exhibit withdrawal behaviors (Judge et al., 2021). They do this in a number of ways. To name a few, workers can withdraw by absenteeism, turnover, turnover intention, and decrease in organizational commitment. This section describes these withdrawal behaviors. The review shows that job satisfaction reduces employee withdrawal. As such, job satisfaction is critical. Considering this together with the other positive outcomes previously highlighted, the pursuit of more antecedents of job satisfaction is prudent.

Turnover. Employee turnover refers to people leaving the organization, either by force or voluntarily for their own reasons (Tett & Meyer, 1993). Judge et al. (2021) labeled this a withdrawal behavior, meaning that employees want to avoid the tasks and conditions of their job. Excess turnover bears negative consequences for organizations such as lowered performance and significant financial costs (Leider et al., 2016).

On the other hand, job satisfaction can help organizations reduce excessive employee turnover (Ganji et al., 2021; Leider et al., 2016; Li et al., 2019; Mullen et al., 2018; Naburi et al., 2017; Tett & Meyer, 1993). In Tett and Meyer's (1993) meta-analysis, 42 studies totaling 18,839 participants produced a corrected correlation of $-.697$ between job satisfaction and voluntary turnover.

Turnover Intention. Turnover intention is withdrawal cognition occurring prior to leaving (i.e., the actual point of voluntary turnover) with the deliberate plan to leave one's job (Tett & Meyer, 1993). Related to turnover, job satisfaction also predicts turnover intention (Al Sabei et al., 2020; Berber et al., 2022; Ganji et al., 2021; Hennicks et al., 2022; Trimble, 2006). Ganji et al. (2021) found that job satisfaction mediated the relationship between perceived organizational support and turnover intention. More importantly, in their study of 215 higher education professionals in Iran, Ganji et al. (2021) reported that higher job satisfaction led to lower intent to leave. People happy with the facets of their job life do not want to leave. Most surely, this lowered turnover intention is considered gratifying and fortifying to organizations wanting to flourish through retaining talent.

The quenching effect that job satisfaction has on turnover is of particular interest to the current study. The astronomically high turnover among software and information technology workers across industries is a significant problem (Booz, 2018; Harden et al., 2018; Moquin et al., 2019; Özkan, 2021; Shaikh & Joseph, 2020; Sharma & Stol, 2020; Smite et al., 2020). As discussed in this subsection on turnover, job satisfaction can reduce turnover. However, there exists a gap in the literature on how job satisfaction can be fostered. The present study addresses this gap by exploring dispositional and conditional antecedents of job satisfaction in efforts to learn how to improve job satisfaction among software developers.

Job Satisfaction and Organizational Commitment. Organizational commitment refers to how an employee identifies with, and is fervently involved with, their organization and its goals (Porter et al., 1974). To extend the definition of organizational commitment, it can be viewed as rooted in valuation. When an employee values the company objectives and they themselves feel of value to achieving the objectives, they value their job life situation.

Organizational commitment can be further broken down to include the worker's alignment with the organization's goals and their engagement at work for their company (Porter et al., 1974). Job satisfaction significantly correlates with organizational commitment (Ahmad et al., 2010; Ćulibrk et al., 2018; Fentie & Babu, 2021; Goswami, 2022; Khuong et al., 2022; Maleka et al., 2019; Özgül et al., 2022; Trimble, 2006; Xu et al., 2023; Yousef, 2017). The relationship between these two variables is crucial to the success of the organization because the more satisfied a person is at work, the more they make the company's objectives their own (Özgül et al., 2022). Therefore, turnover is less likely (Porter et al., 1974). Being so closely related to an intention to remain at their job, organizational commitment also refers to the unlikelihood of turnover. In this way, organizational commitment could be conceptualized as the opposite of turnover intent.

Organizational commitment matters because it solves the major problem of retaining good employees (Fentie & Babu, 2021). Indeed, attracting and retaining talented technologists and software workers is a modern day challenge for organizations (Daniel et al., 2020; Moquin et al., 2019; Özkan, 2021; Sharma & Stol, 2020). Therefore, more studies should explore the possibilities of increasing job satisfaction.

Given that job satisfaction improves organizational commitment, more factors affecting job satisfaction levels of software developers should be explored. Furthermore, since job

satisfaction predicts turnover intent and organizational commitment, job satisfaction may be key to building a workforce that will be more likely to stay devoted to the company long-term. As such, job satisfaction is a primary aim for positive organizational leaders. The present study examined factors that could predict job satisfaction among software developers. Prior to the current study, no study has examined how dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work predict software developers' level of job satisfaction.

Gratitude and Job Satisfaction

Previous studies have found a positive correlation between gratitude and job satisfaction (AL-Hashimi & Al-Barri, 2017; Chen et al., 2021; Chen et al., 2020; Cortini et al., 2019; Lanham et al., 2012; McKeon et al., 2020; Ritzenhöfer et al., 2019; Stegen & Wenkier, 2018; Waters, 2012). The level of people's gratitude seems to positively influence their level of job satisfaction (Chen et al., 2021; Chen et al., 2020; Cortini et al., 2019; Lanham et al., 2012; McKeon et al., 2020; Ritzenhöfer et al., 2019; Stegen & Wenkier, 2018; Waters, 2012). This demonstrates that gratitude could be beneficial in the workplace. Job satisfaction is considered something employees and employers want (Hoff et al., 2020; Mullen et al., 2018; Rothmann, 2008). That being the case, leaders benefit from knowing and cultivating gratitude (Hu et al., 2023). Job satisfaction is a good goal for an organization, and cultivating gratitude at work is a good strategy to achieve it. Because of this, the present study attempted to deepen understanding of this relationship.

In one study, Cain et al. (2019) looked for a correlation between gratitude and other positive work outcomes, including job satisfaction. They defined workplace gratitude as dispositional gratitude a person feels toward basic aspects of their work. The 207 participants were all in the health and human services sector. Interestingly, the GQ-6 was also added to this

study. The Minnesota Satisfaction Questionnaire-Short Form (Weiss et al., 1967) was used to measure job satisfaction. Here, too, findings indicated a correlation between gratitude at work and job satisfaction (two subscales of the Gratitude At Work Scale [GAWS] with workplace satisfaction: .77 and .56).

Job satisfaction has also been used to examine new ways to measure gratitude in job life. Specifically, Wnuk (2020) proposed a gratitude measurement tool for organizations and used one job satisfaction question: “I generally like working here,” on a 7-point Likert scale (p. 157). Wnuk (2020) included this question to show the validity of gratitude toward one’s workplace. The result of the study showed a Pearson correlation between gratitude toward an employer and one’s job satisfaction (0.44). This led to the conclusion that feeling grateful for one’s job could enhance employees’ well-being and relationships at work (Wnuk, 2020, p. 163). Wnuk used this to show the importance of leadership in improving the gratitude levels in the organization for positive outcomes. To sum up, job satisfaction was measured to test the validity of a newly proposed scale of gratitude for the workplace. When gratitude levels can predict job satisfaction, an argument can be made for the importance of gratitude. The next section discusses antecedents of job satisfaction, including what is currently known about how dispositional gratitude, expressions of gratitude, and receipt of gratitude predict job satisfaction.

Antecedents of Job Satisfaction

A demonstrative amount of studies have asserted that there are numerous variables that predict job satisfaction (Asif et al., 2017; Hoff et al., 2020; Judge et al., 1998; Judge et al., 2021; Kim et al., 2021; Lemelle & Scielzo, 2012; Shaheen et al., 2021; Thoresen et al., 2003; Türker & Kahraman, 2021; Valieiev et al., 2019; Viseu et al., 2020). The antecedents of job satisfaction have been divided into three categories: event-based, contextual, and dispositional (Judge et al.,

2021). There is some variation in the terminology of these categories. For example, Topino et al. (2021) discussed the dispositional, environmental, and integrative categories of job satisfaction antecedents. By considering episodic events at work, the situation of one's job, and the person's personality traits, job satisfaction could be predicted. Event-based antecedents were outside the scope of this study's purpose. The present study explored a possible dispositional antecedent: dispositional gratitude at work. Additionally, the study examined two contextual antecedents: expression of gratitude at work and receipt of gratitude at work. Within the two contextual variables, the present study considered the context of supervisor and colleague interaction. The purpose was to discover if forms of gratitude (i.e., dispositional gratitude and relational gratitude) at work could be significant antecedents to job satisfaction.

Knowing what predicts job satisfaction is useful to practitioners because it is a means to improving job satisfaction and discouraging job dissatisfaction (Judge et al., 2021). Job satisfaction in employees leads to an array of positive outcomes at work (Ahmad et al., 2010; Bitner et al., 2021; Chao et al., 2015; Judge et al., 2001; Scanlan & Still, 2019; Wright & Cropanzano, 2000), so the antecedents of job satisfaction matter not just to improving job satisfaction but also connect to other desired work outcomes. Topino et al. (2021) argued that continued research into the antecedents is required since the copious research has revealed job satisfaction has utility in job life. The purpose of the present study was to examine antecedents of job satisfaction. In so doing, the study uncovered new information that contributes to increasing job satisfaction among software developers.

Events That Predict Job Satisfaction. Event-based antecedents of job satisfaction were not within the scope of the present study but shall be briefly mentioned. Events at work that illicit positive affect have predicted job satisfaction (Judge et al., 2021). Weiss (2002) discussed

affective work experiences in relation to job satisfaction. In other words, a temporal moment of positive affect could predict job satisfaction. For example, in this study, episodic gratitude at work could have been explored. However, the purpose of this study was to explore forms of gratitude that last on a continual basis. This study was nonexperimental and did not attempt to examine any state of episodic gratitude, nor a temporary state of job satisfaction, for that matter. For this study, I cared more about the overall culture of gratitude at work and how it impacts overall job satisfaction.

Dispositions That Predict of Job Satisfaction. Disposition has been consistently defined by gratitude and job satisfaction researchers. A disposition is a personality trait, which is a tendency to feel, think, or behave in a certain way, and these dispositions are patterns of a person by which they can be differentiated from others with different personality traits (Eckhardt et al., 2016; Judge & Bono, 2001; Judge et al., 2000; Judge et al., 2001; Judge et al., 1998; Judge et al., 2001; McCullough et al., 2002; Portocarrero et al., 2020; Staw & Ross, 1985; Topino et al., 2021; Zhai et al., 2013; Zhao et al., 2022). Personality traits being correlated with job satisfaction suggest that some people might be more predisposed to thriving at work amidst work-related variables.

The present study questioned how dispositional gratitude predicted job satisfaction. Researchers have found that dispositional gratitude is an antecedent of job satisfaction (Chen et al., 2021; Effendi et al., 2021; Lanham et al., 2012; McKeon et al., 2020; Unanue et al., 2021; Waters, 2012). Too few studies have explored this topic, and even fewer studied gratitude among the software developer population.

However, strong evidence emerges from reviewing studies of other dispositions and job satisfaction. Indeed, noting the predictive power that a person's traits have on their job

satisfaction, I questioned how dispositional gratitude at work might also be a factor. As previously mentioned, researchers have approached gratitude from different sides. Given that dispositions seem to impact job satisfaction, dispositional gratitude at work stood out among other forms of gratitude as well-suited for the present study.

Bono et al.'s (2012) literature review concluded that positive personality traits like self-efficacy, emotional stability, and independence influence job satisfaction. Some people might be more predisposed to thriving at work amidst work-related variables.

Core Self-Evaluation. Core self-evaluation is a dispositional source that refers to a set of traits that combine to describe how people view themselves and how they are situated in the world: self-esteem, locus of control, self-efficacy, and nonneuroticism (Judge & Bono, 2001; Judge et al., 1997). This combination of traits is considered a dispositional source (i.e., personality trait) of job satisfaction (Judge et al., 1997; Judge et al., 1998). Judge et al. (1997) derived this psychology self-schema from various fields of psychology as well as job satisfaction literature. It explains differences in people's level of job satisfaction by pointing to the individual's affective tendencies. Researchers have found that core self-evaluations correlate with job satisfaction (Asif et al., 2017; Judge & Bono, 2001; Judge et al., 2000; Judge et al., 1998; Judge & Bono, 2001; Lemelle & Scielzo, 2012; Lin, 2015; N. Nguyen & Stinglhamber, 2021; Piccolo et al., 2005). For example, self-efficacy predicts job satisfaction (Asif et al., 2017; Judge et al., 1998; Türker & Kahraman, 2021), and self-efficacy is the dispositional trait that reflects how one views their ability and competence (Judge et al., 1997). This means that having self-efficacy increases the potential for feeling satisfied at one's job, irrespective of other job factors that might impact job satisfaction. The other three factors making up the four core self-evaluation dispositions are self-esteem, locus of control, and nonneuroticism, which together

predict job satisfaction. In other words, when two employees have the same job, the employee with a disposition for a more positive core self-evaluation is likely to experience more job satisfaction.

Trait Positive Affect. In their study on how trait positive and negative affect predict job satisfaction, Lan et al. (2022) defined trait positive affect as an individual's disposition of experiencing more frequent or higher levels of positive feelings. In a word, some people are just happier (Lyubomirsky & Lepper, 1999), and it results from a combination of one's heritability figures, environment, experiences, and the individual's choices (Diener et al., 2017). Trait positive affect (PA) tends to precede higher job satisfaction (Forjan et al., 2020; Judge et al., 2021; Lan et al., 2022; Staw & Ross, 1985; Thoresen et al., 2003). For example, a longitudinal study across 50 years revealed that affective disposition was a significant antecedent of overall career satisfaction (Staw et al., 1986) among a sample of 76 ($N = 76$, $r = .35$, $p < .01$). Staw et al. (1986) argued that their results had implications for researchers and practitioners. Namely, the study indicated that a person's dispositional traits should be addressed to improve job attitudes, not just the job's contextual factors and that more research is required to determine just how much one's traits can explain job satisfaction variation among workers. In agreement, this study examined trait gratitude at work.

Notably, trait positive affect is distinct from other emotionally positive dispositions. For example, the construct of dispositional gratitude represents the tendency to experience gratitude as a positive emotion (Emmons & McCullough, 2004), and this construct is a unique construct separate from trait positive affect (Emmons & McCullough, 2004; McCullough et al., 2002) despite the fact that feeling and practicing gratitude can produce positive affect (Fagley, 2018; Locklear et al., 2023; Perez, 2022).

Dispositional Gratitude. Dispositional (trait) gratitude has been found to predict job satisfaction (Chen et al., 2021; Cortini et al., 2019; Kim et al., 2019; Lanham et al., 2012; Lee et al., 2018; Peterson et al., 2010; Waters, 2012). Ganji et al. (2021) went as far as to include gratefulness for one's job as part of their definition of job satisfaction. However, little research has investigated dispositional gratitude at work and its impact on job satisfaction among the software developer populations.

Dispositional gratitude's link to job satisfaction was first investigated by Waters (2012). The purpose of Waters' (2012) quantitative study was to explore how dispositional, state, and institutional gratitude related to job satisfaction. At that time, researchers had established a strong correlation between gratitude and other interpersonal and social positive outcomes similar or related to job satisfaction like well-being (Portocarrero et al., 2020), life satisfaction (Armenta et al., 2022; Lambert et al., 2009), employee morale (Patil et al., 2018), prosociality (Grant & Gino, 2010; Locklear et al., 2023; Ma et al., 2017), and high-quality connections at work (Chhajer & Dutta, 2021).

Waters (2012) hypothesized that job satisfaction also correlated with gratitude. Waters recruited 171 finance and teaching professionals. The participants were given a survey that measured dispositional gratitude with the GQ-6 (McCullough et al., 2002), state gratitude with the Gratitude Adjective Checklist, institutional gratitude using the Positive Practices scale (Cameron et al., 2004), and job satisfaction with the Index of Job Satisfaction (Brayfield & Rothe, 1951; Waters, 2012). The data were analyzed using hierarchical multiple regression. Waters concluded that all three types of gratitude correlated with job satisfaction. Waters (2012) argued that leaders should promote gratitude in their organization by encouraging the expression

of gratitude and that, by doing so, job satisfaction among the whole staff could increase. The study was enough to establish a link between dispositional gratitude and job satisfaction.

However, the study did not isolate dispositional gratitude at work because Waters (2012) used the original GQ-6 (McCullough et al., 2002), whereas the present study modified this scale by adding at work to the items. Furthermore, Waters (2012) indicated that expressions of gratitude are important yet did not explicitly measure participants' expressions and receipt of gratitude among both supervisors and colleagues, which was the purpose of the present study. Therefore, the present study contributes new and more specific information about how dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work with supervisors and colleagues could predict job satisfaction among software developers, which is also a novel population for participants.

Published in the same year as Waters' (2012) study, Lanham et al. (2012) conducted a study involving dispositional gratitude and job satisfaction among workers. In their quantitative study, they measured how dispositional gratitude might predict burnout and multidimensional job satisfaction among 65 mental health participants. Like Waters (2012), Lanham et al. (2012) measured dispositional gratitude using the GQ-6 (McCullough et al., 2002). Different from Waters (2012), though, Lanham et al. (2012) measured job satisfaction using the Minnesota Satisfaction Questionnaire. The difference between the Index of Job Satisfaction scale (Brayfield & Rothe, 1951), which Waters (2012) used, and the Minnesota Satisfaction Questionnaire that Lanham et al. (2012) used is that Lanham et al.'s scale focused on facets of one's job instead of overall job satisfaction (Gallagher & Lopez, 2019). Burnout was assessed using Maslach's Burnout Inventory, and hope was measured using the Adult Trait Hope scale (as cited by Lanham et al., 2012). To analyze the data, Lanham et al. (2012) ran a hierarchical multiple

regression for the dependent variables and found that dispositional gratitude was not a significant predictor of multifaceted job satisfaction. Therefore, the present study explored how dispositional gratitude at work might predict overall job satisfaction among software developers, which Waters (2012) had found with another population instead of exploring multidimensional job satisfaction, for which Lanham et al. (2012) found no evidence.

Other than Waters's (2012) and Lanham et al.'s (2012) studies, surprisingly little research addresses dispositional gratitude as an antecedent of job satisfaction. However, what few articles exist have confirmed this connection (Chen et al., 2021; Chong et al., 2017; Kim & Oh, 2020). One rare case was a quantitative study conducted by Chong et al. (2017) that addressed empathic ability, dispositional gratitude, and job satisfaction among 204 nurses. Chong et al. (2017) used the Korean version of the GQ-6 (McCullough et al., 2002) to measure dispositional gratitude. They used the Index of Work Satisfaction (Kim & Bea, 2014, as cited by Chong et al., 2017), a 30-item scale on a 5-point Likert scale about multiple facets of nurses' jobs to measure job satisfaction. Empathic ability was measured using the reactivity index (Park et al., 2014, as cited by Chong et al., 2017). Chong et al. (2017) analyzed the results using hierarchical multiple regression and found that dispositional gratitude had a significantly positive effect on job satisfaction. The researchers argued that dispositional gratitude should be a target for professional training to raise levels of job satisfaction of nurses. Similarly, the present study could inform leaders about the importance of offering dispositional gratitude training for software developers to raise their job satisfaction. However, Chong et al. (2017) recruited nurses and not software developers. Furthermore, instead of empathy as a variable, the present study used expression of gratitude and receipt of gratitude at work as possible antecedents for job

satisfaction, which makes the present study more focused on types of gratitude at work to learn more about gratitude exclusively.

Taken together, researchers have asserted that dispositional gratitude is a significant antecedent of job satisfaction, making dispositional gratitude important for leaders as well as future researchers. However, the current literature has rarely separated dispositional gratitude from dispositional gratitude at work when measuring dispositional gratitude and job satisfaction among workers (Chen et al., 2021; Chong et al., 2017; Kim & Oh, 2020). Of those few studies, even fewer addressed job satisfaction as a singular construct versus multiple aspects of one's job added together. The present study examined dispositional gratitude as it pertains to the workplace by modifying the GQ-6 (McCullough et al., 2002) to include "at work" on the six items. Additionally, the present study targeted software developers at work. Finally, contrary to other studies that include a variety of other variables besides forms of gratitude, the present study focused on how three forms of gratitude—dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work—predict job satisfaction.

Other forms of gratitude besides disposition, such as relational gratitude expressions and the receiving of gratitude, have also correlated with job satisfaction, which will be discussed in the section called Gratitude and Job Satisfaction. The present study, therefore, further explored these gratitude forms in relation to their effects on job satisfaction among the software developer employee population.

Job Conditions (Contextual) That Predict Job Satisfaction. The conditions of the job also factor into one's satisfaction with the job (Giauque et al., 2014; Khuong et al., 2022; Riaz & Ramay, 2010; Suyono et al., 2019; Viseu et al., 2020). Job conditions have been described as the situations of the job (Giauque et al., 2014) and factors of the organization that is providing the

job (Choi et al., 2021). Described another way, the contextual antecedents of job satisfaction entail an organization's climate and communication features (Krupa, 2021). These antecedents could also be called structural determinants (Asif et al., 2017). Examples of contextual factors include myriad work conditions such as salary, opportunity for advancement, opportunity for learning, organizational climate, workload, work stress, ease of communication, supervisor support, and relational gratitude (Asif et al., 2017; Babin & Boles, 1996; Cortini et al., 2019; Effendi et al., 2021; Judge et al., 2021; Sena et al., 2020; Stegen & Wankier, 2018; Waters, 2012).

Most relevant to the study at hand, I provide more details on positive organizational climate and culture and supervisor support, and then, more directly, the subject of the study: expressed and received gratitude. These positive work variables are relational in nature and can be characterized as virtuous or positive, flourishing behaviors. Gratitude at work is relational, part of the culture, and malleable (Baker, 2011; Cunha et al., 2019; Fehr et al., 2017; Khan et al., 2022; Locklear et al., 2020; Morgan et al., 2017; Quinn, 2015; Waters, 2012).

Organizational Culture. Organizational culture and climate refer to the cumulative effect produced by the collection of individuals' experiences and perceptions of the social setting and interactions that are characterized by their level of unique virtues, values, and tendencies embedded in the processes and situations both intentionally and as subconsciously part of the organization's DNA (Cameron et al., 2004). Positive work climate correlates with higher levels of job satisfaction (Asif et al., 2017; Barsade & O'Neill, 2016; Cameron et al., 2011; Cameron et al., 2004; Judge et al., 2021; Parker et al., 2003; Sena et al., 2020; Suyono et al., 2019; Türker & Kahraman, 2021). For example, Sena et al. (2020) found that organizational culture had a positive impact on job satisfaction. Sena et al. (2020) surveyed 98 flight instructors using simple

random sampling and calculated a positive path coefficient of .749 between organizational culture and job satisfaction. A workplace culture that impacts job satisfaction can be fostered by socializing core values like supervisor support (Krupa, 2021) as well as expressing and receiving gratitude at work (Fehr et al., 2017; Kersten et al., 2021; Wang et al., 2020; Waters, 2012).

Supervisor Support. Supervisor support is the degree by which employees perceive their supervisors as supportive, encouraging, and positively responsive to their needs and ideas (Babin & Boles, 1996). The supervisor is respectful and supervisor support is a contextual factor that predicts job satisfaction (Bowling & Sessa, 2021; Judge et al., 2021; Krupa, 2021; Qing et al., 2021; Tucker et al., 2018; Wnuk, 2019). For example, Krupa (2021) found that supervisor support ($b = .11, p < .001$) predicted higher job satisfaction among 454 correctional facility workers. To measure supervisor support, Krupa (2021) asked participants if their supervisor supported their creative solutions to work-related problems. Supervisors show support to subordinates by responding encouragingly and positively (Babin & Boles, 1996; Castle, 2008; Choi et al., 2021). Expressing gratitude resembles such behavior. A supervisor might show support by expressing gratitude through written, digital, verbal, or nonverbal means (Apostel et al., 2018; Beck, 2016; McKeon et al., 2020).

Expression and Receipt of Gratitude. Most pertinent to the present study, expressing and receiving gratitude at work classifies as contextual antecedents to job satisfaction. The first researcher to measure gratitude and job satisfaction together to look for a correlation was Waters (2012). To Waters (2012), institutional gratitude meant observable gratitude being shared among employees. In the study, institutionalized gratitude was measured by asking participants about the exchanges of gratitude expressions at their workplace (e.g., giving thanks to each other). The study partially answered Emmons and McCullough's (2003) call for research on gratitude in

organizations. Noteworthy, Waters (2012) did not stop at dispositional and state gratitude. Instead, Waters's (2012) study made relational gratitude at work (the expressing and receipt of gratitude at work) part of the gratitude-to-job satisfaction scholarship from the onset. Since then, more empirical evidence has revealed that expression and receipt of gratitude are contextual factors that connect to job satisfaction (Chen et al., 2021; Cortini et al., 2019; Effendi et al., 2021; Lanham et al., 2012; McKeon et al., 2020; Patil et al., 2018; Pfister et al., 2020; Ritzenhöfer et al., 2019; Stegen & Wankier, 2018; Waters, 2012).

Researchers have devoted an insufficient amount of research exploring relational gratitude—the socially exchanged expression and receipt of gratitude at work—as a feasible way to boost job satisfaction. However, one of the few studies that does was conducted by Cortini et al. (2019). The purpose of Cortini et al.'s (2019) mixed-method study was to examine how dispositional gratitude, collective gratitude, and relational gratitude might influence job satisfaction among Italian public administration workers. For the qualitative part of the study, they asked nine participants to keep a gratitude diary for 10 days. To analyze the data from this qualitative portion of their study, Cortini et al. used a bottom-up analysis to align with grounded theory. Cortini et al. (2019) found that the most common form of relational gratitude was expressing thanks verbally toward colleagues. The most common benefit for which participants expressed gratitude at work was the help they received from colleagues in performing work-related tasks. Additionally, Cortini et al. (2019) found that receipt of gratitude from customers was mostly commonly delivered by concrete behaviors, followed by formal social practices of gratitude expressions. These results were based on the frequency each occurred in the diaries. This part of Cortini et al.'s (2019) was important to the present study because it addressed both parts of relational gratitude, the expressions and receipt of gratitude, as self-reported by

participants. However, this was qualitatively examined based on Cortini et al.'s (2019) diary intervention. The present study will instead examine relational gratitude quantitatively.

Moreover, Cortini et al. (2019) also conducted an important quantitative study with other participants in which they measured job satisfaction along with several types of gratitude. An online survey measured 96 participants' gratitude (Cortini et al., 2019). The scale used for dispositional gratitude was the GQ-6 (McCullough et al., 2002). To measure participants' collective gratitude, Cortini et al. (2019) used the Collective Gratitude Scale (Akgun et al., 2016, as cited by Cortini et al., 2019). To measure relational gratitude, Cortini et al. (2019) measured perceived gratitude and expressed gratitude with the Perceived Gratitude Scale (Martini et al., 2015) and additional questions (as cited by Cortini et al., 2019). Two items on a 5-point Likert scale were used to measure job satisfaction. An example of the job satisfaction items is "In general, I am satisfied with my job" (p. 6). Cortini et al. found that dispositional gratitude had an indirect, positive effect on job satisfaction. Furthermore, they found that collective and perceived gratitude, which include aspects of relational gratitude at work among colleagues and customers, had a direct effect on job satisfaction. Cortini et al. (2019) combined the results from the qualitative and quantitative parts of their study. They argued that dispositional gratitude and relational gratitude were predictors of job satisfaction. Like Cortini et al. (2019), the present study investigated different types of gratitude and how they might predict job satisfaction. However, unlike Cortini et al. (2019), the present study explored quantitatively how dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude among both colleagues and supervisors at work predict job satisfaction among software developers of U.S.-based companies. Cortini et al. (2019) investigated gratitude using Di Fabio et al.'s (2017) three-part construct of gratitude in organizations: episodic, persistent, and collective gratitude. In

contrast, the present study used McCullough et al.'s (2002) construct of dispositional gratitude and Algoe's (2012) idea that relational gratitude that is interactively expressed and received in dyadic relationships is vital to social life. Therefore, the present study investigated gratitude at work in a novel way.

Summary of Contextual Antecedents to Job Satisfaction. Contextual factors of one's job predict their level of satisfaction (Judge et al., 2021). Among interpersonal factors, supervisor support and positive culture predict job satisfaction (Judge et al., 2021; Krupa, 2021). Since the present study examined expressed and receipt of gratitude at work as contextual antecedents to job satisfaction, other relational-based contextual factors were worth discussing. Interpersonal displays of gratitude at work predict job satisfaction (Chen et al., 2021; Cortini et al., 2019; Effendi et al., 2021; Lanham et al., 2012; McKeon et al., 2020; Patil et al., 2018; Pfister et al., 2020; Ritzenhöfer et al., 2019; Stegen & Wankier, 2018; Waters, 2012).

However, the existing research on how expression and receipt of gratitude at work might predict job satisfaction is still in its embryonic phase. The present study sought to uncover further how this interpersonal factor, relational gratitude at work, might predict job satisfaction among software workers.

Summary of Job Satisfaction Antecedents. Job satisfaction has been predicted by personal traits, organizational events, and contextual factors. In formulating this present study's purpose, dispositional gratitude and relational gratitude were shown to predict job satisfaction. Nevertheless, it is an incipient field of study in need of further development. More precisely, first, dispositional gratitude at work versus general dispositional gratitude of workers is promising. Among software developers, gratitude has been unexplored prior to the present study.

Secondly, the interpersonal contextual antecedents of expressing and the receipt of gratitude at work among software developers also require empirical investigation.

Chapter Summary

In summation of gratitude, empirical evidence abounds for the myriad advantages of gratitude for the individual and for organizations. The power of gratitude is hardly disputable. It promotes well-being, prosociality, organizational commitment, creativity, and job satisfaction (Arnout & Almoied, 2021; Corona et al., 2020; Emmons & McCullough, 2003; Grant & Gino, 2010; McCullough & Tsang, 2004; O’Leary & Dockray, 2015; Sood et al., 2015; Stocker et al., 2019). Thus, the real research problem resides in increasing the measurement of gratitude in more settings and groups. Contributions along these lines were the aim of this study. First, leaders need more details about gratitude to best cultivate gratitude among followers. If gratitude is good, more must be understood about different angles of gratitude, like quantifiable levels of the dispositional, expression, and receipt of gratitude.

Second, which of these types of gratitude correlates with job satisfaction? Because job satisfaction has been linked to higher performance, less stress and burnout, better teamwork, and company loyalty, job satisfaction should draw attention from leaders. Previous studies have linked gratitude and job satisfaction. Therefore, the relationship between gratitude and job satisfaction should be measured among software developers. This industry needs more information about what staves off their current problems of negative emotions and subsequent negative organizational outcomes. Software companies and departments struggle with job satisfaction and its detrimental effects of decreased creativity, teamwork, and productivity, as well as increased turnover rates, coding errors, knowledge loss, team disconnection, and commitment. To date, there is a dearth of research found that addresses dispositional gratitude at

work, expression of gratitude at work, receipt of gratitude at work, and job satisfaction with the software worker populations. Taken together, a study should look deeper into how gratitude, in several aspects, could predict greater job satisfaction among software developers.

Chapter 3: Research Method

Software developers can often experience negative emotions and low job satisfaction (Anany et al., 2019; Khan & Saleh, 2021; Liu et al., 2021; Storey et al., 2019). Low job satisfaction is inherently negative (Brayfield & Rothe, 1951; Judge et al., 1998; Shobe, 2018). A lack of creativity, coding errors, time pressure, stress, turnover, knowledge loss, and negative emotions are among the negative impacts of software developer dissatisfaction (Alsunki et al., 2020; Cataldo, 2010; Choi, 2019; Graziotin et al., 2018; Huq et al., 2020; Khan et al., 2011; Kuuttila et al., 2017; Newton et al., 2019; Rashid et al., 2019; Sánchez-Gordón & Colomo-Palacios, 2019; Storey et al., 2019).

Although there is research supporting negative emotions among software developers, there is limited research that addresses positive emotions among software developers and how emotions influence their job satisfaction (Alsunki et al., 2020; Anany et al., 2019; Sánchez-Gordón & Colomo-Palacios, 2019; Storey et al., 2019). For example, there is limited research that explores the potential positive impact that gratitude might have on the job satisfaction of software developers (Butler & Jaffe, 2021). Specifically, I found no literature about the impact of dispositional gratitude at work, expression of gratitude at work, or receipt of gratitude at work on the job satisfaction of software developers. Nor did I find such studies on related populations, such as targets within the computer and information technology industry or technology departments in other industries.

This study explored the relationship that dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work have on the job satisfaction of software developers. The findings may help leaders of software companies understand how to help

software developers flourish. Currently, there is a lack of evidence in the literature on whether gratitude could predict the job satisfaction of this population.

The present quantitative correlational study's purpose was to explore how dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work predict the job satisfaction of software developers. This chapter explains the research question, hypothesis and how this study's research design addresses them. This chapter provides the details of the population, sample, survey instruments, data collection procedures, ethical considerations, assumptions, limitations, and delimitation. The chapter concludes with a summary of the research design for this study.

Research Question

One primary research question, with corresponding hypotheses, formed the foundation of this research study.

RQ1: How do dispositional gratitude at work, expression of gratitude at work to supervisors, receipt of gratitude at work from supervisors, expression of gratitude at work to colleagues, and receipt of gratitude at work from colleagues predict job satisfaction among employed U.S.-based software developers?

H1₀. Dispositional gratitude at work, expression of gratitude at work to supervisors, receipt of gratitude at work from supervisors, expression of gratitude at work to colleagues, and receipt of gratitude at work from colleagues are not statistically significant predictors of job satisfaction.

H1_A. Dispositional gratitude at work, expression of gratitude at work to supervisors, receipt of gratitude at work from supervisors, expression of gratitude at work to colleagues, and

receipt of gratitude at work from colleagues are statistically significant predictors of job satisfaction.

The research question and hypotheses were informed by the broaden-and-build theory of emotions (Fredrickson, 2001). The broaden-and-build theory has been employed to predict positive relationships between gratitude and other positive outcomes (Chang et al., 2022; Fredrickson, 2004; Subramanian & Thakur, 2022; Xiang & Yuan, 2021; Zhao et al., 2022). Job satisfaction is a positive, emotional, work-related construct that is positive and beneficial (Herzberg, 1959; Judge et al., 1998; Yousef, 2017). Therefore, by applying the broaden-and-build theory (Fredrickson, 2001), there is justification to question if job satisfaction could be positively correlated with one's level of gratitude. The hypothesis is dispositional gratitude at work, expression of gratitude at work to supervisors, receipt of gratitude at work from supervisors, expression of gratitude at work to colleagues, and receipt of gratitude at work from colleagues are statistically significant predictors of job satisfaction, and it was informed by the broaden-and-build theory of positive emotions (Fredrickson, 1998).

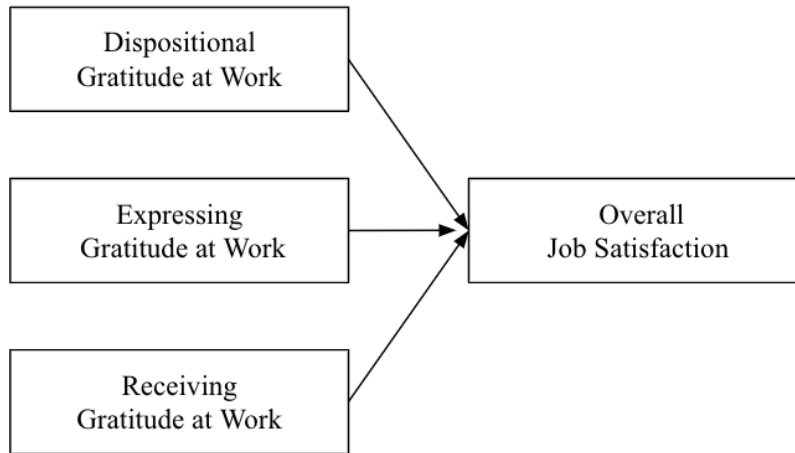
Such has been the case in other studies—the broaden-and-build theory of positive emotions (Fredrickson, 2001) has been employed to understand gratitude's connection to job satisfaction. Waters (2012) connected gratitude and job satisfaction by first questioning if Fredrickson's (2001) causal mechanism for positive emotions that connects gratitude to well-being could also be present in the workplace. Other researchers have presumed the same. For example, Stegen and Wankier (2018) determined that, through the broaden-and-build theory, practicing gratitude improved job satisfaction among a sample of 31 nurses. Stegen and Wankier (2018) reported a 17.9% increase in nurses' experiencing high levels of job satisfaction after a gratitude intervention. In the present study, the research question presumed the broaden-and-

build theory (Fredrickson, 2001) as a mechanism for dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work predicting the positive work outcome, job satisfaction.

Furthermore, the research question and hypotheses were informed by the find-remind-and-bind theory (Algoe, 2012) of gratitude. This theory iterates that relational gratitude improves relationships. Gratitude is a social function that enables people to detect and connect to others; it leads to flourishing (Algoe et al., 2008). One sign of flourishing at work, for example, is job satisfaction (Bono et al., 2012; Redelinguys et al., 2019), including the flourishing of the organization (Judge et al., 2021). Based on the find-remind-and-bind theory of gratitude, gratitude could be a positive resource in organizations. As such, the present study hypothesizes that socially expressed gratitude predicts positive work outcomes. Indeed, Algoe (2012) called for future research on the movement of gratitude from expression to receipt in a dyadic relationship throughout a social network. Complimentarily, this study examined the expression and receipt of gratitude on a social network. Specifically, the present study examined the social network, which is the workplace of software developers, of software developers and the gratitude expression and receipt of gratitude at work among the dyads of their colleagues and supervisors (see Figure 1).

Figure 1

Does Gratitude at Work Predict Job Satisfaction?



Note. This image was created by the dissertation author.

This chapter will explain the research design and method with justification for the methodology used. This section elucidates the population, study sample, data collection and analysis procedures, ethical considerations, assumptions, and limitations.

Research Design and Method

This cross-sectional study used a quantitative correlational, nonexperimental approach. A quantitative nonexperimental research design allows researchers to construct and then conduct statistical analysis to determine the relationships or differences between variables (Black, 2009; Nardi, 2018; Vogt, 2007). In my literature review, I found no research on how dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work could predict job satisfaction among software developers.

Quantitative Instead of Qualitative

A quantitative design was most appropriate for this study. Quantitative approaches are able to test for relationships between variables (Lau, 2017). In this study, the five independent

variables were dispositional gratitude at work, expression of gratitude at work to supervisors, expression of gratitude to colleagues, receipt of gratitude from supervisors, and receipt of gratitude from colleagues at work. The dependent variable was job satisfaction. Qualitative methodology was not appropriate for this study. Qualitative methodology would be better suited for learning from open-ended questions of participants about their experiences and personal conceptualizations (Privitera, 2018). To illustrate, a qualitative design would be appropriate with grounded theory to inductively explain the phenomenon of or around gratitude at work by asking open-ended questions to participants about their opinions, confusions, or stories about gratitude. Perhaps this would be a useful approach for unearthing new information with which to propose new aspects of the gratitude construct, new methods of gratitude interventions, or distilling themes of the who, what, where, how, and why of gratitude grounded in the perspective of software developers. A qualitative design could not measure the variables the same way and thus was inappropriate for this study. Qualitative designs seek to learn more about the nature of a phenomenon or to further understand the meaning or complexity of a topic, often through interviews (Gay et al., 2012). There is a place for exploring, through a constructivist lens, people's conceptualization of gratitude.

However, this study subsumes gratitude constructs that already exist and have been measured, validated, and correlated with specific outcomes in other settings. There is a need to quantify the impact of gratitude on job satisfaction among software developers, thus a quantitative methodology is most befitting for this study. A quantitative approach was selected to determine how dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work predict job satisfaction among software developers.

Correlational Design

Correlational research designs are effective in determining how constructs are related to other outcomes, factors, or constructs (Privitera, 2014). The correlational design was cross-section in nature—collecting data on all variables at one point in time (Black, 2009). This study looked at the constructs of dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work to determine if it predicts job satisfaction. Lau (2017) explained that correlational studies work well by taking an objective view of variables as long as they can be well-defined and measurable, and then a hypothesis can be tested. My hypothesis was that dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work predict job satisfaction. This made a correlational study suited for the study.

Also, quantitative designs are generalizable (Black, 2009). That is, because the quantitative designs are governed by statistical figures, including the population size and a priori strength of the sample size in comparison, the quantitative measures seek to convey results of the sample size that could be said also apply to the general population it is targeting (Black, 2009). Generalizability also means that the study can be repeated by other studies with the expectation of repeatability and findings. The same hypothesis can be accepted or rejected by other researchers following the same methods and steps. This study was designed so that findings could be applied to similar populations. Thus, a quantitative design was most suitable for this study.

Finally, the study was cross-sectional. Data were collected on all variables at one point in time (Black, 2009). Gay et al. (2012) explained the benefit of such a design is its effectiveness in conveying a specific juncture in time, capturing the current status of the participants. A cross-sectional approach was appropriate for this study to discover both the current levels of gratitude

and job satisfaction at the same time. It limited other variables that could skew the data since people's thoughts and feelings can change over time based on new situations or others' altered behaviors.

Population

Employed software developers in the United States were selected as the target population. A software developer is defined as a person who designs, engineers, codes, or manages the development of software for computer applications (U.S. Bureau of Labor Statistics, 2022a, 2022b). This job title takes many forms. According to the U.S. Bureau of Labor Statistics (2022a), applications software developers, software engineers, systems software developers, and IT project managers are all examples of jobs that fall under the category of software development. Developers could have a wide range of job descriptions, depending on where they work. For example, software development can mean designing video games, planning the scope and plan of a software project, or building user interfaces or entire operating systems used in smartphones, vehicles, or manufacturing machinery (U.S. Bureau of Labor Statistics, 2022a, 2022b).

Sample

Sample Size

The G*Power (Faul et al., 2007) analysis determined that this study needed a total of 119 respondents to reach the statistical power number of .05 and a sample that is 10% of the sample size. Using the G*Power 3 (Faul et al., 2007), researchers can estimate the required number of participants. This statistical power analysis helps to avoid type I and type II errors because if the number surveyed is below the power threshold, the survey results lack statistical power. When this happens, the study results should not be evidence to make implications of the study. The

G*Power tool was used to conduct a power analysis prior to acquiring participants (Faul et al., 2009). Therefore, the researchers can plan to gather data from enough participants to reject or accept hypotheses with confidence. Moreover, G*Power 3 is appropriate for quantitative studies in the social sciences, with which it has frequently been used. As was previously stated, I used this program to calculate an *a priori* total sample size of 119 participants. The sample population comprised employed software developers in the United States who self-identify as software developers. Since the survey instrument was posted on LinkedIn, the sample included those with access to LinkedIn, a social media platform for careers and networking.

Inclusionary Criteria

There were some inclusionary criteria for the recruitment of software development workers in addition to working in software development in some way. To qualify for the survey, prospects needed to be at least 18 years of age. Also, they must have been employed full-time at their U.S.-based organization for at least 6 months to ensure participants can answer questions about gratitude at work. Lastly, they must have identified as a software developer as defined by working directly with software development.

U.S.-Based Organizations. The present study measured the dispositional gratitude at work, expression of gratitude at work, receipt of gratitude at work, and job satisfaction of those working for a U.S.-based organization. Gratitude experience, expression, and reception are significantly varied between diverse cultures (Emmons & McCullough, 2004; Freitas et al., 2022; Naito & Washizu, 2015; Wilang, 2022). The participants could already be in any industry. Hence, concentrating the sample into one country limited interference of confounding cultural and environmental variances; the results could provide organizations in the United States with information on the role of gratitude. United States organizational leaders are good targets for

benefit because of the escalating need for software developers and, with it, the management of them in the United States (U.S. Bureau of Labor Statistics, 2022a, 2022b).

Moreover, the world's workplaces and workforces are increasingly multinational, interconnected, and culturally diverse (Mor Barak, 2016). Cultural unquities in the workplace, such as value dimensions and level of power distances, continue to present some of the most significant challenges facing organizations (p.174). In the case of this study, for example, the diversity between U.S.-based companies and other countries could likely include the nature of software development tasks, work processes of software companies, conceptualizations of gratitude, and job satisfaction.

Employed Full-Time. The target population is those currently employed full-time as developers. Employed as opposed to unemployed was a qualifier because the study was measuring job satisfaction, so the scale for job satisfaction presupposed employment. Additionally, the gratitude scales used in the survey were modified to pertain to the workplace. Thus, any responses to the survey by unemployed workers would not serve the hypotheses about working software developers. Employment was an important factor because the present study was testing a hypothesis about the emotions of people at work. Therefore, working is required to be included in the data that were run through SPSS statistical multiple regression.

Self-Identify as Software Developers. To be considered part of the target population, a person must have self-identified as a software developer or closely related to the process of software development. A participant viewing themselves as developers was essential for the study. This is not a given, as it might be targeting K–12 teachers, police officers, neurosurgeons, or other more clearly defined careers. The lines are blurred between definitions of software-related jobs. To illustrate, information technologist can be an umbrella term that includes

software developers. In turn, the software developer can be a general term for types of information technologists, such as coders, programmers, or technology engineers. For example, the U.S. Bureau of Labor Statistics (2022a, 2022b) combines software developers into a group with quality assurance and software testers. A software developer could be either a job title or merely part of the job description of other jobs in the computer and information technology field (U.S. Bureau of Labor Statistics, 2021). This study adopted the term software developer in previous chapters, including the research question that drove the study (How do dispositional gratitude at work, expression of gratitude at work to supervisors, receipt of gratitude at work from supervisors, expression of gratitude at work to colleagues, and receipt of gratitude at work from colleagues predict job satisfaction among employed U.S.-based software developers).

Notably, there are many job titles within computer technology and the information field that reside in the same workplaces as software developers. The consistency must therefore be found in the employee's own identifiers. If one describes their job as in some way part of software development, then the sample population could be identified as software developers.

Therefore, the intention of this study was to limit the geographical location of participants as a means of obtaining cultural consistency. Irrespective of the international similarities present among software developer problems such as dissatisfaction and turnover (Bass et al., 2018; Eckhardt et al., 2016; Kurian & Thomas, 2021), this study hypothesized only about people within the United States. Participants' locations were collected in the demographics section of the survey.

Sampling Method

I recruited participants by posting on group pages on LinkedIn using a nonprobability, purposive sampling method. Secondly, I used a snowball sampling method. A survey

invitation included a link to the qualifying questions followed by a consent form and finally the survey.

Purposive Sampling. Purposive, homogenous sampling was the primary sampling method of this study. As a nonprobability sampling method, purposive sampling means that the subjects were selected based on their characteristics rather than random probability (Black, 2009). Purposive is a nonprobability sampling method. Nonprobability sampling was the direction of this study because it is the best way to learn about gratitude among employed software developers in the United States, which was the goal of the present study.

Nonprobability sampling has been the chosen method in the limited existing research with software developers as the sample population (Baltes & Ralph, 2022; Graziotin et al., 2018; Kachorowski et al., 2018; Ralph et al., 2020). In their analysis of sampling methods in software engineer research, Baltes and Ralph (2022) found that purposive sampling was most common and used 73% of the time. Probability sampling methods were used the least often, less than 9% of the time. The prevalence of purposive sampling in software developer research could denote that it is difficult to reach this population, as I had anticipated. Indeed, Baltes and Ralph (2022) deemed software developers a hidden population. This did not necessarily make purposive sampling better for generalizability to the software developer population. However, it does indicate that many researchers have selected purposive sampling as the best way to obtain a sample of software developers.

Therefore, in the interest of recruiting participants who share the unique characteristic of being full-time software developers of U.S.-based organizations, I used purposive sampling. Using this approach enabled the recruitment of software developers. This study's research question concerned people who share the common characteristic of currently working at a full-

time job that directly involves developing software. Purposive sampling was the best sampling method to gain participants that met this requirement.

My invitation was purposive as I requested that only software developers apply, and I searched for software developers to invite. My subjectivity in choosing the participants was not a factor because being an employed software developer for a U.S.-based company is an objective characteristic.

Additionally, I used snowball sampling as the secondary method. Therefore, the people to whom this study's survey invitation was sent were not up to me. They entered the study voluntarily but were hand-picked based on prequalifying as software developers so as to best address dispositional gratitude at work, expression of gratitude at work, receipt of gratitude at work, and job satisfaction among full-time software developers working for U.S.-based organizations. Purposive sampling was well-suited to meet that goal.

Snowball Sampling. Snowball sampling was used secondarily to gain information about the population being examined in the study. Black (2009) defined snowball sampling as a method of obtaining participants with targeted traits by having candidates invite their own contacts to join the study. Black stated that snowball sampling is beneficial when lists of this population are challenging to acquire (p. 125). Snowball sampling has become more popular as a recruitment method because participants with shared traits desired for the study likely can bring in others more quickly than the research seeking out this harder-to-recruit population (Dusek et al., 2015). Furthermore, snowball sampling is cost-effective (Audemard, 2020; Leighton et al., 2021; Marcus et al., 2017). Cost was an important factor to consider for this study since finding specific populations for a study can be costly (Audemard, 2020; Dusek et al., 2015).

There are benefits to snowball sampling in research. Atkinson and Flint (2001) stated that snowball sampling in quantitative studies helps researchers work with samples otherwise hidden or unlikely to be obtained. Presumably, software developers would likely know other software developers. Typically, software developers work with other software developers. Rather than just one person doing all the work, software development usually entails teams. Tripp et al. (2016) asserted that developing software is best done by software-development teams. Building software requires complex steps such as code review, testing, and deployment. Those choosing to participate in this study could invite other software developers with whom they work. Software developers also know other developers outside of work when they use online communities to learn more about their field from one another (Graziotin et al., 2018). Software developers could invite others who are members of the same software developer-centered groups to participate, where they are accustomed to supporting one another.

On the other hand, using a targeted online recruitment strategy opens the doorway for participants to join across many regions. For example, Desroches (2020) posted a survey on Facebook to recruit nurses, resulting in a sample made up of people from multiple geographical regions. As Desroches (2020) stated, having participants from across the nation reflected the national makeup of the targeted population. It was considered beneficial. The similarity was revealed by comparing the study's sample demographics to that of an updated national nursing workforce survey from another source outside the study. Because the targeted online recruitment so closely mirrored the national population, findings were convincingly generalizable. Likewise, the present study also stands to gain insight into U.S.-employed software developers in companies across industries and geographical regions across the nation rather than surveying one company.

Moreover, software developers are a nuanced population that could be challenging to find (Baltes & Ralph, 2022; Graziotin et al., 2018; Ralph et al., 2020), so the snowball approach could provide the participants sought. Ralph et al. (2020) used snowball sampling as their secondary method to obtain software developers. They argued that random sampling of software developers is uncommon because lists of developers are difficult to acquire. Conceding that snowball sampling could introduce unknown bias, Ralph et al. (2020) nevertheless believed that snowball sampling gave their study a larger and more diverse sample than other sampling methods. The present study used snowball sampling to achieve a larger sample of software developers.

Survey Instrument

The measures included in the survey instrument were the GQ-6 (McCullough et al., 2002) to measure dispositional gratitude at work, AIR (Gordon et al., 2012) expression of gratitude at work and receipt of gratitude at work, OJS (Judge et al., 2000) to measure job satisfaction and demographic questions. AIR (Gordon et al., 2012) was used to address gratitude in relationships (receipt of gratitude and expression of gratitude) with both their supervisors and among their coworkers. The entire instrument is listed in Appendix A.

Gratitude Questionnaire Six Scale (GQ-6)

Dispositional gratitude at work was measured using the Gratitude Questionnaire (GQ-6; McCullough et al., 2002), with approved modifications so that it pertains to one's workplace setting. Other scales that measure dispositional gratitude were considered for this study, but ultimately, the GQ-6 was best suited for this study. First, the definition of dispositional gratitude was derived from McCullough et al.'s (2002) study in which the scale was developed. Hence,

there was a consistency between the definition used for dispositional gratitude in this study and how the study measured it because both were derived from the same seminal study.

The GQ-6 measures one's tendency to feel emotion gratitude or dispositional gratitude (McCullough et al., 2002). The GQ-6 was the first scale of its kind. Secondly, among the measurements for dispositional gratitude found in the literature, the GQ-6 has been the most frequently employed (Portocarrero et al., 2020). In their meta-analysis of dispositional gratitude's relationship to well-being, Portocarrero et al. (2020) found that the GQ-6 was used to measure dispositional gratitude in 75% of the 123 studies they reviewed, of which 10 other dispositional gratitude scales were found. Therefore, gratitude researchers have highly and enduringly trusted my choice of instrument. Clearly, its accuracy has been well-documented.

The GQ-6 is a self-administered, six-question scale (McCullough et al., 2002). The six questions are on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The scale measures intensity, frequency, span, and density of emotion gratitude, which are the components of dispositional gratitude. The language used for gratitude in the questions includes not just the word gratitude but also thankful, as in Question 1, "I feel thankful for what I have received in life" (McCullough et al., 2002, p. 127), and appreciate, as in "...I find myself more able to appreciate the people..." (McCullough et al., 2002, p. 127). Also, the test survey contained two questions that were reverse-scored: Question 3, "When I look at the world, I don't see much to be grateful for" (McCullough et al., 2002, p. 127) and Question 6, "Long amounts of time can go by before I feel grateful to something or someone" (McCullough et al., 2002, p. 127). The numbers are added together to score the data. The higher the score, the greater the dispositional gratitude of the participant. The lowest possible score is 18 and the highest is 30.

Reliability. McCullough et al. (2002) stated that the internal consistency reliability of the GQ-6 had a Cronbach alpha of .82, a good reliability index. Other more recent studies have yielded similar levels of internal consistency. Zhang et al.'s (2020) results showed an alpha of .76; Chang et al.'s (2022) was .71; Cousin et al.'s (2020) was .79; Garg et al.'s (2021) was .84; Langer et al.'s (2016) was .832; McCullough and Tsang (2004) was .87; Guan and Jepsen (2020) was .88; Cho (2019) was .89; all representing good internal reliability via Cronbach's alpha.

Validity. To measure the validity of the GQ-6, McCullough et al. (2002) used a one-factor analysis. They stated that the CFI was .95 and SRMR was .04, both indicating good validity. The good results from the one-factor analysis served as another reason for using the GQ-6 to measure dispositional gratitude at work for the present study.

Modification of the GQ-6. In its original form, the GQ-6 (McCullough et al., 2002) was not specific to a particular time or place in one's life. Ergo, this study adapted it to the workplace. Modifying the GQ-6 items to fit the workplace, which was done by changing items to read "at work," was generously approved by its coauthor, Dr. Michael McCullough, via email reply on May 6, 2022 (see Appendix B). Despite the GQ-6's widespread use in measuring dispositional gratitude, trying new modifications to it (e.g., the present study's isolated dispositional gratitude at work) yielded more evidence with which to analyze the GQ-6's reliability and validity (Card, 2019).

My Changes to the Items. An example of the modification is the first question changed from the original GQ-6 (McCullough et al., 2002), "I am grateful to a wide variety of people," to instead read for this study, "I am grateful to a wide variety of people at work." The at work was added to the question and other questions from the original GQ-6. Changes to all questions to pertain to the workplace were not all done by adding at work to the end of the sentence because

it did not always make grammatical sense. Other items were modified differently: the GQ-6 questions were altered from “I have so much to be thankful for” (McCullough et al., 2002, p. 127) to “I have so much at work to be thankful for,” and the original “As I get older, I find myself more able to appreciate the people, events, and situations that have been part of my life history” (McCullough et al., 2002, p. 127) was changed to “As I get older, I find myself more able to appreciate the people, events, and situations that have been part of my work history” for this study of dispositional gratitude at work. The modified scale can be seen in full in Appendix A.

Closely Related Modifications by Previous Authors. Based on my review of the current literature on the GQ-6 scale, only four other studies have modified the GQ-6 for the work setting thus far (Cho, 2019; Kersten et al., 2021; Unanue et al., 2021; Wang et al., 2020) that resemble the way the present study will change it. Each study presented a different way to transform the GQ-6 (McCullough et al., 2002). However, they were the same in that they all used the GQ-6 to measure dispositional gratitude at work (Kersten et al., 2021; Unanue et al., 2021; Wang et al., 2020), which is how the present study used it. Moreover, all four studies sought and found that dispositional gratitude at work had a positive influence on the employees (Kersten et al., 2021; Unanue et al., 2021; Wang et al., 2020). Therefore, at once, the paucity of research modifying the GQ-6 for the work setting has both precedence and a need for more evidence. In other words, the present study’s method of using the GQ-6 to measure dispositional gratitude at work was not the first of its kind but will contribute significantly to the currently limited literature.

In a previous study, Cho (2019) modified the GQ-6 (McCullough et al., 2002) to measure dispositional gratitude at work. Their change was inexplicable. Their only modification was to delete two items, making the GQ-6, so titled because it has six items, into a four-item measure

(Cho, 2019, p. 807). The two reverse-scored items were omitted. Cronbach's α was reported as .89 for the combined four questions (Cho, 2019, p. 807). There may have been methodological reasons for omitting reverse-scored items, as other researchers have asserted (Carlson et al., 2011; Rodebaugh et al., 2007).

When McCullough et al. (2002) were developing the scale, it started out with 39 items (p. 115). Ultimately, the GQ-6 decreased from 39 to six items based on psychometric research. McCullough et al. reported a standardized root-mean-square residual (SRMR) of 0.04, a Cronbach's alpha of .82, and a comparative fit index (CFI) of 0.95 for their six-item version. However, Cho (2019) removed two items.

Since the published version of the study did not offer more justification for removing two items for the GQ-6, Cho's (2019) method did not appear to be a convincing modification to McCullough et al.'s (2002) measure. Therefore, for the present study, I did not find this method the most appropriate choice of modifications to reproduce the GQ-6 most faithfully for the work environment. That is why I sought and received approval to modify the GQ-6 in a new way. The permission is included in Appendix B.

In another study, Wang et al. (2020) also modified the GQ-6 (McCullough et al., 2002) for the workplace. The purpose of Wang et al.'s (2020) study was to measure the relationship between company culture, employees' anxiety, and employees' gratitude. They found that in situations where mistakes are made at work, when management strives to make employees feel supported, their gratitude at work increases while their work anxiety decreases. Their recommendation was to promote a culture of gratitude at work. That was the potential benefit of the study. Results can be used to guide leadership in stressing positive emotions, namely gratitude, in their workplace culture.

However, the present study took a different approach to testing gratitude at work than that of Wang et al. (2020). In Wang et al., gratitude at work was measured by adapting the GQ-6 (McCullough et al., 2002) to the setting of one's job. There are two significant differences between Wang et al.'s (2020) modification and this study's modification. First, the present study used the word "organization" (p. 4) and the present study used the word "work." Secondly, Wang et al. stated that they added two more items to the GQ-6 (McCullough et al., 2002), making the gratitude at work measure into a total of eight questions (Wang et al., 2020). They did not provide the full list of these items, nor reasoning for adding two questions to their adaptation. Wang et al. (2020) reported a Cronbach's alpha of .89 (p. 4) for their version of the GQ-6 (McCullough et al., 2002). The present study expected to find higher reliability. Therefore, the present study did not add additional questions to a scale that has already shown strong reliability and validity and that is already being modified from its original (McCullough & Tsang, 2004; Portocarrero et al., 2020).

In another study, Kersten et al. (2021) modified the GQ-6 for the work setting. However, the modifications, again like in Wang et al.'s (2020) study, made questionable alterations. Kersten et al. (2021) modified five of the items to read "at work" (p. 142) and deleted one item. Kersten et al. (2021) removed this item from the original GQ-6 (McCullough et al., 2002): "As I get older, I find myself more able to appreciate the people, events, and situations that have been part of my life history" (p. 116). This item was part of the original six items. In subtracting one item from the original GQ-6, Kersten et al.'s (2021) instrument for measuring dispositional gratitude at work consisted of only five questions. Kersten et al. (2021) reasoned that this item did not lend itself to a work life context. However, there is no empirical evidence to support their claim. On the contrary, at least 92 peer-reviewed research studies have used all six items of the

GQ-6 to measure gratitude (Portocarrero et al., 2020). Researchers have considered the GQ-6 to have strong validity based on the number of diverse contexts in which it has been implemented (Card, 2019; Portocarrero et al., 2020; Youssef-Morgan et al., 2022).

Unlike Kersten et al.'s (2021) modification, the present study retained all six items of the GQ-6 (McCullough et al., 2002). I modified the original item "As I get older, I find myself more able to appreciate the people, events, and situations that have been part of my life history" to read "As I get older, I find myself more able to appreciate the people, events, and situations that have been part of my work history." This, plus the other modified five items from the GQ-6, was used to measure dispositional gratitude at work.

A fourth and final article modified the GQ-6 so that it pertains to work life. Unanue et al. (2021) adapted the items of the GQ-6 to find out if gratitude in the workplace would curtail negative materialism. However, the changes to the scale were different from Kersten et al.'s (2021) in two important ways. First, Unanue et al. (2021) reduced the Likert scale from the original 7 points (McCullough et al., 2002) to only 6 points (Unanue et al., 2021). Secondly, they kept all six items, whereas Kersten et al. (2021) eliminated one item (Kersten et al., 2021; Unanue et al., 2021).

The item that Kersten et al. (2021) found incompatible with a work context modification was transformed by Unanue et al. (2021) to read, "As I get older, I become increasingly able to appreciate the people, events, and situations that are part of my work" (p. 6). Similar to my modification, the item exchanged the original "life" (McCullough et al., 2002, p. 127) to "work" (Unanue et al., 2021, p. 6). The present study did the same exchange.

What the present study did differently is retain the ending word to the item: "history" (McCullough et al., 2002, p. 127). My modified item reads, "As I get older, I find myself more

able to appreciate the people, events, and situations that have been part of my work history.” This decision made my item closer to the original item’s intent, which was to question one’s history. Confounding and indeed unexplained, Unanue et al. (2021) left off “history” at the end of the item (p. 6). According to McCullough et al. (2002), the purpose of this item of the GQ-6—“As I get older, I find myself more able to appreciate the people, events, and situations that have been part of my life history” (p. 127)—was to measure not life but life history. Striking this word from the item is not common, even among researchers who change the scale. For example, to convert the scale to a state gratitude measure, Walsh et al. (2022) kept “history” (p. 233). This conveys that the authors believed that history was an important piece of the item, even when modifying the scale. The state gratitude construct significantly differs from dispositional gratitude. A state of gratitude is feeling grateful as an emotion in a moment, whereas trait gratitude is one’s tendency to feel grateful (Li et al., 2022; Lin, 2019; McCullough et al., 2002; Wood et al., 2010). Walsh et al. (2022), in their paper, shared this understanding of the difference. They sought to measure state gratitude since the purpose of their study was to measure one’s level of state gratitude immediately following a gratitude intervention.

Nonetheless, Unanue et al.’s (2021) adaptation provides an example of employing the GQ-6 to represent an individual’s level of gratitude in the context of their jobs. Unanue et al. (2021) reported a Cronbach’s alpha of .81 for their workplace version of the GQ-6. This occurred when their adapted GQ-6 scale was given to 979 employed adults in its second administration halfway through their longitudinal study.

Therefore, in the present study I kept and modified it for the workplace. In keeping the item, the expectation was that it would more closely maintain the integrity of the original GQ-6 (McCullough et al., 2002). Deleting a question from a scale was seen as a more extreme

modification. That also goes for adding items to it. Furthermore, the modification for this study seemed equally appropriate to the modifications of the other items used in the present study, and incidentally, the one by Kersten et al. (2021), which had yield for Kertsen et al. of Cronbach's α 's of .85, .87, and .87 in their three samples. At the very least, their study marked the beginning of an alternative method for measuring gratitude in the context of one's job life exclusively. Finding new ways to measure dispositional gratitude at work could likely be a growing subject within positive organizational scholarship. Indeed, ample researchers have highlighted the need for more of this kind of research (Clay & Stearns, 2020; Patil et al., 2018; Unanue et al., 2021; Watkins & McCurrach, 2021; Zhao et al., 2022).

Conclusion. In summary, the GQ-6 (McCullough et al., 2002) is the most common scale used by researchers to date to measure gratitude (Lavelock et al., 2016; Portocarrero et al., 2020). Few studies even modified the GQ-6 (McCullough et al., 2002) for the work context by amending the items (Cho, 2019; Kersten et al., 2021; Unanue et al., 2021; Wang et al., 2020). Those studies influenced this present study. They provided justification for applying and modifying the GQ-6 for the workplace. Namely, studies like mine have precedence, but simultaneously, what little there is currently also implies more similar studies should be conducted. The present study measured dispositional gratitude at work by using the GQ-6 (McCullough et al., 2002) but with modifications. With the modification for this study, "at work" was added to each question, making each one pertain to work. One of the cocreators of the GQ-6, Dr. Michael McCullough, gave me permission to make these modifications via email correspondence on March 17, 2022: "You are very free to use the GQ-6. Feel free also to modify it as you see fit" (M. McCullough, personal communication, March 17, 2022).

More especially, the present study's particular modifications to the GQ-6 scale were not only the first of its kind but also, mathematically, the closest word-for-word match to the original GQ-6 (McCullough et al., 2002). As such, the present study will make a significant contribution to workplace dispositional gratitude scholarship. The study marks a new method to measure dispositional gratitude at work by modifying the GQ-6 scale in a novel way.

Other Forms of Gratitude. Fehr et al. (2017) noted that gratitude at work should be treated as a multifaceted construct rather than limiting it to simply either state or trait. Correspondingly, Youssef-Morgan et al. (2022) maintained that gratitude at work should encompass more elements of gratitude than trait gratitude. Youssef-Morgan et al. (2022) asserted that to capture a more meaningful sense of gratitude at work, the social aspect of gratitude, for example, the outward exchange of appreciation between people, should also be measured. Their study, published in 2022, presents a powerful implication for researchers to explore further. There remains a lack of studies that examine this gratitude at work in a multifaceted manner. This study sought to do that. Rather than focusing on one type of gratitude, this study quantified three types of gratitude at work among participants. This study measured dispositional gratitude at work, the expression of gratitude at work, and receipt of gratitude at work. Therefore, in addition to the GQ-6 scale that measures dispositional gratitude, I used other scales to measure the other forms of gratitude at work.

Appreciation in Relationships Scale

I incorporated the Appreciation in Relationships (AIR) scale (Gordon et al., 2012) into the survey to measure both expression and receipt of gratitude among software developers' supervisors and colleagues. The AIR scale is 16 questions on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Five questions were reverse-scored: Items 2, 5, 7, 13,

and 15. There were two subscales: the appreciative subscale (nine items with an alpha of 0.74) and the appreciated subscale (seven items with an alpha of 0.86).

This scale is appropriate for the study because it was designed to measure one's gratitude in relationships in both expressing and receiving gratitude (Gordon et al., 2012). The AIR scale uses the term appreciation in the title, and this context is synonymous with gratitude. In clarifying that they used appreciation to mean gratitude, the article states, "We use the term appreciation to refer to general feelings of gratitude for whom a person is and for what a person does. We use the term gratitude to refer to an emotional response to a person's kind deed" (Gordon et al., 2012; p. 258). In other words, AIR was developed to measure gratitude. Feeling appreciative/appreciation is synonymous with feeling grateful/thankful (Emmons & McCullough, 2003; Fredrickson, 2013). Therefore, the scale was well-suited to measure expression and receipt of gratitude for the present study.

Furthermore, other researchers have also asserted that Gordon et al.'s (2012) AIR scale measures expression and receipt of gratitude (Brady et al., 2021; Zoppolat et al., 2020). In the context of both Brady et al.'s (2021) study and Zoppolat et al.'s (2020) study, expressing gratitude means showing appreciation for others, and receiving gratitude means how one feels appreciated by others. The goal of this study was to measure the expression and receipt of gratitude among software developers. Since the AIR measures both directions of socially exchanged gratitude at the same time, the AIR scale is well-suited to measure two independent variables in this study: expression of gratitude at work and receipt of gratitude at work.

Expressing Gratitude at Work. The appreciative subscale of AIR (Gordon et al., 2012) measures a person's level of expression of gratitude. I modified this subscale to fit the workplace setting so that the modified appreciative subscale of AIR could measure a person's self-reported

expression of gratitude at work, a variable in the present study. The appreciative subscale is nine items of the total 16 in AIR. Three of the nine appreciative items were reverse-scored.

The appreciative subscale asks the participant about their own expression of gratitude rather than their opinion about others' expression (Gordon et al., 2012). This must be carefully noted because in some studies, gratitude expression is measured by asking participants about the expressions of others (Algoe et al., 2016; Bock & Thomas, 2021; Chen et al., 2022; Grant & Gino, 2010; Thomas et al., 2022), and that is not what the appreciative subscale of AIR was designed to measure. For this study, the self-reporting appreciative subscale of AIR measured the participants' expression of gratitude at work toward their colleagues and supervisors.

When measuring the gratitude expression, the language used for how and how often must be discussed. The authors of the appreciative subscale of AIR (Gordon et al., 2012) rightly accounted for the fact that expressing gratitude could come in many forms. Some items ask about verbal expression. For example, Item 2 reads, "I often tell my partner how much I appreciate her/him" (Gordon et al., 2012, p. 263). This item is specific to verbalizing gratitude. Other items ask about expression of gratitude in ways besides verbalizing. For example, Item 6 is nonspecific to how gratitude is expressed, reading, "I make sure my partner feels appreciated" (Gordon et al., 2012, p. 263). Here, how gratitude is expressed has not been limited to speaking about one's gratitude. Instead, this item asks about one's successful effort to communicate gratitude to one's partner. Referring again to Item 6, "I make sure my partner feels appreciated" (Gordon et al., 2012, p. 263), the expression of gratitude here could be verbal, yet the item also covers the possibility that participants have used multiple ways to communicate gratitude.

Receipt of Gratitude at Work. Receipt of gratitude merits further explanation, considering how limited the research is on it. This appreciated subscale in AIR (Gordon et al.,

2012) was designed to measure how appreciated by other people in their life a person feels. In the current study's use of the appreciated subscale of AIR, the conceptualization of feeling appreciated is analogous to a person's level of perceived receipt of gratitude from others. The justification for this is grounded in the precursor study to Gordon et al. (2012): Gordon et al. (2011). I call it a precursor because not only is Gordon et al. (2011) by the same author and strikingly close to the same subject (i.e., relational gratitude in the marriage dyad), but Gordon et al. (2011) is cited by Gordon et al. (2012) as their source to explain that expressing appreciation as well as feeling appreciated are synonymous with relational gratitude (p. 260). This precursor study, Gordon et al. (2011), examined thanking and feeling thanked in a relationship, in which Gordon et al. defined feeling appreciated, which matches the terms in the appreciated subscale in Gordon et al. (2012), as receiving gratitude (Gordon et al., 2011, p. 340). Using the appreciated subscale to measure receipt of gratitude in this survey was also justified by the fact that the subscale could best align with expression of gratitude being measured in this study by the other half of the AIR scale. By using AIR to measure expression and receipt of gratitude together, there could be data analysis possibilities for validity. For example, Gordon et al. (2012) found that expression of gratitude by the partner correlated with how much the other member of the dyad felt appreciated. This finding could convey that one's partner is receiving the gratitude being expressed, as opposed to a breakdown in exchanging intended gratitude. Gordon et al. were able to control for satisfaction when looking at the subscales' correlation. The same analysis was conducted for job satisfaction in this study. Finally, the wording of items in the appreciated subscale of AIR indicates that feeling appreciated is the same as receiving gratitude. Item 14 reads, "My partner often expresses her/his thanks" (Gordon et al., 2012, p. 263), and gratitude means thanks (Emmons & McCullough, 2003), but also Items 10 and 12 directly

inquire about the participant's receipt of expressed gratitude. Therefore, because the language of this study and the scale both include receiving and feeling appreciated to represent the same side of relational gratitude, the appreciated subscale of AIR was best suited to measure the receipt of gratitude at work.

Through email correspondence on March 21, 2022, Dr. Amie Gordon gave me permission to modify the questions so that the subject of the receipt of gratitude could change to relationships with colleagues and supervisors instead of romantic partners (see Appendix C).

Reliability. Gordon et al. (2012) determined an alpha of .74 for expressing appreciation and .86 for receiving appreciation, indicating strong reliability. In developing this scale, the authors used a three-step process in four separate samples of participants. The first and second samples using the scale helped the authors narrow down the scale questions from 30 to 16 questions. In the first sample, Gordon et al. (2012) conducted a reliability analysis along with descriptive statistics and exploratory factor analysis. In the second sample, the authors used confirmatory factor analysis on the 16 items that had been narrowed down in the first sample. Gordon et al. stated that the test-retest reliability was strong. The retest 9 months later resulted in an alpha of .61 for the appreciative subscale and .71 for appreciated. Therefore, the scale has good reliability.

Since then, other authors adopted the AIR scale (Gordon et al., 2012). In Brazil, de Medeiros et al. (2019) administered a version of the AIR scale in the Portuguese language. Exploratory factor analysis and structural equation modeling indicated good reliability ($\alpha = .93$). Hence, the study further validated the scale. Moreover, de Medeiros et al.'s method of recruiting participants for the study used social media networks online. This supports using the AIR scale (Gordon et al., 2012) in an online survey format versus face-to-face. That is relevant to this study

because the present study administered the scale on LinkedIn, an online social platform. Since de Medeiros et al. (2019) also used the scale this way, it established precedence for the scale's delivery method.

However, de Medeiros et al. (2019) had less of a concern for the impact of gratitude. Nonetheless, the study informed the present study in three primary ways. First, their study used the AIR (Gordon et al., 2012), modifying for their context (de Medeiros et al., 2019), which the present scales sought to do. Second, the purpose of de Medeiros et al.'s (2019) study was to affirm the validity of AIR (Gordon et al., 2012) for future studies. Third, de Medeiros et al. (2019) stated that appreciation was synonymous with gratitude (p. 861), which was the conceptual stance of the present study, thereby justifying using AIR (Gordon et al., 2012) to measure gratitude in this study. De Medeiros et al. (2019) concluded that the AIR scale (Gordon et al., 2012) had good reliability and validity in Brazil. In that respect, though it provided more evidence for the reliability of the AIR scale, other studies have displayed even more promise for using the AIR scale for gratitude research. Brady et al.'s (2021) study measured experienced gratitude and receipt of gratitude using the AIR (Gordon et al., 2012) scale in three separate studies reported in the article. The internal consistency was high in all three (Brady et al., 2021). In the first study, which was their pilot consisting of 185 participants, Brady et al. (2021) determined that the AIR (Gordon et al., 2012) measured gratitude with high internal consistency: experienced gratitude $\alpha = .84$, received gratitude $\alpha = .86$ (p. 275), and their other studies reported even higher alphas. Brady et al. concluded that expressing and receiving gratitude improved sexual relationships. Brady et al.'s (2021) conclusion was based on their one-way analysis of variance between the variable of sexual communal strength and experiencing gratitude condition ($M = 8.71, SD = 1.97$; p. 278) and the receiving gratitude condition ($M =$

9.35, $SD = 1.71$; p. 278). As was stated earlier, they conducted three studies, entailing the application of the AIR scale (Gordon et al., 2012) for a good gratitude measurement several times (Brady et al., 2021).

In addition to using the AIR scale (Gordon et al., 2012), there are other similarities between Brady et al.'s (2021) study and the present one. First, part of the present study's theoretical framework was the find-remind-and-bind theory of gratitude set forth by Algoe (2012). Brady et al. (2021) cited the same theory as a reason to suspect that gratitude positively affected sexuality, upon which they founded their study's hypothesis. Second, Brady et al.'s study sought to understand the relationship between several forms of gratitude and another variable, which is similar to what my study did. Finally, Brady et al. (2021) recruited participants online, which the present study present also did. However, they used Amazon's MTurk resource, and MTurk does not have the option to select software developers, which was the target population of this study. Therefore, I used LinkedIn.

Validity. In developing this scale, Gordon et al. (2012) tested for validity during the third and fourth samples of the four samples. The first two samples were used to consolidate questions from 30 to 16 and confirm the structure of the two subsections, expressing and receiving appreciation, so the third and fourth samples were used to look at convergent and discriminate validity.

Modifications. The AIR scale (Gordon et al., 2012) was originally created to address intimate relationships, but it did not apply to the work environment addressed in the study. However, Gordon et al. called for future research that used the scale for other types of relationships. Therefore, the current study followed this suggestion by applying it to workplace relationships between employees, their coworkers, and their supervisors.

Dr. Amie Gordon approved modifications to the scale to fit workplace relationships on March 21, 2022 (see Appendix B). Through email correspondence on March 21, 2022, Dr. Amie Gordon permitted me to modify the questions so that the subject of the expression of gratitude could change to relationships with colleagues and supervisors instead of romantic partners. The nine questions in the appreciative subscale of (AIR) were asked twice, once modified for “colleagues” and repeated for “supervisors” to measure the expression of gratitude at work with both colleagues and supervisors.

Further, this scale was used twice in the survey. One scale asked about supervisors. A repeat of the scale was used to ask participants about gratitude with coworkers. The two AIRs (Gordon et al., 2011) are identical except that one used “supervisor” while the other used “colleagues” in the questions. Both are modifications of the original AIR by replacing “partner.”

Gratitude Measures That Were Considered. Other scales have been used to measure expression of gratitude at work, but they were not appropriate. For example, in a study by Waters (2012) that had similar goals to this study—measuring both job satisfaction and gratitude at work—the expression of gratitude questions targeted employees’ judgment of their institution rather than their personal expressions and receipt of gratitude from supervisors and coworkers as was required to test the hypotheses of this study. Waters (2012) devised the institutional gratitude measure of the study from Cameron et al.’s (2011) gratitude subset in their measurement of institutional positivity and virtuousness, titled the Positive Practices Scale (IG-PPS). This gratitude survey was used to measure what Waters (2012) called institutionalized gratitude. Ostensibly, expression of gratitude would be a different measurement than institutional gratitude. However, upon closer inspection, the questions clearly reveal a consistent theme of gratitude expression. Two questions of the subset from Cameron et al. (2011) used by Waters’s

(2012) institutional gratitude: “We express gratitude to each other” (Cameron et al., 2011, p. 297); “We show appreciation for one another” (p. 297) are close to what I was looking for but not exactly.

As an aside, it is worth noting that this serves as yet another example of researchers using the term appreciation and gratitude interchangeably, which gives more weight to using the AIR scale (Gordon et al., 2012) to measure gratitude, though it bears appreciation in its title. Grammatically speaking, the subject in these questions is “we,” which alone should be dismissed from this study despite Waters (2012) being one of the most closely related models to the current study of how forms of gratitude predict job satisfaction. The psychometrics in both cases of these expression of gratitude questions demonstrated reliability and validity. The Cronbach’s alpha of gratitude subset in Cameron et al.’s (2011) two studies was .941 and .954, displaying good psychometrics. Similarly, in Waters’s (2012) study, Cronbach’s alpha of this, referred to as institutional gratitude, was .92, once again displaying good reliability. Yet, this study measured forms of gratitude at work, not what Waters (2012) labeled institutional gratitude. The present study was more concerned with dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work as self-reported by individuals about themselves.

Another manifestation of gratitude is receipt of gratitude (Beck, 2016; Cardon et al., 2021; Davis et al., 2021; Grant & Gino, 2010; Lee et al., 2019). As a social emotion, gratitude can be exchanged in a dyadic relationship (Leong et al., 2020). Expressing gratitude and receiving gratitude are the two sides of the exchange. The benefactor is the receiver of gratitude from the beneficiary who expresses their thanks. In contrast to dispositional gratitude and expression of gratitude, there are considerably fewer instruments presently developed for measuring receipt of gratitude exclusively, even when receiving gratitude has a role in the study

(Davis et al., 2021; Grant & Gino, 2010; Hori et al., 2020; Lee et al., 2019; Wilang, 2022; Williams & Bartlett, 2015; Zhu et al., 2022). Studies about receiving gratitude have been mostly experimental designs (Grant & Gino, 2010; Hori et al., 2020; Walsh et al., 2022; Williams & Bartlett, 2015). In most cases, the experiment artificially induces the receipt of gratitude, and those do not measure the receipt but rather the impact of receiving gratitude. In the few studies that measure the receipt of gratitude besides Gordon et al.'s (2012) AIR scale, the measures were not used in nonexperimental designs.

Lee et al. (2019) was one exception. Lee et al. (2019) conducted a survey and measured the receipt of gratitude with three questions, but these questions addressed how the participants received gratitude for specifically how they “help” (p. 203) others. This measure would not work for the present study because the research question was not about receiving gratitude exclusively for the help provided by the receiver of expressed gratitude.

The present study was a nonexperimental design. It measured the receipt of gratitude at work. Therefore, Gordon et al.'s (2012) AIR, which measures the receipt of gratitude (feeling appreciated), was best suited for this study. This study will contribute to the literature on measuring the receipt of gratitude that is currently limited.

Overall Job Satisfaction

Job satisfaction was measured using the Overall Job Satisfaction scale (OJS; Judge et al., 2000). The survey was a shortened version of the Index of Job Satisfaction (Brayfield & Roth, 1951). Both the Index of Job Satisfaction scale (Brayfield & Roth, 1951) and the shortened version, the OJS (Judge et al., 2000), are in the public domain (Gallagher & Lopez, 2019) and thus permitted to be used in this study. The OJS (Judge et al., 2000) is five questions on a 7-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*). The scale was designed to measure

overall job satisfaction as a positive work outcome and was created and first used in Judge et al.'s (1998) study. The present study used a copy of the scale's items used in Judge et al.'s (2000) article.

The Likert scale has been reduced from a 10-point (Judge et al., 1998) scale in its first use to 7 points in Judge et al.'s (2000) following study. Selection of a 1 means the participant *strongly disagrees*, while 7 means the person *strongly agrees* with the statement. Two of the items (statements three and five) are reverse-scored. In order, five items of the OJS are as follows: (a) "I feel fairly well satisfied with my present job," (b) "Most days I am enthusiastic about my work," (c) "Each day of work seems like it will never end," (reverse-scored), (d) "I find real enjoyment in my work," and (e) "I consider my job rather unpleasant" (reverse-scored; Judge et al., 2000, p. 241).

Gallagher and Lopez (2019) stated that the OJS is one of the most common, valid, and reliable surveys for job satisfaction amidst a litany of weaker measurements in other studies in recent years. They explained that studies interested in job satisfaction as a single construct should use OJS over other common, valid, and reliable measures. Researchers have done just that (Alrawashdeh et al., 2021; Darrat et al., 2021; Di Fabio, 2018; Jawahar & Liu, 2017; Piccolo et al., 2005; Topino et al., 2021). Akin to such studies, the dependent variable for the present study was overall job satisfaction as a singular construct. Therefore, Gallagher and Lopez's (2019) assertion about using the OJS (Judge et al., 2000) for a singular conceptualization of job satisfaction was applied to the present study.

From its inception, the OJS scale demonstrated significant correlations with positive outcomes (Di Fabio, 2018; Judge et al., 2000; Judge et al., 1998; Topino et al., 2021). Through canonical correlation analysis, Judge et al. (1998) found that the self-reported OJS has a

statistically significant correlation— $p < .001$ —with the self-reported measures of life satisfaction, self-esteem, self-efficacy, and the employee's perception of job significance and positive intrinsic job attributes. The findings confirmed that the OJS instruments reveal a form of job satisfaction that is positively correlated with other positive personality traits and positive work outcomes (Judge et al., 1998, p. 24). The OJS scale consists of merely five items (Judge et al., 2000), which lends itself to efficient methods of measuring job satisfaction for studies seeking its correlations with other variables. Therefore, the OJS scale was chosen to explore the relationship between job satisfaction and multiple sides of gratitude, requiring many additional scales in the sum of this study's survey.

Reliability. The reliability of this survey in its introductory article was good, with an alpha of .88 in three samples (Judge et al., 1998). In Judge et al.'s (2000) study, which used a 7-point Likert scale instead of 10, the sample yielded an alpha of .89 (p. 242). Many studies have conveyed the reliability of the OJS (or SIJS). To name a few, Cronbach's alpha was .70 in Piccolo et al.'s (2005) study; .74 in Jawahar and Liu (2017); .81 in Alrawashdeh et al. (2021); and .87 in Darrat et al. (2021). Reporting the SIJS both valid and reliable, Sinval and Marôco (2020) found the alphas of .84 and .88 for their two groups of participants. Therefore, not only was the OJS well-suited conceptually for this study, but it also showed good reliability as an instrument in other studies.

Validity. The OJS (Judge et al., 2000) has shown good internal and external validity. First, Judge et al. (1998) attempted to establish good external validity by diversifying their populations across three separate samples. The three samples were made up of 650 psychiatrists, 650 general practice physicians, 200 Israeli undergraduates and graduate-level college students,

and 1,086 more students from the United States. Additionally, the participants' significant other also participated in the survey to eliminate the possible bias of self-reporting (Judge et al., 1998).

Subsequent usage of the OJS by other researchers further validated the scale. In Sinval and Marôco (2020) study, the factorial validity of the survey showed $CFI = .994$, which is within an acceptable range. The two sample groups of the study also resulted in $.54$ AVE and $.65$ AVE, which presented good convergent validity.

In another study, though calling it JSS (Job Satisfaction Survey) instead of OJS, Di Fabio (2018) sought to validate the scale. Their study responded to the lack of reliability of other scales and further validated the OJS (Italian version). A confirmatory factor analysis verified goodness of fit: ($N = 268$, $TL = .95$, $CFI = .96$, $RMSEA = .06$, $SRMR = .05$). Furthermore, for concurrent validity, they ran a Pearson's r correlation of OJS with Work and Meaning Inventory scale (WAMI; $N = 268$, $r = .59$) and Occupational Fatigue Exhaustion Recovery (OFER; $N = 268$, $r = -.38$). They determined that the positive correlation with WAMI combined with the negative correlations with OFER revealed strong concurrent validity. Notably, Di Fabio's (2018) study that validated the OJS (Judge et al., 1998) was cited by Topino et al. (2021) in their selection of the OJS (Judge et al., 1998) to measure overall job satisfaction of 202 employees. They determined that dispositional traits such as extraversion, agreeableness, and emotional stability positively affected overall job satisfaction.

In summary, the OJS (Judge et al., 2000) was used to measure overall job satisfaction in this study for several reasons. The OJS (Judge et al., 2000) best represented the overall job satisfaction construct that was the dependent variable of the present study. Furthermore, it is reliable and valid. Notably, using the OJS to measure the job satisfaction of software developers can provide a new context and thus contribute to the body of research on this instrument.

Operational Definition of Variables

This section explains each variable of the study. There are five independent variables: dispositional gratitude at work, expression of gratitude at work to supervisors, expression of gratitude to colleagues, receipt of gratitude from supervisors, and receipt of gratitude from colleagues at work, which coincides with the three types of gratitude being measured against job satisfaction levels. Job satisfaction was the dependent variable in the study. The survey also gathered demographic data to explore possible patterns of demographic variations among software developers and their level of gratitude and job satisfaction.

Dispositional Gratitude at Work

Dispositional gratitude (i.e., a person's trait gratitude) at work is a continuous level independent variable that measures a person's tendency to feel grateful at work or dispositional gratitude at work. The GQ-6, modified to pertain only to dispositional gratitude in the workplace, measured dispositional gratitude at work. Without modification, the GQ-6 is a self-reporting scale that measures dispositional gratitude on a continuous Likert scale from 1 to 7 (McCullough et al., 2002). Reflective of six questions on the 7-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*), two items of which are reverse-scored, the scores range from six to 42 (McCullough et al., 2002). The higher the score, the higher the participant's dispositional gratitude level. As a self-report scale that measures one's tendency to feel grateful, the lower the score, the higher the threshold for experiencing state gratitude in situations. In other words, the scale was not designed to reveal that a person has a zero or negative degree of trait gratitude. Rather, a lower score means the participant does not have as pronounced tendency to feel grateful as others who take the GQ-6. If a person scores 42 on the GQ-6, they are more likely to

experience gratitude in higher intensity and frequency and feel grateful toward a wider range of people about a wider range of a person's perceived benefits and life outcomes.

Expression of Gratitude at Work

A second continuous level independent variable in the study was a person's level of expression of gratitude in their work setting. Expression of gratitude at work was measured using a modified version of the AIR subscale of appreciation (Gordon et al., 2012). The appreciative subscale of AIR is nine items, all on a 7-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*). These nine questions contained three reverse-scored items (Questions 2, 3, and 7). The possible scores range from 27 to 45.

Receipt of Gratitude at Work

Receipt of gratitude at work is a continuous level independent variable. The measure for receiving gratitude in the workplace was a modified version of the appreciated subscale of the AIR (Gordon et al., 2012). The appreciative subscale of AIR is seven items, all on a 7-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*). These seven questions contained two reverse-scored items (Items 13 and 15). The possible scores range from 19 to 37 (Gordon et al., 2012). The seven questions in the appreciated subscale of (AIR) were asked twice, once modified for "colleagues" and repeated for "supervisors" to measure the receipt of gratitude at work with both colleagues and supervisors (see Appendix A).

Job Satisfaction

The continuous dependent variable in the study was overall job satisfaction. The self-reported OJS (Judge et al., 2000) measured overall job satisfaction. OJS is five items on a 7-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*). Two items are reverse-scored

(Item 3 and Item 5 are reverse-scored). Scores range from 17 to 23, with higher scores indicative of greater overall satisfaction.

Demographic Information

Demographic data were gathered from the survey. Participants were asked questions about the industry in which they work and other details about their jobs. Personal demographic information was collected, including gender, age, and ethnicity. The demographics questions can be seen in full in Appendix D.

Industry. I measured the industry in which the participant works. That is different than measuring whether they are software developers. The sample was software developers, but I was curious to know the industry for the purpose of descriptive data. For example, a software developer could work in the healthcare industry. This could be relevant information since the study examines people in their work environments, measuring their levels of dispositional gratitude at work, expression of gratitude at work, receipt of gratitude at work, and job satisfaction. Software developer jobs are technology jobs. However, a software developer's job can also exist within any other industry (U.S. Bureau of Labor Statistics, 2021).

Therefore, information about the industries within which they work was also collected from participants. I chose the industries based on the aggregate industry groupings of the North American Industry Classification System (NAICS), the official classification of industries of the U.S. Bureau of Labor Statistics (U.S. Bureau of Labor Statistics, 2022a, 2022b). The NAICS is the official classification of industries by Federal statistical agencies (U.S. Bureau of Labor Statistics, 2022a, 2022b). Each industry was listed in a drop-down menu of options: Mining, Quarrying, and Oil and Gas Extraction; Utilities; Construction; Manufacturing; Wholesale Trade; Retail Trade; Transportation and Warehousing; Information; Finance and Insurance; Real

Estate and Rental and Leasing; Professional, Scientific, and Technical Services; Management of Companies and Enterprises; Administrative and Support and Waste Management and Remediation Services; Educational Services; Health Care and Social Assistance; Arts, Entertainment, and Recreation; Accommodation and Food Services; Other Services (except Public Administration); Public Administration. There were also options for unsure and unwilling to share: “I am not sure” and “I do not prefer to disclose.” By including this item, I identified the software developer’s industry with a complete list of the possibilities from the NAICS, the office list used by the U.S. Bureau of Labor Statistics (2022a, 2022b).

Size of Organization. Participants were asked the size of the organization based on number of employees. Number of employees is the most common way to measure the size of an enterprise (Organisation for Economic Co-operation and Development [OECD], 2022). For the classification of size by number of employees, I used the descriptions of the Organisation for Economic Co-operation and Development (OECD). The OECD is an international organization that works with governments, creating international standards and solutions in economics. They currently have 38 member countries, and the United States is one of these. The options were as follows: Micro-sized business: less than 10 employees; Small-sized business: 10–49 employees; Medium-sized business: 50–249 employees; Large-sized business: more than 250 employees; Unsure; I do not prefer to disclose.

Length of Time Employed at Current Job. Participants were asked how long they had been employed full-time at their current job. The options in a drop-down menu were as follows: less than 6 months; between 6 months and a year; 1–5 years; 6–10 years; 11–15 years; 16–20 years; over 20 years; I do not prefer to disclose.

Length of Time as a Software Developer. Participants were asked how long they had been software developers. The options were as follows: less than 6 months; between 6 months and a year; 1–5 years; 6–10 years; 11–15 years; 16–20 years; over 20 years, I do not prefer to disclose.

Age. Data about the participants' ages were collected. The options in the menu were as follows: under 18 years; 18–29 years of age; 30–39; 40–49; 50–59; 60–69; 70 years of age or over; I do not prefer to disclose. When a candidate answered that they were under 18 years of age, they were electronically automatically redirected to a message that graciously declined to accept them into the sample. They were directed to a note that thanked them for their eagerness to participate because they were not legal adults and, therefore, outside of the range of the desired population for this study (see Appendix D).

Gender. Data about the gender of participants were collected. Seven options were available: Female, Male, Non-binary, Transgender, Gender Non-conforming, Other, and I chose not to disclose.

Ethnicity. Data about the ethnicity of participants were collected. There were nine options, including an option not to disclose. The choices were as follows: American Indian or Alaskan Native; Asian/American; Black/African American; Hispanic/Latino/Latina or Spanish origin; Middle Eastern and North African (MENA); Native Hawaiian or Pacific Islander; White; Other (type in a response); I do not prefer to disclose.

Additional Descriptive Data

Additional descriptive data were collected for descriptive statistics regarding gratitude at work. Though not part of the analysis of this study's variables, this section of the survey consisted of nine additional questions about expressing and receiving gratitude at work for

descriptive statistics (see Appendix A). These were not part of any previously established gratitude measurement tool.

Asking gratitude questions beyond the gratitude instruments used is not unheard of in the literature. In a similar case, Patil et al. (2018) asked questions about the amount of felt and expressed gratitude at work among participants. Based on Pearson's test of these participants' answers, Patil et al. (2018) determined that participants mostly believed that they were more motivated and happier when a culture of gratitude is present at work. The present study's methods were comparable in the use of descriptive data collected about gratitude, how it was distributed via social media, and a majority of the workers surveyed were employees in software jobs. However, some differences in the present study are that the questions were not taken from Patil et al. (2018), the target population was exclusively software developers, and the social media platform used was only LinkedIn. Nevertheless, Patil et al.'s (2018) study provides evidence for methods and meaning to add descriptive data to the present study.

The first item that started this section was, "I feel appreciated," and was on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*).

Two questions were derived from a widely cited gratitude survey that was administered by the John Templeton Foundation (Kaplan, 2012): "If my boss were more grateful (showed more appreciation for my work), I would want to work harder," and "If my boss were more grateful, I would feel better about myself" (p. 15), both using a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*).

Also, information about the frequency of gratitude expression and receiving was collected. For the frequency of expression of gratitude at work to the participant's supervisor, colleagues, and customers, the question was, "How often do you express gratitude to the

following.” For the frequency of receiving gratitude at work from the participant’s supervisor, colleagues, and customers, the question was, “How often do you receive gratitude at work.” Each of these two questions was divided into three questions to isolate specifically with whom the gratitude exchanges of expressing and receiving take place: supervisor, colleagues, and customers. Thus, with the frequency of expression and receiving, there were six questions. Each question had six possible answer choices: *one or more times per day, several times per week, at least once per month, a couple of times per year, once per year, and never.*

Data Collection and Analysis Procedures

This study’s purpose was to explore how dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work predict job satisfaction among full-time software developers employed in organizations based in the United States. I measured the predictive relationship between these variables using a survey method. The survey instrument includes scales to measure the variables, demographic information, and additional descriptive data.

After obtaining institutional review board (IRB) approval (see Appendix J), I invited participants using the social media platform for professionals, LinkedIn. The sampling method was purposive because I posted the invitation in groups of software developers and to software developers. Secondly, I applied snowball sampling by asking participants to share the invitation link with anyone else they know who is a software developer. This subsection justifies using LinkedIn to recruit participants and explains step by step how I collected and analyzed the data.

LinkedIn

I gave a description and invited participants to a post on LinkedIn, and the post included a link. I distributed the survey instrument as a hyperlink using a social media platform called LinkedIn. Online surveys are cost-effective and can reach a large pool of participants for social research (Dodemaide et al., 2020; Dusek et al., 2015; Herbell, 2019; Leighton et al., 2021; Privitera, 2018; Reagan et al., 2019). Dusek et al. (2015) argued that traditional ways of acquiring samples are not always successful in gaining adequate sample sizes of the targeted population. For their evidence, Dusek et al. mentioned the traditional strategies of surveying companies, using professional services, and contacting random people as sampling approaches that do not always yield sufficient sample sizes. Meanwhile, other researchers have noted that snowball sampling on social media, LinkedIn in particular, is a viable way to gain participants for a study (Leighton et al., 2021).

Using social media platforms in addition to LinkedIn was also considered for the study but found unnecessary. For example, Facebook, another social media platform, has proven fruitful for gaining sufficient sample sizes (Herbell, 2019; Reagan et al., 2019). LinkedIn contained a large enough number of members in the software development business. This is often the case. In fact, Leighton et al. (2021) compared studies that used LinkedIn versus multi-sites to recruit and found that multi-sites could be as much as 8% lower in response rates than using only LinkedIn. Comparably, Desroches (2020) used social media and email to recruit nurses for a survey about their emotions toward their work.

In the current study, I determined not to expand beyond LinkedIn to find employed software developers. In addition to individuals who label themselves on their profile as software developers, there are dozens of groups on LinkedIn totaling tens of thousands of members. This

study required a minimum of 119 participants. Other social media outlets were not necessary to recruit enough participants and would only be used if enough participants could not be collected. The results were specific to software developers who have a LinkedIn profile.

The invitation to participate and the link to consent to the survey were posted on social media platforms and taken voluntarily. Using social media to administer a survey to measure the relationship between gratitude and job satisfaction has precedence. Cortini et al. (2019) used Facebook and LinkedIn to post their survey, asking for volunteers using a snowball sampling method. In their mixed-methods study, Cortini et al. (2019) measured the dispositional, collective, and relational gratitude of 96 voluntary participants who accepted the online invitation. This model of gratitude surveys posted on social media served as a significant influence on the design of the present study.

Given its effectiveness, not surprisingly, Cortini et al.'s (2019) study has not been alone in the method among other recent gratitude researchers. Bohlmeijer et al. (2020) also used LinkedIn to acquire participants in the gratitude study. In another study, Patil et al. (2018) also used LinkedIn to distribute their questionnaire measuring 120 adult employees' gratitude and morale at work using a 7-point Likert scale, which was determined to be reliable and valid. Such a data collection method is similar to the present study, which also used LinkedIn to circulate gratitude measures using Likert scales. Moreover, consistent with the present study, Patil et al.'s (2018) participants included employed workers mostly from the software industry (21.6%; p. 26). The similarity is that the target population for the present study was software developers. Patil et al. applied a Pearson's test to find a positive correlation of 0.56 between gratitude at work and their level of job contentment. Comparatively, the present study looked for such a correlation between gratitude at work and job satisfaction among software developers. Therefore,

Patil et al.'s (2018) study provided encouraging evidence that supports the direction of the present study.

The exact number of employed software developers residing in the United States is difficult to determine. First, software developers are often associated with other types of jobs in information technology-related fields. Not to mention, even when drilling down on software developers, there are 303 different industry jobs listed as types of software developers, totaling approximately 1.85 million employed. This does not factor in the number of out-of-work developers, interns, or ones that never get counted for various reasons. Additionally, approximately 189,000 developer job openings fluctuate each year, with an unknown quantity of those being because developers are job hopping, leaving the industry, or even leaving the labor force (U.S. Bureau of Labor Statistics, 2022a, 2022b). The numbers are constantly changing, with a 22% projected increase in software developer jobs by the year 2030. Moreover, software companies and software workers vary in their use of the term software developer, making the size of the U.S.-based software developers even more unclear. In short, the number of software developers in the United States cannot be reliably determined. This fact was taken into consideration for this study. As a result, nonprobability and purposive sampling were chosen as the best path for this study.

The sample could not have represented the demographics of software developers accurately. However, nonprobability was chosen because those participants aware of and available to take the study could participate. The sample was gathered by purposive sampling and secondarily by snowball sampling. By offering this faster method of obtaining more participants, the study maintained its effectiveness in having a cross-sectional snapshot of software developers.

Data Collection

I secured participants for the study only after being given Abilene Christian University's (ACU) IRB approval to conduct the study. I posted the invitation to groups on LinkedIn as well as my personal account. The invitation explained the study's purpose, qualifications, risks, and privacy statements (see Appendix E), followed by the anonymous link they could click. The anonymous link took them to the Qualtrics survey. The first screen they saw asked them two questions that qualified them to participate, followed by the consent form, and finally, qualified and consenting participants continued to the survey.

Data were collected from September 21 to October 21. Qualtrics software powered the survey instrument. Data were collected for an estimated 1 month, at which time the post was taken down, and the link to the survey instrument became inactive. I reposted the survey to the LinkedIn groups and my account every 7 days. The data collected during the time the survey was active was then statistically analyzed using SPSS. The following steps were taken in chronological order:

Before the Study. In preparing for this study, I had already completed a few steps that must be mentioned, especially for researchers interested in repeating this study. On LinkedIn, I searched for groups of software developers. LinkedIn is a social platform in which people can form groups according to their interests. I looked for groups of software developers by using the LinkedIn search bar and filtering for groups only (rather than searching individual accounts). The search results showed groups that used the term "software developer" in their title. My rationale was that groups that center on software development would likely have members who are software developers. Then, I sent direct messages to the group administrators asking for permission to post an invitation to the survey for my dissertation (see Appendix F). The group

administrators permitted me to post the invitation in the group postings (see Appendix F).

Having thus secured an opportunity to reach multiple software developers at once, I waited on ACU IRB approval to post the invitation.

The invitation post explained the study and ended with a link they could click to proceed to the survey. The text of the post explained the following: the purpose, requirements to participate, the benefits and risks, a privacy and anonymity statement, the anonymous link that would take them to the Qualtrics survey, and finally, the post explained the optional raffle. (I offered a guaranteed one in 20 chance, or better, of winning a \$20 gift card, selected at random). Incentives have been a common method of recruiting participants (Gay et al., 2012; Rodriguez et al., 2021). The bottom of the post encouraged people to share it with those they thought might be interested in the study. The full text of the invitation post can be seen in Appendix E.

Finally, there was a statement requesting that people share the invitation on LinkedIn with other people they might know who are software developers and might be interested in participating in this study. Despite the main sampling method being purposive, because I was asking people to share the post with other possible candidates, snowball sampling occurred. By asking participants to share the invitation post with others, it could potentially reach more of the target population (people 18 years of age or older and work as full-time software developers in U.S.-based companies). The text of the post is listed in full in Appendix E.

Participants could voluntarily click on the survey link to enter the survey. The links go to Qualtrics. The first screen asks three questions to determine eligibility (see Appendix G). If they were qualified, they were directed to the electronic consent form. If the participants qualified for the survey, they were taken to the electronic consent form (see Appendix H). The consent form was displayed on the screen for their review. This consent form explained to the participants the

prerequisites to participate, the purpose and potential benefits of the study, what to expect about the nature of the questions asked in the survey, the risks, time commitment, the protected anonymity of participants, and their right to end the survey without finishing at any time.

If participants did not approve their consent, they were deemed ineligible and saw a screen thanking them for their interest in the purpose and potential benefits of the study. These participants were disqualified and unable to proceed beyond that point. On the other hand, if candidates selected the “yes” checkbox of consent, they proceeded as qualified and willing participants in the study.

If they selected to continue with the survey, participants moved to the sections of the survey measuring dispositional gratitude at work (GQ-6 modified), expression of gratitude at work (AIR modified), receipt of gratitude at work (AIR modified), job satisfaction (OJS), and additional gratitude-related questions for descriptive data. The survey ended with the demographics questions. The entire survey can be found in Appendix A.

The participants could edit, pause, or end the survey at any time during the survey, which they were made aware of in the beginning screen. Incomplete entries and entries that were started but never submitted were not used. Once the post was circulated on LinkedIn for the estimated time of 1 month, or until the minimum number of 119 was met, unfinished surveys were eliminated from the data collection process.

Posting the Invitation. First, on July 1, 2023, I posted the invitation to take the survey on my personal LinkedIn account. At the same time that I posted the invitation on my account, I posted the invitation in the four LinkedIn groups that gave me permission to do so: the member of these groups were 528 members, 553 members, 35,846 members, and 872 members. The title of the post read “Software Developer Gratitude: A Dissertation Survey.”

Posting to Groups. Within LinkedIn, the invitation and survey links were posted in software developer groups. The owners or managers of the groups gave me permission to post the survey via direct LinkedIn messaging. I also notified the group administrators in a private message that I had posted it and asked them to share the invitation on their own accounts with software developers they know who might be interested in participating.

The Raffle. After taking the survey, participants had the option to enter a raffle to win a \$20.00 gift card. Qualtrics automated and anonymized the raffle. At the end of the survey, participants can choose to enter a randomized, anonymous raffle by answering this multiple-choice question, “Would you like to enter a raffle for a 20.00 dollar gift card? (Your information is anonymous and WILL NOT BE TIED TO YOUR SURVEY ANSWERS. You will provide an email you want the gift card sent, but not your name.)” There were only two choices, *yes* and *no*. If they selected “no” or left the question blank, they were instead taken to a screen that thanked them for participating that ended the survey.

If they consented to provide an email for the raffle by selecting “yes,” they were taken to another survey independent of the study’s survey, where they entered the email. This happened via an anonymous link that the “yes” answer choice was programmed to send them to, so it is independent of the study’s main survey and their answers to it. In this way, the raffle is completely independent of the study’s survey. The raffle acts as a second survey. In my Qualtrics dashboard, I had a project (survey) titled “Software Developers’ Job Satisfaction and Gratitude Survey” that collected data for the study and another titled “Anonymous Raffle” that only collected anonymous email addresses from anonymous participants voluntarily entering a chance to win a gift card.

The second survey consisted of just one question: “Enter the email to which you’d like your \$20 gift card sent. The email is not tied to your answers to your previous survey answers. You have an estimated 5% chance of winning.” Their names were not collected, just as they were not in the main study’s survey. For the winners to redeem their gift card, Rewards Genius sent them an email with a link that took them to a page of gift card options. Rewards Genius is the gift card management system created by the company Tango Card, which is the option for automated gift card integration in Qualtrics (Qualtrics, n.d.-b). When participants won the raffle (5% chance), they had many options for what kind of card to get, including but not limited to places like Nike, Amazon, Best Buy, Apple, etc. Participants could also choose to split up the winnings between various places. The reward was separate from Qualtrics, and I did not have access to identify those raffle winners. I invested a starting amount of \$360. This amount was enough for 18 winners. Since I told participants they had a 5% chance of winning, I had enough money to accept up to 360 raffle participants, which was more than double the amount of the target minimum of 119 participants for the study. If I ended the survey and collected the results prior to reaching 360, such as once 119 participants took the study’s survey, then more than 5% of participants who chose to enter the raffle could win a gift card.

To execute the raffle, I downloaded a spreadsheet of the emails entered in the raffle. This was downloaded on my password-protected private computer in my office, which is kept locked. The emails downloaded contained no identifying information. I had no way of knowing who the people or emails were, if the emails were even valid, or if I would be able to determine if they even took the study’s survey in the first place.

Then, I randomly selected 5% of the emails on the download. I made a new spreadsheet of this 5% list. I permanently deleted the original from my computer. Next, I uploaded the 5%

spreadsheet of anonymous email addresses into Reward Genius. This company sends an email with the link to the gift card page where they can redeem their \$20 as they desire. Reward Genius does not collect identifying information and has no way of knowing who the people who redeemed the gift cards were. Therefore, the process remains completely anonymous.

Tango Card, the company I used to dispense the gift cards, kept the information private and protected. Tango Card adhered to the data protection laws of the European Union and the United States. The company also handled private information in accordance with the security and privacy provisions of HIPAA and the United States Federal information privacy laws. To maintain the confidentiality of the email data, Tango Card used strong encryption during the processing of information being transmitted.

Tango Card's Reward Genius service had layers of security that protected the emails I uploaded to Reward Genius for gift card redemptions. First, only I was able to log in to my account. Rewards Genius requires a multi-factor authentication (MFA) for me to log in. My phone number is registered to receive a verification code via text message to log in after I have entered my login credentials online. My phone is also password-protected, and only I have the password, which is stored in my human memory. Second, Rewards Genius uses an intrusion detection system. Additionally, Rewards Genius uses a web application firewall. In conclusion, I chose this company to disperse the gift cards because of their high level of protection and security. Using the Tango Card company was also the best way to keep the email addresses completely anonymous during the process of awarding the raffle winners.

Furthermore, the company did not have a way to check whether the emails were used. The service was disconnected from any follow-up to the emails and gift cards. Rewards Genius collected no information from the email addresses. It is a one-way, one-time communication sent

to the blind email addresses. The software that Tango Card developed to perform these tasks was developed by engineers trained in secure coding. During the development lifecycle, the code is subject to threat modeling during design, security testing, and attack surface analysis. In operation, the security monitoring of the software is robust, including monitoring the logs of endpoint, infrastructure, and cloud service logs for anomaly events.

After Rewards Genius sent the gift card links via the anonymized email addresses, I permanently deleted all files related to the email addresses in Qualtrics, downloaded them to my computer, and uploaded them to Rewards Genius. There will be no way to retrieve these email addresses.

Reposting the Invitation. I reposted the invitation on LinkedIn as needed to acquire more participants. I planned to repost the invitation to my account and the two software developer groups in weekly increments. At the end of the planned month-long active survey post, I assessed the number of participants gathered thus far. If the number of participants was below 119 participants, I left it open longer. G*Power 3 (Faul et al., 2007) was used to determine that for a statistical power of at least .05, 119 was the minimum required participants. Therefore, the survey remained active online until the planned month-long window ended or until a minimum of 119 participants had taken the entire survey. If the minimum proved too challenging with the method I had set, my next plan of action was to reach out to more software developer groups to get permission to post the invitation.

Data Storage and Management

Qualtrics software prepared the data for export (n.d.-a). So that the data remains anonymous, IP addresses were not recorded, nor was any data that could identify participants. The data were downloaded onto my password-protected desktop computer at home. This

computer is in my personal office in my house, which I keep locked. These security measures ensured the data were safe.

The data file was exported from Qualtrics by choosing *Export Data with Legacy Format* from the export data options. Then, it was uploaded into SPSS. The data were scrubbed and cleaned using SPSS. Anomalous data were eliminated, including but not limited to surveys that were never completed, completed but mostly unanswered, or straight-lined responses. I checked the time it took for participants to complete the survey to ensure that they had adequate time to read the items rather than speeding to complete items without reading them. I also addressed outlier responses and self-contradictory answers. At this point, analysis of the data occurred. In the interest of data record preservation, this data will not be discarded until at least 7 years later.

Data Assumptions and Analysis

I checked data for the completion of each survey and ensured that a minimum of 119 entries were fully complete. Missing data were handled depending on how much and what kind of data were missing. Then, I relied upon inferential statistics to test if any gratitude predicts job satisfaction among the participants; multiple regression was appropriate when there were multiple independent variables (Laerd Statistics, 2020).

Standard Multiple Regression Procedure. I used SPSS's "Enter" approach to determine what should be part of the final multiple regression model (Laerd Statistics, 2020). This was done by choosing *Analyze-Regression-Linear* from the menu. Dispositional gratitude at work (GQ-6 modified), expression of gratitude at work (AIR, subset I, modified), and receipt of gratitude at work (AIR, subset II, modified) five independent variables, dispositional gratitude at work, expression of gratitude at work to supervisors, expression of gratitude to colleagues, receipt of gratitude from supervisors, and receipt of gratitude from colleagues at work, went in

the independent variables locations. Job satisfaction (OJS, Judge et al., 2000) was the dependent variable and thus would go in the spot for the dependent variable. The data were then ready for me to click *Statistics*.

Assumptions. Because I chose multiple regression to analyze the data, I checked the eight assumptions being made to ensure that multiple regression was an appropriate way to analyze the data (Laerd Statistics, 2020). There is one dependent variable: job satisfaction. Therefore, the first assumption was met: one continuous dependent variable. This study contains three continuous independent variables: dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work. Therefore, the second assumption was met: multiple independent variables. There were six assumptions left to meet: (a) independence of observations, (b) a linear relationship between the dependent variable and each independent variable or the dependent variables and independent variables mutually, (c) data shows homoscedasticity, (d) data does not show multicollinearity, (e) no significant outliers, and (f) residuals have normal distribution.

Independence of Observations. The third assumption to be met in the study stated that the study should have independence of observation (Laerd Statistics, 2020). The assumption tests first-order autocorrelation. Meaning, the errors, which are the adjacent observations, are not independent or correlated (Laerd Statistics, 2020). I tested for independence of observations using the Durbin–Watson statistic in SPSS statistics when conducting the multiple regression model. I selected Durbin–Watson within the Residuals box during the process of running the multiple regression. The results were displayed in the model summary table, displaying a number between 0 and 4. According to Laerd Statistics (2020), if the number is approximately 2, then it can be stated that the residuals were not significantly correlated. Therefore, I determined that the

assumption was met if the Durbin–Watson output number is close to 2. At this point, I moved forward with the addressing the next assumption.

Linear Relationship. There are two parts to this assumption that must be tested. First, there must be a linear relationship between the dependent variable and each independent variable (Laerd Statistics, 2020). The other part to check for this assumption is that there is a linear relationship between the dependent variable and the independent variables collectively (Laerd Statistics, 2020). Visual inspection was used to assess the assumption.

First, I tested the linear relationship between the dependent variable (job satisfaction) and all independent variables collectively (dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work). This required plotting a scatterplot of studentized residuals against predictive values (Laerd Statistics, 2020). To do so, I used the Chart Builder in SPSS statistics, which can be found by clicking Graphs in the menu bar. In the Chart Builder window, under the Gallery tab, I selected Scatter/Dot. Then, I dragged and dropped the Simple Scatter option into the large field in the top right side of the Chart Builder window. The preview pane displayed the Y-axis and X-axis for me to populate. I populated the X-axis by drag-and-dropping the unstandardized predicted values (PRE_1) and the Y-axis with the studentized residuals (SRE_1). I then clicked OK at the bottom of the Chart Builder window. This generated the scatterplot. A horizontal line formation signified that the relationship between the dependent variable (job satisfaction) and the collective independent variables (dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work) was linear. This met the first part of the assumption that the relationships were linear (Laerd Statistics, 2020). I then checked the linearity of the dependent variable with one independent variable at a time.

To check that there was a linear relationship between the dependent variable (job satisfaction) and each independent variable (dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work), with each individually, I used SPSS statistics to create partial regression plots between each pairing with the dependent variable. For example, I looked at a partial regression plot between job satisfaction and dispositional gratitude at work to determine if a linear relationship was present. Then, I did the same except with the next independent variable, expression of gratitude at work. After checking the linear relationship of each of these three sets of partial regression plots and verifying they were linear, I concluded that this part of the assumption was met (Laerd Statistics, 2020). At this point, I moved forward with addressing the next assumption. However, if it did not appear linear, it could be nonlinear, which might be salvageable still by using transformation (Laerd Statistics, 2020). Unfortunately, not all nonlinear relationships can be coaxed into linearity (Laerd Statistics, 2020). If this did not work, I considered a different method of analysis (Laerd Statistics, 2020).

Homoscedasticity. The data must also show homoscedasticity of residuals or equal error variances to meet the assumption of homoscedasticity (Laerd Statistics, 2020). In other words, the residuals are assumed equal for all values of the dependent variable being predicted. I checked this by referring to the plot I created when checking for linearity. It was ready to interpret for homoscedasticity, having already plotted the studentized residuals against the unstandardized predicted values (Laerd Statistics, 2020). I assessed the assumption through visual inspection. The points of the plot should be evenly spread, neither increasing nor decreasing across the predicted values, to meet this assumption. If the points of the plot resemble a funnel shape, a fan shape, or another shape rather than appearing evenly spread, the assumption of homoscedasticity is not met (Laerd Statistics, 2020). Heteroscedastic residuals would need to

be counteracted by either running a weighted least squares regression equation, a regression with robust standard errors, or transforming the dependent variable (job satisfaction; Laerd Statistics, 2020). On the other hand, if I assessed the points on the plot as evenly spread, then the assumption of homoscedasticity was met.

Multicollinearity. The data should not have multicollinearity, meaning independent variables are highly correlated (Laerd Statistics, 2020). The present study's independent variables were three forms of gratitude (dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work). These three forms of gratitude, or gratitude behaviors, were highly related but were distinct constructs (Algoe, 2012; Algoe et al., 2020; Emmons & McCullough, 2004; Fehr et al., 2017; Hori et al., 2020; Kaplan, 2012; McCullough et al., 2002; Walsh et al., 2022; Wood et al., 2010). If the independent variables were highly correlated, a multiple regression analysis might not be able to determine which independent variable most predicts the dependent variable (Laerd Statistics, 2020). To test this assumption, I inspected the correlation coefficients and Tolerance/VIF values. First, I observed the Correlations output table, which I have because I selected the option for Descriptives at the Linear Regression: Statistics dialogue box. If none of the correlations in the independent variables columns of the Correlations table are greater than 0.7, then the correlation coefficients are good. Second, I checked the Tolerance and VIF values by observing the Tolerance and VIF columns in the Coefficients table. The Tolerance values must be greater than 0.1 to qualify as collinearity, thereby meeting the second check for the multicollinearity assumption (Laerd Statistics, 2020). In the case that this assumption is not met, I considered dropping one of the offending variables and rerun all analyses.

Outliers. When conducting standard multiple regression, there should be no significant outliers, leverage, or influential points that impact the regression line (Laerd Statistics, 2020). If they do exist to a significant degree, SPSS statistics could produce a flawed analysis of the predictive accuracy and measure of significance. I detected outliers using casewise diagnostics and studentized deleted residuals (SDR_1). Additionally, I checked for leverage points (LEV_1) and influential points (COO_1).

First, the casewise diagnostics table highlighted standardized residuals that are more than three standard deviations because I had already selected casewise diagnostics (Laerd Statistics, 2020). If any cases were greater than three standard deviations, I addressed these by checking for data entry errors and particular values of the independent variable (Laerd Statistics, 2020). I then examined the studentized deleted residual (SDR_1) column by sorting it by ascending and then descending to look for any case greater and lower than 3 standard deviations. If I found any, I removed the outliers and reran the multiple regression analysis without the outliers.

Because I checked the Leverage value box in the Linear Regression box, I already had the LEV_1. I sort the LEV_1 column in the Data View in descending order. I considered leverage values below 0.2 as safe (Laerd Statistics, 2020). If leverage values were higher than 0.2, I removed them and reran the regression analysis.

I had also already checked the Cook's option in the Linear Regression: Save dialogue box in SPSS statistics, so I sorted this column in descending order (Laerd Statistics, 2020). I investigated any number of one in the COO_1 column. If numbers above one existed in this column, I filtered them out and reran the analysis. I also tried a transformation and reran the regression analysis. Once I confirmed this assumption, with no significant outliers, I proceeded to the next assumption.

Normal Distribution. The residuals (errors) should be reasonably distributed (Laerd Statistics, 2020). I checked this using a histogram and P–P Plot, which is the default analysis, which was automatically already created based on my selections in the Linear Regression: Plots box when running the multiple regression (Laerd Statistics, 2020). I visually inspected the Histogram for approximal distribution to determine that the standardized residuals appear evenly spread (Laerd Statistics, 2020). To confirm, I examined the P–P Plot table, which was produced because I selected it from the Linear Regression: Plots dialogue box (Laerd Statistics, 2020). The points should be aligned along the line. If that was the case, the assumption of normality was considered met. If it was not met, I attempted a transformation on the dependent variable or independent variables, reran the regression analysis, and checked the assumption of normality again.

Analysis. When all assumptions were met, I examined the tables that SPSS statistics created when I ran the multiple regression. Using the tables and data sets, I tested the research question of the study: How do dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work predict job satisfaction among software developers? Laerd Statistics (2020) recommended a three-stage process when analyzing the multiple regression results. First, check that the model itself is a good fit (Laerd Statistics, 2020). Second, understand the coefficients (Laerd Statistics, 2020). Third, use the value of the independent variables (dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work) to make predictions of the dependent variable (job satisfaction).

Regression Model Fit. I evaluated how well the multiple regression model fit for the data. The fit can be measured in several ways, including the multiple correlation coefficient, proportion of variance, statistical significance, and the precision of the model's predictions

(Laerd Statistics, 2020). In the model summary table, I looked at the coefficients (R) in the R column, which measured the strength of the relationship between variables. This value should be between 0 and 1. The closer to 1, the stronger the linear association (Laerd Statistics, 2020). Additionally, I considered the values of the coefficient of determination (R²), which measures the proportion of variance dependent variable that can be explained by the independent variables (Laerd Statistics, 2020). In the present study, this measured the proportion of variance of job satisfaction that could be explained by the gratitude variables. This information is listed in the R Square column of the model summary table. However, since the Adjusted R Square column is considered more accurate, I also considered the values in this column to determine an accurate percentage of the variance of the dependent variable (job satisfaction) that was explained by the independent variables (dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work). The Adjusted R Square value represents the estimated effect size (Laerd Statistics, 2020). Next, I switched tables to view the ANOVA table. I looked at the Sig. column to check the overall statistical significance of the model (Laerd Statistics, 2020). If the value was less than .05 ($p < .05$), it meant there was statistical significance of the overall model (Laerd Statistics, 2020). If this was the case, it meant that the addition of the independent variables led to statistical significance in predicting the dependent variable and a better fit than the mean model. It was then time to analyze the coefficients.

Interpreting the Coefficients. I used the coefficients table in SPSS statistics to interpret the coefficients. The regression equation of this study uses gratitude as an independent variable and job satisfaction as the dependent variable. The regression equation reads like this: predicted job satisfaction (dependent variable) = $b_0 + (b_1 \times \text{dispositional gratitude at work}) + (b_2 \times \text{expression of gratitude at work}) + (b_3 \times \text{receipt of gratitude at work})$. The b_0 represents the

intercept. This was listed on the coefficients table in SPSS statistics under the column named model. The intercept is called constant and should appear at the top of the model column. Its slope coefficient value is on the same line as constant and listed in the B column. In the same row, under the Sig. column, I determined if the intercept was statistically significant if the value was less than 0.05 (Laerd Statistics, 2020). A positive slope coefficient represents a positive relationship between an independent variable and the dependent variable. For example, if an independent variable, such as receipt of gratitude at work, has a positive coefficient value in the B column, then I was able to conclude that receipt of gratitude at work had a positive relationship with job satisfaction. I also considered the 95% Confidence Interval for B (CI) columns in the table, both Lower Bound and Upper Bound, to define a range of plausible values for the slope coefficient (Laerd Statistics, 2020). There was statistical significance if these values of the slope coefficients crossed 0. After the test was completed, the regression equation was completed.

Descriptive Statistics. I reported descriptive statistics of the data from the sample population. This procedure was used to describe the information gathered in the study from the participants (Gay et al., 2012). Descriptive statistics helped prepare for computing relationships (Vogt, 2007). To begin analyzing the results for each variable, I totaled up each scale (GQ-6 modified; AIR modified for supervisors, AIR modified for coworkers, OJS). I calculated frequency and measures of central tendency. The data tables will appear in Chapter 4 of this study.

Cronbach's alphas were calculated for each of the variables to represent each one's level of internal consistency and reliability. The closer the value of Cronbach's alpha was to 1, the more reliable the study's measurements were demonstrated. The scales used in this study for measuring a person's dispositional gratitude at work, expression of gratitude at work, and receipt

of gratitude at work were modified in a novel way. Reporting the reliability of the measures could help future gratitude studies.

Ethical Considerations

This research study considered relevant ethical considerations. First, the online survey instrument used for collecting data from voluntary participants maintained their anonymity. In doing so, the study adhered to the guidelines set by the IRB (Abilene Christian University, 2018, 2022; Aldridge, 2022; CITI Program, 2022; Wassenaar, 2013). Prior to conducting this study, the ACU IRB approved the process, the survey instrument, and the plan for data collection. As a prerequisite for taking the survey, the participants' consent was obtained by their electronic signing of the consent document (see Appendix H). To maintain the proper ethical standards, participants must not feel harassed by researchers to take the survey nor be forced to answer all questions (Privitera, 2018). Included in the viewing of informed consent, participants acknowledged that they entered the survey voluntarily and that they could fully withdraw. Instructions were given for how to exit the survey temporarily. Neither terminating nor pausing the survey had any kind of penalty, of which participants were clearly informed prior to in the informed consent they were required to sign before moving forward with the survey.

This study considered the ethical principles as outlined by the Belmont Report: respect for persons, beneficence, and justice (U.S. Department of Health and Human Services, 1979). In a cross-sectional, survey-based design such as the present study, ethical standards must be upheld during the process of recruiting participants and administering the survey (Adashi et al., 2018; Federal Register, 2017; U.S. Department of Health and Human Services, 1979). The survey design sought to find participants justly, treat them with respect, and limit the risk of harm.

First, the present study respected all persons. Adashi et al. (2018) noted that researchers respect all participants by supporting and protecting the participants' autonomy. All participants were shown respect through using the method of informed consent, voluntary entrance, and the right to competent third-party assistance in taking the survey (Adashi et al., 2018), all of which this study accomplished. Therefore, the present study respected all persons by ensuring that the study methods were not coercive toward volunteers.

Second, the study considered the Belmont Report's principle of beneficence. The Belmont Report defined beneficence as maximizing benefit while also doing minimal to no harm (Adashi et al., 2018; U.S. Department of Health and Human Services, 1979). The risk-benefit analysis of a study should reveal benefits that far outweigh the risk of harm to participants (Adashi et al., 2018; Friesen et al., 2017; U.S. Department of Health and Human Services, 1979). Research that involves a survey instrument given online versus conducting an intervention has minimal risk of harm and could benefit society as a whole (Federal Register, 2017). Moreover, for the present study, which asked questions about participants' positive emotions, there could be a risk of emotional harm, but this was considered to be low risk. The survey asked questions mostly about one's emotional experiences. I minimized this risk by avoiding an experimental design in which participants' emotions are attempted to be manipulated and altered. Furthermore, the risk of emotional harm was minimized by the ability to discontinue the study at any time if they began to feel adverse emotions. The study was online, taken voluntarily, and at the participants' convenience, so emotional harm was also less likely. Participants self-selected where and when to take the survey. This freedom gave them the option to naturally choose a location and time they felt the safest and most secure. Meanwhile, the study aimed to benefit society by providing data about how gratitude experiences could predict job satisfaction. Thus,

the rewards far outweigh the minimal risks of the emotional harm from answering questions about positive emotions that seem unlikely to stir emotional harm in the first place.

I minimized the risk of experiencing negative cognitive effects from participating in the study. This was a nonexperimental study, and thus, it carried none of the emotional risks involved with using people for social science experiments. The study was also cross-sectional, so it had none of the risks related to keeping participants involved in the study past the point of the one survey they took in this study. This study was also quantitative, so the risks associated with interacting with an interviewer over open-ended questions were not present. The instrument was administered without human interaction and taken at a private time in a private place.

Moreover, anonymity was maintained. The privacy and confidentiality of the survey participants were protected using Qualtrics and its features. First is the Qualtrics system itself; Qualtrics's servers are secured by firewalls and an Intrusion Detection System. This prevents access by unauthorized users. The servers and at-rest data are encrypted using Transport Layer Security (TLS).

There is no place to enter a name on the instrument. Since it was posted and shared as a link online, there was no way for anyone else online to determine who had clicked on the link. Even those sharing or reposting the survey to help the sample snowball into more participants, and the profile of these individuals are visible to others online, there was no way for others to determine if the person posting the survey took it themselves. Furthermore, once in the survey, participants, though their identification was already protected, were able to decline to disclose demographic details about themselves in the demographics sections (e.g., "I prefer not to disclose" is an answer to choose on each of these items), and was not identifiable.

Finally, this study considered the ethical principle of justice. The Belmont Report explains justice in research as the effort to treat subjects equally (U.S. Department of Health and Human Services, 1979). A researcher should avoid using disadvantaged populations as subjects based on convenience or ease of manipulability (U.S. Department of Health and Human Services, 1979). Friesen et al. (2017) stated justice should underpin how a researcher obtains participants. The recruitment phase should be carefully reviewed. In the present study, justice was considered in the design of the recruitment of participants. Rather than unjustly targeting vulnerable populations, the selection process of this study relied on people's voluntary entry into the survey instrument. Moreover, the survey was posted openly online so that it could be highly accessible, inclusive, and free of bias, which are traits of research that uphold the ethical standard of justice (Adashi et al., 2018; U.S. Department of Health and Human Services, 1979).

Assumptions

Assumptions were made about how participants self-reported items on the survey instrument. One assumption in this study was that participants who considered themselves software developers per the prerequisite for joining the study and taking the survey were, in fact, software developers. There was no way to verify their job roles beyond their own belief and their honesty in answering. This was an assumption rather than a guarantee because often software developer has been a term interchangeable with jobs that can be technically varied in nature. For example, terms like software programmer, coder, and engineer refer to separate jobs and varied tasks (U.S. Bureau of Labor Statistics, 2022a, 2022b). The assumption was that software developers understand their role as software developers to count as a software developer in the survey. Perhaps their job title or job description, as they understand it, uses the term software developer. On the other hand, perhaps their company considers a person a coder, yet the coder

believes themselves to be a developer as well. Still, another scenario of confusion is perhaps the company they work for sees no difference between a software developer, a coder, a programmer, or an engineer and thus uses the terms interchangeably. In all cases, a software developer was assumed to view themselves as software developers in this study. This is despite the fact that one could argue the drastic difference between what a coder does and what a software developer does in their day-to-day tasks. The questionnaire defined software developer at the beginning but had no way to ensure that one who does more coding than developing chose to participate as a developer. To test the study's hypotheses, which were that forms of gratitude at work predict job satisfaction among software developers, the analysis of the data collected was on a target population. The target population for the present study was employed software developers in the United States, which I targeted through LinkedIn, where profiles, interests, and group membership have been established as related to software development.

An additional assumption made in the study was that the participants had a basic understanding and recognition of gratitude. The participants were assumed to be able to answer questions about how they receive, express, witness, and experience gratitude. Thankfulness and appreciation were assumed to be the basic understanding that participants have for gratitude. This study was based on the frequently cited work of Emmons and McCullough (2003) and McCullough et al. (2002), which deemed gratitude as the positive emotional response from the thoughts of thankfulness and appreciation of intentional and beneficial effort from another agent besides self.

Assumptions were also made that pertain to the method of measuring the variables of the study. To test the hypotheses, I assumed that the scales chosen to measure them accurately measure dispositional gratitude at work (GQ-6 modified), expression of gratitude at work (AIR

modified), receipt of gratitude at work (AIR modified), and job satisfaction (OJS). All scales must demonstrate reliability and validity, or I could not make any determination on the variables' relationships.

Limitations

This study has limitations. First, it is a cross-sectional study. Lau (2017) noted that a cross-sectional survey would only capture the conditions of one moment in time. The survey sent to participants cannot measure possible future levels of gratitude or job satisfaction. Other organizational researchers have noted the same limitation in studies examining gratitude and studies exploring levels of job satisfaction (Fleury et al., 2018; Lin, 2019; Maleka et al., 2019). Fleury et al. (2018) conceded that the cross-sectional methodology of their study was a limitation. The purpose of their study was to determine if team climate impacted job satisfaction (Fleury et al., 2018). As Fleury et al. (2018) stressed, in contrast to their cross-sectional study, a future longitudinal study would better infer the antecedents and benefits directly associated with job satisfaction. The same limitation holds true in this study. However, by capturing this data despite its limitation, software leaders stand to gain more knowledge about improving software developers' job satisfaction and its subsequent benefits ranging from organizational performance and retention rates. Additionally, a cross-sectional approach provided a more cost-efficient method. Most importantly, since the research question was concerned with the relationship between gratitude at work and job satisfaction, a cross-sectional approach was the best methodology. The purpose of the study was not concerned with how the variables change over time, so using a cross-sectional design and surveying participants at a single point was most appropriate.

A second limitation of the study was the self-reporting method of measuring all variables in the study. Self-report instruments are limited because participants' biases could affect the accuracy of the findings (Vogt, 2007). Ford et al. (2018) confessed the self-reporting limitation in their study of episodic anger and gratitude in the workplace. In their study, they measured chronic and episodic gratitude along with seven other variables, all with self-reporting items. They explained that correlations could have been inflated because participants might have had inflated biases about their own positive organizational behaviors. The present study could also have inflated correlations, or deflated correlations for that matter, due to the self-reporting nature of how this study measured its variables. At the same time, the instruments used in this study were chosen for their reliability and strong validity (Gordon et al., 2012; Judge et al., 2000; McCullough et al., 2002). Therefore, self-reporting was sufficient.

A third limitation of the study was that the gratitude scales used to measure dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work were modified to pertain to gratitude while "at work" (which was endorsed by the authors of the original scales). This study is unique in that way. The exact modifications to each scale, the combination of the three types of gratitude, and the double use of the AIR (Gordon et al., 2012) to measure two kinds of relationships is a novel approach to examining workplace gratitude. I did so in the interest of learning more about gratitude at work and the potential new ways to measure it. Few studies have approached the aspects of gratitude at work that this study measured. Therefore, this limitation has the potential to benefit future research in workplace gratitude.

Delimitations

The research plan has delimitations. First, the participants recruited, and the method of doing so, was delimited. The study's research question is concerned with software developers

who are employed full-time within the United States. The target population was particular, thus narrowing the scope of the study. For example, people from a wider range of technology jobs across the world were delimited from participating. Some studies have examined the emotions of IT professionals (Eckhardt et al., 2016; Kurian & Thomas, 2021; McMurtrey et al., 2002; Moquin et al., 2019; Shaikh & Joseph, 2020). Granted, IT and software developer jobs are related. Software developers fall under the umbrella industry of computer and information technology, but other jobs in IT are completely different in tasks, skills, and nature (e.g., tech support, hardware specialist, technology administration, and technology educators and trainers) (U.S. Bureau of Labor Statistics, 2022a, 2022b). Nonetheless, this study focused only on software developers. By delimiting the participants, the study sought to avoid cultural barriers, differences, and work situations that could interfere with the study results. Narrowing the scope in this way maintained a good association between the research question about software developers specifically and those who qualified to participate in the study. As such, the results only draw conclusions and implications for this group of participants.

Moreover, the purposive and snowball sampling on LinkedIn is a method that will delimit by excluding other social platforms where the software developers spend more time on rather than on LinkedIn. I did not post the survey on additional social media outlets such as Facebook, Twitter, and Snapchat. This decision adds the consistency of social media usage among the software developers. Other researchers have used MTurk to recruit participants, but MTurk was not used because there is not an option to select only software developers.

The survey instrument is another delimitation. To measure the study's variables—dispositional gratitude at work, expression of gratitude at work, receipt of gratitude at work, and job satisfaction—this study used the GQ-6 (McCullough et al., 2002), AIR (Gordon et al., 2012),

and OJS (Judge et al., 2000). Various methods of measuring gratitude have surged in recent decades (Araz & Erdugan, 2017; Bernabe-Valero et al., 2020; Gulliford et al., 2013; Lee et al., 2019; Locklear et al., 2020; Morgan et al., 2017; Portocarrero et al., 2020; Spence et al., 2014; Youssef-Morgan et al., 2022). I determined that other scales that measure gratitude did not address the precise variables being measured in this study. The gratitude scales that were used in the present study were chosen based on their reliability and validity, not to mention that they fit this study's research question well and were approved by the authors to modify for the workplace.

For the scope of this study, the OJS (Judge et al., 2000) was chosen to measure job satisfaction, the dependent variable in the study. There are many ways to measure job satisfaction (Brayfield & Rothe, 1951; Buitendach & Rothmann, 2009; Hoff et al., 2020; Judge et al., 1998; Lakatamitou et al., 2020; Lemelle & Scielzo, 2012; Weiss et al., 1967) For example, the Minnesota Satisfaction Questionnaire (MSQ, Weiss et al., 1967) measures job satisfaction with good reliability and is available in the public domain (Gallagher & Lopez, 2019), but it asks participants about 20 aspects of their job that are outside the scope of this study. On the other hand, the OJS (Judge et al., 2000) has been a reliable and valid method used by researchers to measure job satisfaction as an amalgamated construct versus a multi-component measure of job circumstances (Gallagher & Lopez, 2019; Judge et al., 2000; Judge et al., 1998). Being the dependent variable of this study, job satisfaction is best measured as a unitary construct, which is what the OJS (Judge et al., 2000) measures.

Chapter Summary

Summarizing, this cross-sectional quantitative study determined how dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work predict job

satisfaction among software developers. The study employed purposive sampling and snowball sampling on LinkedIn to request qualifying participants. The criteria for eligibility to take the survey were software developers employed full-time by a U.S.-based company. Once prerequisites were met, volunteer participants took a survey comprising survey instruments that measured the independent variables and dependent variables, followed by demographic questions and additional gratitude questions. The five independent variables are dispositional gratitude at work, expression of gratitude at work to supervisors, expression of gratitude to colleagues, receipt of gratitude from supervisors, and receipt of gratitude from colleagues at work. Job satisfaction is the dependent variable. This chapter also made clear the operational definitions of these variables. The instruments used to measure the independent variables were the GQ-6 (McCullough et al., 2002), modified for dispositional gratitude at work, and AIR (Gordon et al., 2012), modified for expression and receipt of gratitude at work. The dependent variable, job satisfaction, was measured with the OJS (Judge et al., 2000). A multiple regression was conducted to analyze the clean and acceptable data since there was more than one independent variable. I checked eight assumptions of running a multiple regression. This chapter detailed how I checked each assumption and the steps I took when an assumption was not met the first time. Cronbach's alpha was calculated to determine the reliability of each instrument. Descriptive statistics calculated the relationship, if any, between the independent variables (dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work) and the dependent variable (job satisfaction). Information about participants' identities was not collected. This chapter outlined steps taken to protect participants' anonymity. I have taken steps to uphold ethics. The research design also addressed the assumptions, limitations, and delimitations of the study.

In the following chapter, I provide a detailed description of the data collection process and the results. Then, Chapter 5 reports the statistical analysis of the collected data.

Chapter 4: Results

The purpose of this study was to explore how dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work predict overall job satisfaction among software developers. The study was a nonexperimental, quantitative, correlational, cross-sectional survey study since this methodology was most suitable to the research question. The research question was: How do dispositional gratitude at work, expression of gratitude at work to supervisors, receipt of gratitude at work from supervisors, expression of gratitude at work to colleagues, and receipt of gratitude at work from colleagues predict job satisfaction among employed U.S.-based software developers?

This chapter presents the findings of the study. First, I present descriptive statistics of the participants, including frequency of age, gender, ethnicity, work history, and details about their workplace. I also present descriptive statistics of the independent variables, dispositional gratitude at work, expression of gratitude at work to supervisors, expression of gratitude at work to colleagues, receipt of gratitude at work from supervisors and receipt of gratitude at work from colleagues, and the dependent variable, overall job satisfaction. I then report the results of assumption testing. The analysis of the multiple regression follows. Finally, I summarize the chapter.

Findings

Summary of Respondents

The population sought for this study was software developers 18 years of age or older and were software developers employed full-time at U.S.-based organizations for at least 6 months. I received ACU's IRB approval to conduct the study on September 18, 2023. The survey was distributed using Qualtrics (see Appendix I) on the social media platform, LinkedIn, from

September 21, 2023, to October 21, 2023. September 21 was National Gratitude Day and October 21 marks 1 month that the survey invitation remained open online in the form of a LinkedIn post.

There were 4,098 responses, but only 146 responses went into the data analysis. After filtering out responses that appeared to be bots, were completed too quickly, or submitted incompletely, 146 participants were used for this study. The minimum required responses sought for this study based on an a priori G-power analysis was 119; therefore, 146 responses were adequate. The next subsection explains in more detail how I filtered the responses from 4,098 likely bad responses to 146 valid, usable participants.

Filtering Out Potentially Bad Data. While the responses were still in Qualtrics, I reduced the number of responses that would be downloaded and used in SPSS (see Appendix I). I did this based on several parameters, including Qualtrics's bot detection system, participants' survey response time, and the completeness of the submission's survey questions. I filtered based on bot detection, time taken to complete the survey, and visual inspection of each survey response. These filters reduced the sample size in an effort to ensure good data.

Descriptive Statistics of Respondents

The last blocks in the 63-item quantitative online survey of the present study were demographic questions. A total of 146 software developers answered the demographic questions. The participants were software developers working full-time for at least 6 months at an organization based in the United States with varying ages, gender, ethnicity, length of time at their current job, length of time as a software developer, size of organization, and industry of organization.

Age. As can be seen in Table 1, 123 of the 146 participants (84.2%) were between the ages of 18 and 39. That makes up most of the participants. There were 17 respondents (11.6%) between the ages of 40 and 49, four (2.7%) participants between the ages of 50 and 59, and two participants (1.4%) 60 years of age or older. A similar age range was reported by Patil et al. (2018) in their quantitative survey that also explored gratitude at work.

Table 1

Age of Participants

Age range	<i>n</i>	%
18–29	52	35.6
30–39	71	48.6
40–49	17	11.6
50–59	4	2.7
60–69	1	0.7
70+	1	0.7
Total	146	100

Gender. As shown in Table 2, 45 participants identified as female (30.8%), and 94 as male (64.4%). The other seven participants did not identify as female or male. One identified as non-binary, five as transgender, and one preferred not to disclose. Similarly, the U.S. Bureau of Labor Statistics (2021) reported that in 2019, only 18.7% of software developers were female.

Table 2*Gender*

Gender	<i>n</i>	%
Female	45	30.8
Male	94	64.4
Non-binary	1	0.7
Transgender	5	3.4
Prefer not to disclose	1	0.7
Total	146	100

Ethnicity. I collected ethnicity data from participants. Most of the participants identified as White (78.1%). According to Zippia (2021), 52.5% of software developers are White, 29.9% are Asian, with each of the other ethnicities less than 9%. As such, the ethnicity of the present study's participants is comparable with the demographics of software developers, both reporting a majority White population (see Table 3).

Table 3*Ethnicity*

Ethnicity	<i>n</i>	%
Asian/American	10	6.8
Asian and White	8	5.5
Black/African American	4	2.7
Black and White	2	1.4
Hispanic/Latino/Latina or Spanish	2	1.4
White	114	78.1
Other	4	2.7
Do not prefer to disclose	2	1.4
Total	146	100

Time at Current Job and as a Software Developer. The survey included two questions about time at their current job and time as a software developer overall. For the most part, the length of time at one's job and time as a software developer were similar. Dissatisfied software developers is a problem that is connected to the need to find ways to improve job satisfaction (Storey et al., 2019), which was the goal of the present study. The first question asked was how long the respondent has been at their current job. One of the requirements for participating in the study was that they needed to be at their place of work for at least 6 months. As shown in Table 4, roughly half of the participants (50.7%) have been with their organization 1 to 5 years. Thirteen percent of respondents answered less than 1 year, 28.8% 6 to 10 years, 6.8% 11–20 years, and only one participant (0.7%) has been at their job over 20 years. The next question

asked about the length of time the respondent has been working as a software developer cumulatively across all places they have worked (see Table 5). Most of the participants (41.8%) have been working as a software developer for 1 to 5 years. Thirteen percent of respondents have been working as a software developer for only 6 months to 1 year, 32.9% answered 6 to 10 years, 11% answered 11–20 years, and 1.4% had been a software developer for over 20 years. Taken together, software developers have been software developers slightly longer than they have worked at their current job, indicating that some churn exists among the respondents, which supports the problem of the present study outlined in Chapters 1 and 2.

Table 4

Overall Time at Current Job

Time at organization	<i>n</i>	%
6 months to 1 year	19	13.0
1 to 5 years	74	50.7
6 to 10 years	42	28.8
11 to 20 years	10	6.8
Over 20 years	1	0.7
Total	146	100

Table 5*Overall Time of Working as a Software Developer*

Time as a software developer	<i>n</i>	%
6 months to 1 year	19	13.0
1 to 5 years	61	41.8
6 to 10 years	48	32.9
11 to 20 years	16	11.0
Over 20 years	2	1.4
Total	146	100

Size of Organization and Industry. I collected information about the respondents' organization. The present study did not target a specific organization or industry. Instead, the requirement to participate was to work for a U.S.-based organization. Participants were asked about the size of their organization (see Table 6). Most respondents (76.7%) worked for a business of 10 to 249 people. Somewhat contrastingly, Zippia (2021) reported that most software developers (52%) work for organizations with 500 employees or less, and the other 48% work at companies with more than 500 employees. The present study had more respondents from smaller companies than the national average.

Table 6*Size of Organization*

Size of organization	<i>n</i>	%
Micro: less than 10 people	5	3.4
Small: 10–49 people	53	36.3
Medium: 50–249 people	59	40.4
Large: more than 250 people	28	19.2
Unsure	1	0.7
Total	146	100

Respondents were also asked about the industry in which they worked as software developers (see Table 7). The industries listed in the question came from the NAICS industry categories, which is the standard used by the U.S. Bureau of Labor Statistics. The participants represented 16 different industries. Most respondents worked in Professional, Scientific, and Technical Services (26%). The second most common answer was Manufacturing (10.3%). Next, the Management and Information industries both had 8.9%. Comparatively, Zippia (2021) reported that most software developers in the United States (56%) work in the technology industry, for example, software companies. The other industries share around the same lower percentage of software developers, as did the respondents in the present study.

Table 7*Industry*

NAICS industry category	<i>n</i>	%
Mining, Quarrying, Oil and Gas Extraction	1	0.7
Utilities	8	5.5
Manufacturing	15	10.3
Wholesale Trade	12	8.2
Retail Trade	6	4.1
Transportation and Warehousing	10	6.8
Information	13	8.9
Finance and Insurance	4	2.7
Real Estate and Rental and Leasing	7	4.8
Professional, Scientific, and Technical Services	38	26.0
Management of Companies and Enterprises	13	8.9
Administrative and Support and Waste Management	1	0.7
Educational Services	1	0.7
Health Care and Social Assistance	6	4.1
Arts, Entertainment, and Recreation	9	6.2
Public Administration	1	0.7
Not Sure	1	0.7
Total	146	100

Descriptive Statistics of Workplace Gratitude

In addition to demographic information, I also collected information about gratitude at work that was descriptive in nature. The Gratitude Survey (Kaplan, 2012) was a seminal survey still referred to by gratitude scholars today to highlight the gratitude gap in the workplace and people's need to feel more appreciated. Therefore, I included similar gratitude questions to help describe gratitude among software developers at work. Other researchers like Beck (2016) have explored the medium through which gratitude is expressed and received in the workplace. Therefore, I also asked that.

Descriptive Statistics for Workplace Gratitude. The survey included 11 descriptive items related to gratitude at work. The items were intended to gather additional information about how software developers experience gratitude at work, including how appreciated they feel and how they experience gratitude at work. Some of the items were derived from the seminal Gratitude Survey (Kaplan, 2012) supported by the John Templeton Foundation, other previous gratitude research about workplace expression and receiving gratitude mediums (Beck, 2016; Cortini et al., 2019), and my own experience working with software developers.

The first item was, "I feel appreciated at work." The only response options were *yes*, *no*, or *neither yes nor no*, which is unique from similar items of the modified AIR appreciation subscales (Gordon et al., 2012). I used to measure receipt of gratitude from supervisors and colleagues (My supervisor/colleagues make sure I feel appreciated). The subscale questions asked about feeling appreciated in specific relationships at work on a 7-point Likert scale. In contrast, the descriptive item is nonspecific to certain relationships. It only asked if they felt appreciated at work. Most respondents (86.6%) feel appreciated, leaving 16.4% of respondents who did not feel appreciated (see Table 8).

Table 8*I Feel Appreciated at Work*

Yes, No, or Neither	<i>f</i>	%
Yes	122	83.6
No	5	3.4
Neither Yes nor No	19	13
Total	146	100

The survey also included gratitude questions about the medium of gratitude exchanges (e.g., expressing gratitude face-to-face, handwritten notes, text messages, etc.). Few studies have collected and compared various mediums of relational gratitude and how workers experience them (Beck, 2016). Therefore, I collected descriptive data about how software developers express and receive gratitude from colleagues and supervisors, as well as what medium (method) of relational gratitude they prefer.

Two items, one pertaining to the respondents' supervisors and one for their colleagues, stated, "I receive gratitude at work most often via..." There were nine response options: face-to-face privately, face-to-face publicly, email, phone, video, text, direct messaging, handwritten note or card, or other (text box). Face-to-face publicly ranked as the most common medium of receiving gratitude at work from supervisors (37.7%) as well as from colleagues (30.1%). The second most common answer for receiving gratitude from supervisors was via email (19.2%), and from colleagues, it was face-to-face privately (23.3%; see Table 9).

Table 9*I Receive Gratitude at Work Most Often via [Medium]*

Medium	Receive from supervisor frequency		Receive from colleague frequency	
	<i>n</i>	%	<i>n</i>	%
Face-to-face privately	27	18.5	34	23.3
Face-to-face publicly	55	37.7	44	30.1
Email	28	19.2	26	17.8
Phone	8	5.5	14	9.6
Video (e.g., Zoom, Teams)	11	7.5	10	6.8
Text	5	3.4	4	2.7
Direct Message (e.g., Google Chat, Slack)	9	6.2	12	8.2
Handwritten note or card	1	0.7	2	1.4
Other (1 blank, 1 “never”)	2	1.4	0	0
Total	146	100%	146	100%

Then, in the same format as the previous question about how they receive gratitude, two survey items asked about mediums in which they express their gratitude to supervisors and colleagues: “I express gratitude at work most often via...” For both supervisors and colleagues, the two highest percentages were the face-to-face items: 31.5% of respondents express gratitude to their supervisors most often via face-to-face publicly, 22.6% of respondents express gratitude to their supervisors most often via face-to-face privately, 34.2% of respondents express gratitude to their colleagues most often via face-to-face publicly, and 18.5% of respondents express

gratitude to their colleagues most often via face-to-face. Handwritten notes or cards were selected most infrequently in both cases (supervisors: 0.7%, colleagues: 1.4%; see Table 10).

Table 10

I Express Gratitude at Work Most Often via [Medium]

Medium	Express to supervisors frequency	%	Express to colleagues frequency	%
Face-to-face privately	33	22.6	27	18.5
Face-to-face publicly	46	31.5	50	34.2
Email	26	17.8	23	15.8
Phone	9	6.2	20	13.7
Video (e.g., Zoom, Teams)	13	8.9	4	2.7
Text	2	1.4	7	4.8
Direct Message (e.g., Google Chat, Slack)	16	11.0	14	9.6
Handwritten note or card	1	0.7	1	0.7
Total	146	100	146	100

In the same format, the survey also included two items asking participants about how they would want to receive gratitude at work from supervisors and colleagues. This is a different question than how they most often receive gratitude. The goal of this question was to find out more about software developers' preferences when it comes to receiving gratitude at work.

Overwhelmingly, the highest percentage of which medium software developers want to receive

gratitude from supervisors (45.9%) and colleagues (40.4%) was “face-to-face publicly” (see Table 11).

Table 11

I Want to Receive Gratitude at Work via [Medium]

Medium	Gratitude from supervisors frequency	%	Gratitude from colleagues frequency	%
Face-to-face privately	20	13.7	19	13.0
Face-to-face publicly	67	45.9	59	40.4
Email	25	17.1	23	15.8
Phone	9	6.2	14	9.6
Video (e.g., Zoom, Teams)	96	4.1	9	6.2
Text	5	3.4	2	1.4
Direct Message (e.g., Google Chat, Slack)	7	4.8	13	8.9
Handwritten note or card	6	4.1	6	4.1
Other	1	0.7	1	0.7
Total	146	100	146	100

In total, the six survey items about the medium in which software developers express, receive, and want (prefer) to receive gratitude from supervisors and colleagues provided descriptive data separate from the survey’s gratitude scales. One theme of the responses in the sections turned out to be that face-to-face gratitude exchanges were the most common and most

preferred. Table 12 shows a side-by-side comparison of how they receive gratitude versus how they desire to receive gratitude from supervisors and colleagues.

Table 12

Mediums of Receiving Gratitude Compared to How They Want to Receive Gratitude

Medium	Receive (Sup) <i>n</i>	Receive (Sup) %	Want (Sup) <i>n</i>	Want (Sup) %	Receive (Col) <i>n</i>	Receive (Col) %	Want (Col) <i>n</i>	Want (Col) %
Face-to-face privately	27	18.5	20	13.7	34	23.3	19	13.0
Face-to-face publicly	55	37.7	67	45.9	44	30.1	59	40.4
Email	28	19.2	25	17.1	26	17.8	23	15.8
Phone	8	5.5	9	6.2	14	9.6	14	9.6
Video (e.g., Zoom, Teams)	11	7.5	96	4.1	10	6.8	9	6.2
Text	5	3.4	5	3.4	4	2.7	2	1.4
Direct Message (e.g., Google Chat, Slack)	9	6.2	7	4.8	12	8.2	13	8.9
Handwritten note or card	1	0.7	6	4.1	2	1.4	6	4.1
Other	2	1.4	1	0.7	0	0.0	1	0.7
Total	146	100	146	100	146	100	146	100

Number of Times That Gratitude is Expressed and Received at Work. The survey also included two items about how often respondents express and receive gratitude at work. The items were “How often do you express gratitude to your supervisor?” and “How often do you express gratitude to your colleagues?” As shown in Table 13, the frequency of expression to supervisors selected most often by participants was “At least once per month” (35.6%). The frequency of expression of gratitude to colleagues selected most often by participants was “Several times per week” (38.4%). The least common answers to these questions were “Once per year” (supervisors: 4.8%, colleagues: 4.8%) and “Never” (supervisors: 3.4%, colleagues: 1.4%).

Table 13

How Often Do You Express Gratitude to Your Supervisor/Colleagues

Response	Express to supervisor	%	Express to colleagues	%
Once or more times per day	13	8.9	20	13.7
Several times per week	34	23.3	56	38.4
At least once per month	52	35.6	31	21.2
A couple of times per year	34	23.3	30	20.5
Once per year	7	4.8	7	4.8
Never	5	3.4	2	1.4
(Did not answer)	1	0.7	0	0.0
Total	146	100	146	100

Having a More Grateful Boss. The survey included two hypothetical questions about a more grateful boss. These two items were taken directly from the John Templeton Foundation’s seminal Gratitude Survey (Kaplan, 2012). The first item was, “If my boss were more grateful, I

would feel better about myself” (Kaplan, 2012, p. 14). The second item was, “If my boss were more grateful, I would work harder” (Kaplan, 2012, p. 14). Both item responses were on a 7-point Likert scale from *strongly disagree* to *strongly agree*. Most respondents answered they would feel better about themselves if their boss were more grateful. The highest percentage of respondents answered *agree* (61%) and *strongly agree* (26.7), while only a total of 6.2% answered below neutral (*slightly disagreed*, *disagreed*, and *strongly disagreed*). In parallel, most respondents would work harder if their boss were more grateful. The highest percentage of respondents answered *agree* (30.1%) and *strongly agree* (29.5%), while a total of 7.2% answered below neutral (*slightly disagree*, *disagree*, and *strongly disagree*; see Table 14).

Table 14

If My Boss Were More Grateful, I Would Feel Better/Work Harder

Response	Feel better		Work harder	
	<i>n</i>	%	<i>n</i>	%
Strongly Disagree	2	1.4	0	0.0
Disagree	4	2.7	7	4.8
Slightly Disagree	3	2.1	4	2.7
Neutral	10	6.8	16	11.0
Slightly Agree	27	18.5	32	21.9
Agree	61	41.8	44	30.1
Strongly Agree	39	26.7	43	29.5
Total	146	100	146	100

Gratitude Descriptive Data Summary. Taken together, this section of the survey items offered descriptive data about workplace gratitude. Questions were inspired by previous gratitude research. To name a few, I gathered my ideas from the John Templeton Foundation's Gratitude Survey (Kaplan, 2012), Beck's (2016) work on relational gratitude mediums at work, Cameron's (2012, 2021) research on positive culture, and Morgan et al.'s (2017) workplace gratitude scale. To summarize the descriptive data, over half of participants (68.5%) *agree* or *strongly agree* that they would feel better about themselves with a more grateful boss, and over half of participants (59.6%) *agree* or *strongly agree* that they would work harder for a more grateful boss.

Descriptive Statistics of Variables

I ran descriptive statistics on the five independent variables and the dependent variable. Additionally, I added expression of gratitude and receipt of gratitude into one variable to represent relational gratitude for supervisors and then colleagues. I added to two subsets of the AIR scale (Gordon et al., 2012) together to form the full AIR (Gordon et al., 2012) score, though only the subsets were used in the study's model. Doing so resulted in two additional variables: relational gratitude at work with supervisors and relational gratitude at work with colleagues. Table 15 represents the descriptive statistics.

Table 15*Descriptive Statistics of Variables*

Variables	<i>N</i>	Min	Max	<i>M</i>	<i>SD</i>	Skewness	Kurtosis
Overall Job Satisfaction*	146	6	35	24.31	4.490	.095	1.375
Dispositional Gratitude at Work**	146	17	41	29.36	4.896	.200	-.623
Relational Gratitude at Work with Supervisors	146	32	100	73.61	9.889	-.288	2.479
Expression of Gratitude at Work to Supervisors**	146	25	55	41.14	5.320	-.107	.702
Receipt of Gratitude at Work from Supervisors**	146	7	49	32.46	5.511	-.467	3.088
Relational Gratitude at Work with Colleagues	146	57	112	76.02	9.287	.629	.784
Expression of Gratitude at Work to Colleagues**	146	30	63	42.80	5.539	.588	.450
Receipt of Gratitude at Work from Colleagues**	146	21	49	33.2192	4.62302	.264	.546

Note. * indicates a dependent variable; **indicates an independent variable

Per the original authors of the scales (Gordon et al., 2012; McCullough et al., 2002), higher scores on the scales represent higher levels of the variable that the scale is measuring (i.e., higher overall job satisfaction, dispositional gratitude at work, expression of gratitude at work to supervisors, expression of gratitude at work to colleagues, receipt of gratitude at work from supervisors, and receipt of gratitude at work from colleagues). Though not a variable in the present study, the same is true for relational gratitude; according to the AIR scale (Gordon et al.,

2012), higher scores represent higher levels of gratitude in relationships as perceived by how a person both expresses and receives gratitude from the other person (relational gratitude). I will discuss each variable. I describe the mean scores as low, low–medium, medium, medium–high, and high. For example, I describe scores that were slightly above mid-range, such as a mean score of 24.31 on a possible 5–35 score range, as medium–high.

As shown in Table 15, participants tended to report that their job satisfaction and gratitude experiences were mostly at medium–high levels. Notably, on the 7-point Likert scale, wherein the higher score signifies more of the variable, participants' scores tended to be located toward the higher end of the range versus low levels of gratitude and job satisfaction. Previous uses of the present study's scales had similar results with other populations. More specific variations are discussed.

Overall Job Satisfaction. Overall job satisfaction was measured using the five-item OJS scale (Judge et al., 2000; Judge et al., 1998), with each item on a 7-point Likert scale. The scales have two reverse-scored items. The score range is 5 to 35, with the higher score indicating higher levels of job satisfaction. The mean score of the sample was 24.31, which registers as a medium–high level of job satisfaction.

When Judge et al. (1998) created the scale, they used a sample of 222 college students. That is a similar sample size to the present study ($N = 146$). Their results also showed a medium level of job satisfaction. When Judge et al. (1998) reported the mean score, they used the average score of items. A 6.99 average single score of the sample was taken by averaging the total score from their five questions on a 10-point Likert scale. An average of 6.99 was closer to the maximum 10, indicating a medium–high level of job satisfaction among their sample. Furthermore, the mean score of the present study ($M = 24.31$, $SD = 4.490$) is almost the same as

it was in another one of the first studies to use the OJS ($N = 384$, $M = 25.88$, $SD = 6.89$; Judge et al., 2000). However, the present study's sample was unique; it had 146 software developers and was the first to use OJS (Judge et al., 2000; Judge et al., 1998) with this population.

Dispositional Gratitude at Work. Dispositional gratitude at work represents an independent variable in the survey. Dispositional gratitude at work was measured using the GQ-6 scale (McCullough et al., 2002) modified to pertain to the workplace. The scale is six questions, including two reverse-scored items on a 7-point Likert scale. The possible scores on the scale ranged from 6 to 42, with a higher score indicating higher levels of dispositional gratitude at work. The exact middle or medium level would be 21. As noted earlier, the mean score of the sample was 29.36, which indicated a medium-high level of dispositional gratitude at work.

Previous authors have reported similar mean scores (McCullough et al., 2002; Unanue et al., 2021). When discussing the mean scores, some researchers have reported the mean score as an average of a single-item score, whereas I report the mean score of the total of all items. As I discuss the mean scores of other past studies, I will also multiply the score by six to better understand and compare the present study's mean score.

The authors of the GQ-6 (McCullough et al., 2002) administered the GQ-6 to a sample of undergraduate psychology students ($N = 156$), which was similar in size to the present study's sample ($N = 146$). The mean score of their sample was slightly higher ($M = 5.82$; When multiplied by six questions, it would be 34.92) than the present study's sample ($M = 29.36$). In a more recent study of gratitude at work, Unanue et al. (2021) also modified the GQ-6 to pertain to the work context. In their study of 1,841 Chilean workers, the mean score of the sample ($M = 5.09$; When multiplied by six questions, it would be 30.54) was almost the same mean score as

the present study's sample ($M = 29.36$; when divided by six questions like the other studies, it would be 4.8933).

Expression of Gratitude at Work to Supervisors and Colleagues. Expression of gratitude at work to supervisors and colleagues were two independent variables in the survey. I used the appreciative subscale of the AIR scale twice (Gordon et al., 2012). I modified the subscale to pertain to the participants' boss/supervisor, and I modified the scale a second time to pertain to colleagues. There are nine items on a 7-point Likert scale. The score range is 9 to 63, with higher scores representing higher levels of one's expression of gratitude to supervisors and colleagues (i.e., appreciativeness; socially expressed gratitude). As noted earlier, the mean score for expression of gratitude to supervisors was 41.14, and the mean score for expression of gratitude to colleagues was 42.80. The scores were strongly similar, both indicating medium–high levels of expression of gratitude at work.

In the study that established the AIR scale (Gordon et al., 2012), the mean score was 5.60, and then 5.31 in a 9-month follow-up. These mean scores were the average answer of a single item from the scale. Therefore, to compare to the mean total score of the present study, I multiplied Gordon et al.'s (2012) mean scores by nine, which would equal 50.4 for the first round and 47.79 for the follow-up. The mean score of the present study's population (supervisors = 41.14, colleagues = 42.80) reported slightly lower levels of expression of gratitude than Gordon et al.'s (2012) study. Their study had a sample size of 99 adults, which is close to the present study's sample size of 146 software developers. However, the target population of the present study was different. The present study examined work relationships rather than romantic relationships and software developers rather than adult college students.

Receipt of Gratitude at Work From Supervisors and Colleagues. Receipt of gratitude at work from supervisors and colleagues were two independent variables in the survey. I used the appreciated subscale of the AIR scale twice (Gordon et al., 2012). I modified the subscale to pertain to the participants' boss/supervisor, and I modified the scale a second time to pertain to colleagues. There are seven items on a 7-point Likert scale. The score range is seven to 49, with higher scores representing higher levels of one's receipt of gratitude (i.e., feeling appreciated; socially received expressions of gratitude from others). As noted earlier, the mean score for receipt of gratitude from supervisors was 32.46, and the mean score for receipt of gratitude from colleagues was 33.2192. The scores were strongly similar, both indicating medium–high levels of receipt of gratitude at work.

In the study that established the AIR scale (Gordon et al., 2012), the mean was 5.36, and then 5.09 in a 9-month follow-up. These mean scores were the average answer of a single item from the subscale scale. In contrast, I used the average score of the total of all seven items of the subscale. There are seven items in total. Therefore, to understand and compare to the mean total score of the present study, I multiplied Gordon et al.'s (2012) mean scores by seven, which would equal 37.52 and 35.63. Comparatively, the mean score of the present study's population (supervisors $M = 32.46$; colleagues $M = 33.2192$) reported slightly lower levels of receipt of gratitude than Gordon et al.'s study. Their study had a sample size of 99 adults, which is close to the present study's sample size of 146 software developers. However, the target population of the present study was different. The present study examined work relationships rather than romantic relationships and software developers rather than adult college students.

Relational Gratitude at Work to Supervisors and Colleagues. Relational gratitude at work was not an independent variable in the present study. However, because I measured

expression of gratitude at work and receipt of gratitude at work with the two subscales that form the AIR scale (Gordon et al., 2012), I included the total AIR scale in the descriptive statistics. The total AIR scale is labeled as relational gratitude, as it represents the social exchanges of expression and receiving gratitude. The possible score ranges from 16 to 112, with the higher score representing higher levels of relational gratitude (i.e., appreciation in relationships). As noted earlier, the sample reported a medium–high level of relational gratitude at work among people at work (supervisors, $M = 73.61$; colleagues, $M = 76.02$). However, appreciation in relationships with colleagues ($M = 76.02$) had a slightly higher mean score than supervisors ($M = 73.61$), indicating higher levels of relational gratitude with colleagues. Even though relational gratitude was not measured as an independent variable, using the two subscales of the AIR scale to measure expression of gratitude and receipt of gratitude provided consistency among scales used to measure these separate but linked forms of social, relational gratitude among software developers at work.

Testing Reliability of the Scales

I tested all scales used in the study for reliability. All the scales in the present study were chosen in large part because they had shown good reliability and validity. However, I applied the scales in unique ways. I modified all the scales I used to measure the gratitude independent variables. Additionally, I applied the scales with software developers, a different population. The results showed less reliability than previous studies but overall acceptability.

New Modifications of the Scales. I applied all the scales in the study in novel ways. The OJS (Judge et al., 1998) was used to measure overall job satisfaction, the dependent variable. I used this scale with software developers, which had not been done in prior research. The GQ-6 (McCullough et al., 2002) was used to measure dispositional gratitude at work, one of the

independent variables in the study. The scale was modified to pertain exclusively to the workplace in a new way. The AIR scale (Gordon et al., 2012) was used twice to measure expression of gratitude and receipt of gratitude, being modified to pertain to participants' supervisors and then again to their colleagues.

Reliability of Scales. To test the reliability of the scales, I used SPSS to run Cronbach's alpha on each scale. It measures internal consistency (Laerd Statistics, 2020). Cronbach's alpha is appropriate when a survey contains several scales that measure items on Likert scales. Generally, a good level of reliability is .7 or above. In the present study, the results of the test for internal consistency were less than desired. I discuss possible reasons.

I ran Cronbach's alpha for each scale. The Cronbach's alpha of the OJS (Judge et al., 1998) was .69, indicating acceptable reliability. The Cronbach's alpha of the modified GQ-6 (McCullough et al., 2002) was .68, indicating acceptable reliability. The Cronbach's alpha of the modified subscales of AIR (Gordon et al., 2012) indicated mixed results of reliability. The modified subscale of AIR that measured participants' expression of gratitude at work to supervisors ($\alpha = .45$) indicated poor reliability. The result of the modified subscale of AIR that measured participants' receipt of gratitude at work from supervisors ($\alpha = .70$) indicated acceptable reliability. The result of the modified subscale of AIR that measured participants' expression of gratitude at work to colleagues ($\alpha = .62$) indicated poor reliability. Finally, the result of the modified subscale of AIR that measured participants' receipt of gratitude at work from colleagues ($\alpha = .56$) indicated poor reliability. These results do not necessarily convey strong reliability. However, according to Dunn et al. (2014), one of Cronbach's alpha's has underlying properties as a tau-equivalent (true-score equivalent) model that could render it less accurate in some situations. For example, one property of the model is that the items should have

a level of sensitivity as seen in their mean scores (Dunn et al., 2014). In the present study's results, the reverse-scored items tended to have lower means than the regularly scored items. That could have deflated the final internal consistency.

Even though the Cronbach's alpha values did not indicate good reliability of the modified scales used in the present study's survey of software developers, it does not mean the scales are unreliable (Field, 2009; Laerd Statistics, 2020). Notably, in the case of each scale, the reverse-scored items lowered the Cronbach's alphas, which could indicate a coding error or other underlying issue with data, survey design, or simply poor modifications for the population and their work relationships that were measured. On the other hand, it could indicate participants' test fatigue or test bias, which is why reverse-scored items are used in social science (Black, 2009; Field, 2009; Laerd Statistics, 2020; Nardi, 2018). One way I could improve the alpha is to delete the reverse-scored items (Vogt, 2007). However, I retained all items to keep the scales as close to the original, unmodified versions as possible. As discussed in Chapter 3, GQ-6 (McCullough et al., 2002), AIR (Gordon et al., 2012), and OJS (Judge et al., 1998) had shown good reliability in previous studies.

Hypothesis Testing Assumptions

As stated in the previous chapter, I tested eight assumptions of the multiple regression analysis. The assumptions, including normality, linearity, homoscedasticity, and multicollinearity, were met. Therefore, I can support the accuracy of my predictions and test the hypothesis. In this section, I report on the assumptions and explain how they indicated that the multiple regression of the data set I ran could be used to test the hypothesis.

Assumption of Variables. The first two assumptions were met based on the study's design. There was one continuous dependent variable and five independent variables. In SPSS, I

set the variables to scale variables. Therefore, a multiple regression is the correct statistical test (Laerd Statistics, 2020) to explore how dispositional gratitude at work, expression of gratitude at work to supervisors and colleagues, and receipt of gratitude at work from supervisors and colleagues predict overall job satisfaction among software developers working full-time for a U.S.-based organization. Six more assumptions depend on the multiple regression's output. In the following subsections, I discuss these six assumptions: independence of variables, linear relationships between variables, homoscedasticity, multicollinearity, outliers, leverage points and influential points, and normal distribution of residuals (Laerd Statistics, 2020).

Assumption of Independence of Observation. To test the assumption of independence of observation, I used the Durbin–Watson statistic as part of the multiple regression analysis in SPSS. A Durbin–Watson output of approximately two is ideal to represent there is no correlation between residuals (Laerd Statistics, 2020). The Durbin–Watson score can range from 0 to 4, but ideally, to meet the assumption, it would be close to 2. There was independence of variables as assessed by the Durbin–Watson statistic of 1.745. Therefore, the assumption of independence of observation was met (see Table 16).

Table 16

Model Summary^b

Model	<i>R</i>	<i>R</i> Square	Adjusted <i>R</i> Square	<i>SE</i> of the Estimate	Durbin–Watson
1	.727a	.528	.512	3.138	1.745

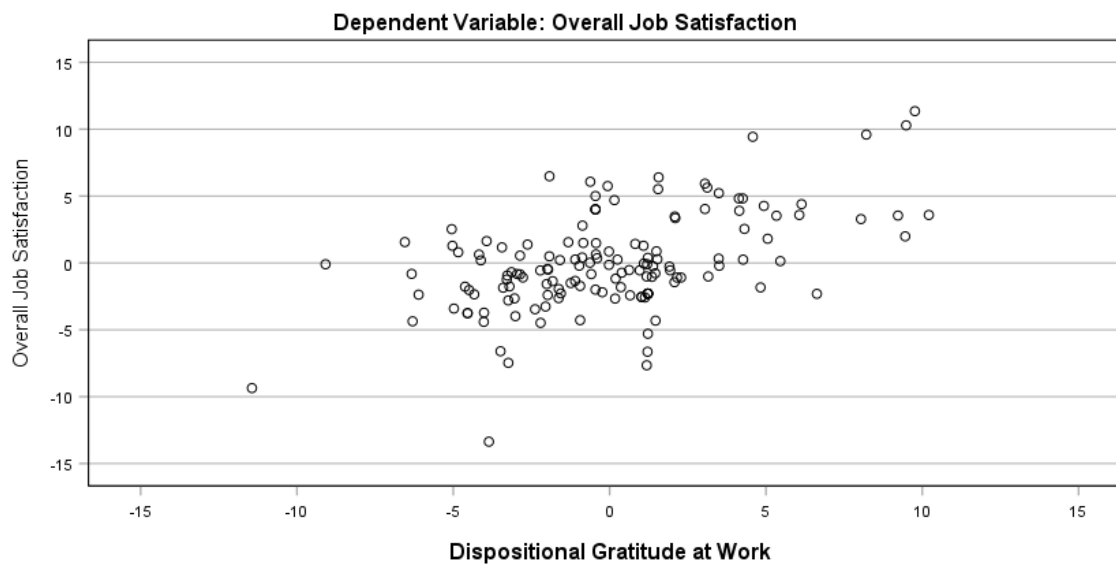
Note. a. Predictors: (Constant), Receipt of Gratitude at Work to Colleagues, Dispositional Gratitude at Work, Expression of Gratitude at Work to Supervisors, Receipt of Gratitude at Work to Supervisors, Expression of Gratitude at Work to Colleagues

b. Dependent Variable: Overall Job Satisfaction

Assumption of Linearity and Homoscedasticity. Another assumption for a multiple regression model is linearity between the single independent variables and the dependent variable and linearity between the collective variables and the dependent variable. To test for linearity between an independent variable and the dependent variable, I used a partial regression plot. I did this for each independent variable separately, which produced a total of five scatterplots since there are five independent variables in this study: dispositional gratitude at work, expression of gratitude at work to supervisors, expression of gratitude at work to colleagues, receipt of gratitude at work from supervisors, and receipt of gratitude at work from colleagues. The dependent variable is overall job satisfaction in each scatterplot. I tested for linearity between the collective variables and the dependent variable using a scatterplot of the studentized residuals against the unstandardized predicted values. To meet the assumption of linearity, I looked for a linear shape on the partial scatter plots (Laerd Statistics, 2020). The following partial regression plots in Figure 2 through Figure 6 show linearity for every independent variable on the X-axis and dependent variable on the Y-axis. Therefore, the assumption of linearity is met for all scales used for the gratitude independent variables and the dependent variable, overall job satisfaction (i.e., dispositional gratitude and overall job satisfaction, the expression of gratitude at work to supervisors and overall job satisfaction, the receipt of gratitude at work from supervisors and overall job satisfaction, and expression of gratitude at work to colleagues and overall job satisfaction, and receipt of gratitude at work from colleagues and overall job satisfaction). Furthermore, as evidenced by visual inspection, the partial regression scatter plots of the variables demonstrate that there are no funnel shapes, and therefore, the assumption of homoscedasticity has been met.

Figure 2

Partial Regression Plot: Independent Variable (GQ-6)

**Figure 3**

Partial Regression Plot: Independent Variable (AIR Subscale, Expression to Supervisors)



Figure 4

Partial Regression Plot: Independent Variable (AIR Subscale, Receipt From Supervisors)

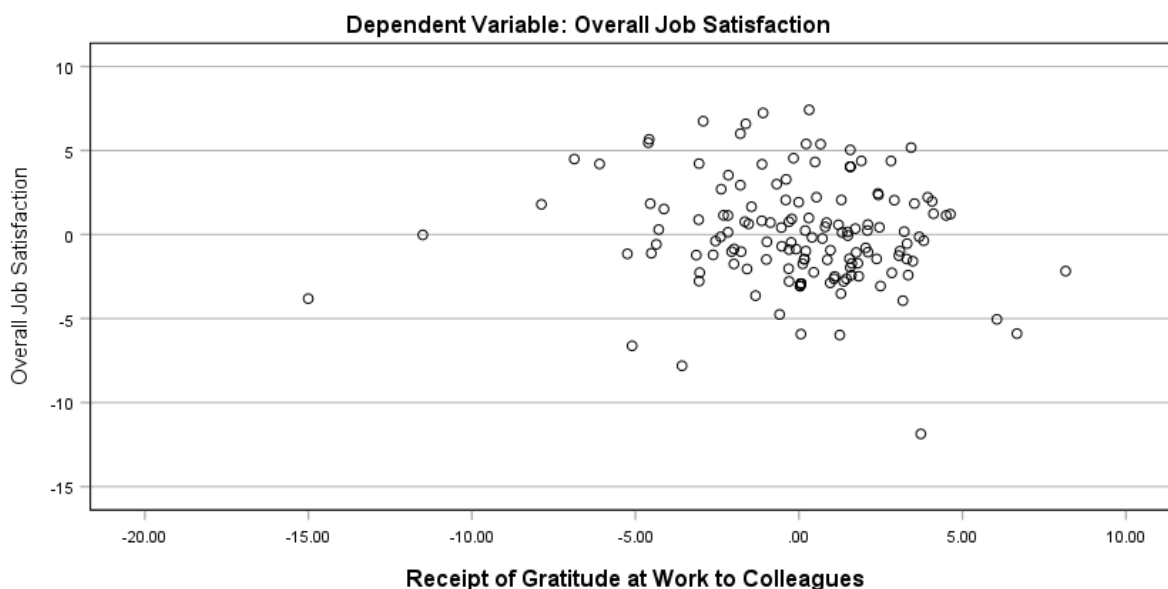
**Figure 5**

Partial Regression Plot (AIR Subscale, Expression to Colleagues)



Figure 6

Partial Regression Plot (AIR Subscale, Receipt From Colleagues)



Assumption of Multicollinearity. The assumption of multicollinearity states that two or more independent variables should not be highly correlated with each other (Laerd Statistics, 2020). This could lead to a faulty interpretation of how each independent variable correlates with the dependent variable. For example, in the present study, dispositional gratitude at work was not highly correlated with receipt of gratitude at work, and this meets the assumption of (no) multicollinearity. Overall, there was no significant multicollinearity. I determined this by inspecting the correlation coefficients and Tolerant/VIF values. As seen in Table 17, there were no Pearson correlation coefficients higher than .7 among independent variables (OJS, GQ-6, AIR Exp. Sup, AIR Rec. Sup, AIR Exp. Coll., AIR Rec. Coll.).

Table 17*Correlation Matrix*

Traits	OJS (Y)	GQ-6 (X ₁)	AIR Exp. Sup (X ₂)	AIR Rec. Sup (X ₃)	AIR Exp. Coll. (X ₄)	AIR Rec. Coll. (X ₅)
OJS (Y)	---					
GQ-6 (X ₁)	.697*	---				
AIR Exp. Sup (X ₂)	.544	.569	---			
AIR Rec. Sup (X ₃)	.493	.540	.666	---		
AIR Exp. Coll. (X ₄)	.467	.551	.614	.490	---	
AIR Rec. Coll. (X ₅)	.377	.506	.566	.614	.668	---

Note. * indicates an extremely significant correlation ($p < .001$); no asterisk indicates no significant correlation. There is no comparative significance between same data, --- is used to fill the gap.

More importantly, I consulted the Tolerance and VIF values in the Coefficients table under the collinearity statistics section of the table from the output. Since the VIF is simply the reciprocal of Tolerance, I used the Tolerance column first, with no need to go further. I created a table to isolate the Tolerance and VIF. As seen in Table 18, the Tolerance value of each variable exceeds .1 (the lowest is Expressed Gratitude to Supervisors at .430); therefore, the assumption of multicollinearity has been met.

Table 18*Variance Inflation Factor (VIF)*

Independent variables	Tolerance	VIF
Dispositional Gratitude	.576	1.737
Expressed Gratitude to Supervisors	.430	2.325
Receipt of Gratitude from Supervisors	.453	2.206
Expressed Gratitude to Colleagues	.446	2.241
Receipt of Gratitude from Colleagues	.443	2.256

Assumption of No Significant Outliers, High Leverage Points, or Highly Influential Points. Outliers, leverage, and influential points identify unusual data points (Laerd Statistics, 2020). When this assumption is met, as it was in the present study, a multiple regression output can have more predictive accuracy and statistical significance (Laerd Statistics, 2020). First, I inspected the Casewise Diagnostics table, as seen in Table 19.

Table 19*Casewise Diagnostics^a*

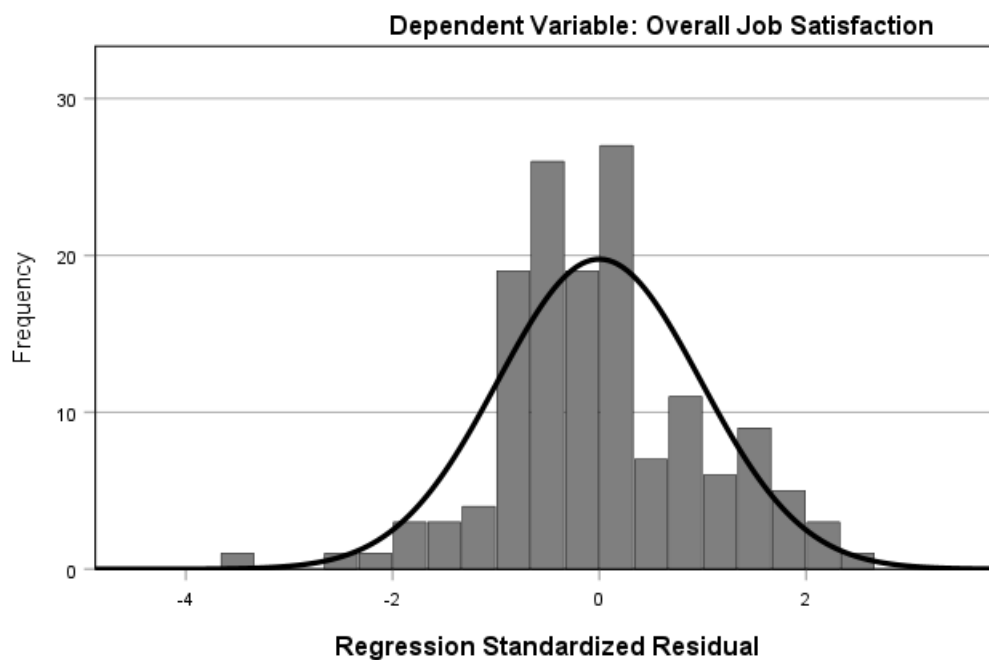
Case number	Std. residual	Overall job satisfaction	Predicted value	Residual
126	-3.634	6	17.40	-11.401

Note. a. Dependent Variable: Overall Job Satisfaction

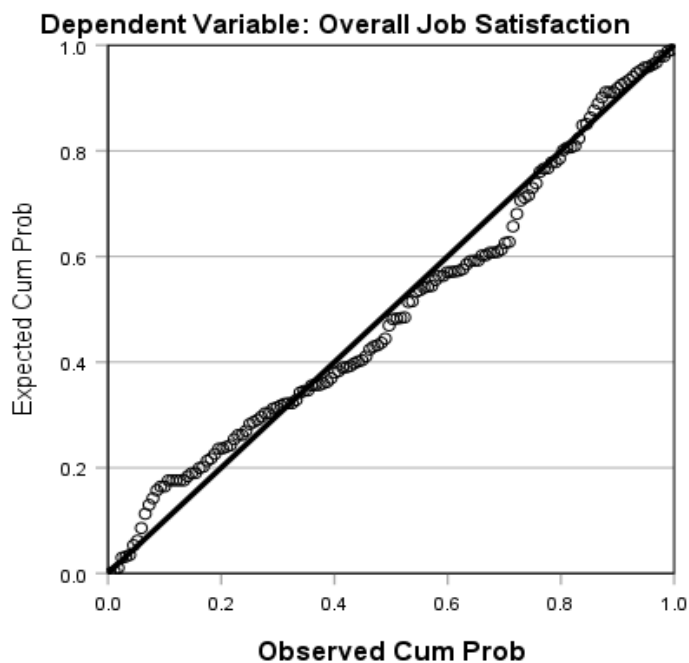
The table contains one case (case number 126) that has a standardized residual of -3.634, a predicted value of 17.40, and an observed value of 6, which is an error in prediction of -11.401. It is an outlier because it is greater than plus or minus 3 standard deviations. However, I did not

remove the case and rerun the multiple regression because the standardized residual was only slightly greater than minus three (-3.634), so I judged this case not to be a significant outlier. I then checked the data for high leverage points. According to Laerd Statistics (2020), values of less than 0.2 are considered safe, but values of 0.5 and above are high. To check this, I inspected the column appearing as Lev_1 on the standard multiple regression data set. There was one case (case number 16) with a value higher than 0.2, and this case had a value of .29036, which is far closer to the safe rule of thumb value of 0.2 than the dangerous zone of 0.5. Therefore, I determined there were no significantly higher leverage points. I then checked for influential points by examining the Cook's Distance values column (titled COO_1 on the data set) on the data set that was created when I ran the multiple regression. There were no values greater than one and no values greater than .10334. Putting it all together, the assumption of no significant outliers, high leverage points, and influential values was met.

Assumption of Normality. The residuals should be normally distributed to determine statistical significance (Laerd Statistics, 2020). An assessment of normality has two approaches. One is numerical, and the other is graphic representation. To determine if this assumption was met, I visually inspected the histogram with a superimposed normal curve and a P-P plot that was created automatically upon running the multiple regression. I concluded that the standardized residuals appeared to be approximately normally distributed. Notably, the standard deviation listed at the top right of the histogram has a value of 0.983 and the mean has a value of $1.26E-15$. Since these values are approximately close to 0 and 1, these values also support a normal distribution. However, to further confirm a normal distribution, I inspected the P-P plot. I determined that, visually, the residuals clearly followed the diagonal line. Therefore, the assumption of normality was met (see Figures 7 and 8).

Figure 7*Histogram of Variables*

Note. $M = 1.26E-15$; $SD = 0.983$; $N = 146$

Figure 8*Normal P-P Plot of Regression Standardized Residual: Dependent Variable*

Summary of Assumptions. In summation, all eight assumptions that must be met for a multiple regression test were met for the present study. In other words, the study design and nature of the data show that the multiple regression I ran was appropriate. In the next subsection, I recall the hypothesis of the present study and then analyze the multiple regression.

Hypothesis Testing

The aim of running a multiple regression on the data set was to explore the study's research question and test the hypothesis:

RQ1: How do dispositional gratitude at work, expression of gratitude at work to supervisors, receipt of gratitude at work from supervisors, expression of gratitude at work to colleagues, and receipt of gratitude at work from colleagues predict job satisfaction among employed U.S.-based software developers?

H1₀. Dispositional gratitude at work, expression of gratitude at work to supervisors, receipt of gratitude at work from supervisors, expression of gratitude at work to colleagues, and receipt of gratitude at work from colleagues are not statistically significant predictors of job satisfaction.

H1_A. Dispositional gratitude at work, expression of gratitude at work to supervisors, receipt of gratitude at work from supervisors, expression of gratitude at work to colleagues, and receipt of gratitude at work from colleagues are statistically significant predictors of job satisfaction.

Multiple Regression Analysis

Because multiple regression is an ideal analysis to explore how dependent variables predict a dependent variable, I used a standard multiple regression analysis to test my hypothesis (Black, 2009; Laerd Statistics, 2020). Chapter 3 outlined step by step how I used SPSS to run a

standard, linear multiple regression. Now, in this subsection of Chapter 4, I report the results and how they connect to the hypothesis.

I tested how each of the five independent, continuous variables (dispositional gratitude at work, expression of gratitude at work to supervisors, receipt of gratitude at work from supervisors, expression of gratitude at work to colleagues, and receipt of gratitude at work from colleagues) predict overall job satisfaction. Using the outputs produced from running a multiple regression on the data set of 146 software developers, I determined that the overall regression has statistical significance ($R^2 = .528$, $F_{(5, 145)} = 31.381$, $p < .001$). Therefore, the null hypothesis, H_0 , can be rejected.

Dispositional gratitude at work ($\beta = .509$, $p < .001$) was a statistically significant predictor of overall job satisfaction. However, none of the other four independent variables were statistically significant predictors of overall job satisfaction. Table 20 reflects that the other four gratitude variables were not predictors: expression of gratitude to supervisors ($\beta = .145$, $p < .055$), receipt of gratitude at work from supervisors ($\beta = .094$, $p < .182$), expression of gratitude to colleagues ($\beta = .069$, $p < .327$), and receipt of gratitude to colleagues ($\beta = -.125$, $p < .143$).

Table 20*Multiple Regression Chart*

Variables	Unstandardized Coefficients		Standardized Coefficients		Sig. (p)
	β	SE	Beta	t	
Dispositional Gratitude at Work	.509	.070	.555	7.256	< .001
Expression of Gratitude at Work to Supervisors	.145	.075	.172	1.938	.055
Receipt of Gratitude at Work from Supervisors	.094	.070	.116	1.341	.182
Expression of Gratitude at Work to Colleagues	.069	.070	.086	.985	.327
Receipt of Gratitude at Work from Colleagues	-.125	.085	-.128	-1.474	.143

Summary of Findings

The present quantitative study explored how forms of gratitude at work predicted overall job satisfaction among software developers ($N = 146$) using a survey made up of 63 items, including six scales and demographic and descriptive items. Specifically, the present study measured how dispositional gratitude at work, expression of gratitude at work to supervisors and colleagues, and receipt of gratitude at work from supervisors and colleagues predicted job satisfaction among software developers. To test the hypothesis, I ran a linear multiple regression in SPSS. The overall regression was statistically significant ($R^2 = .528$, $F_{(5, 145)} = 31.381$, $p < .001$). The null hypothesis can be rejected.

In Chapter 5, I will discuss the findings in relation to past research and how the present study offers new, interesting discoveries about gratitude at work for software developers. I discuss how the findings can be used to address the present study's problem outlined in Chapter

1. Chapter 5 also exposes the known limitations of the present study. Lastly, Chapter 5 concludes with recommendations and a summary.

Chapter 5: Discussion, Conclusions, and Recommendations

Software developers experience a significant degree of negative emotions like unhappiness, stress, and burnout at work (Graziotin et al., 2014; Sánchez-Gordón & Colomo-Palacios, 2019), causing further complications such as software coding errors (Cataldo, 2010; Graziotin et al., 2014), lowered creativity (Choi, 2019; Graziotin et al., 2014), lowered confidence at work (Müller & Fritz, 2015), decreased performance (Gupta et al., 2019; Salgado et al., 2020), and turnover (Özkan (2021)). Özkan (2021) concluded that turnover intention of IT professionals is strongly linked to job satisfaction. Research shows that software developers lack adequate job satisfaction and a job attitude toward and at work diametrically opposed to negative emotions and turnover. In spite of these serious issues currently wreaking havoc on the software employee population and the software products they work on, to date, there is a dearth of research on the positive emotions of software developers (Girardi et al., 2020; Kowalski et al., 2022; Kurian & Thomas, 2023). I addressed this in the present study.

There is an enormity of prospective research topics necessary to ascertain curative strategies to reverse this troubling present trend. Immediate research that addresses positive emotions and job satisfaction among software developers is necessary. Studying positive emotions of software developers could get organizations one step closer to organizational and individual humans flourishing at work, not to mention, better software products that benefit every sector and every aspect of individuals' lives today.

Gratitude was the positive emotion addressed in the present study. In other populations, gratitude has predicted job satisfaction (Chen et al., 2021; Chen et al., 2020; Cortini et al., 2019; Lanham et al., 2012; Stegen & Wankier et al., 2018; Waters, 2012). Gratitude is a moral, virtue, and social emotion that entails the cognitive–emotional process of recognizing and responding to

benefits received by others (Emmons & McCullough, 2003; McCullough et al., 2002). Job satisfaction is the measure of a person's positive attitude toward and during their job (Brayfield & Rothe, 1951). The purpose of the study was to explore how dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work with supervisors and colleagues predict job satisfaction among software developers. The research question and hypothesis were as follows:

RQ1: How do dispositional gratitude at work, expression of gratitude at work to supervisors, receipt of gratitude at work from supervisors, expression of gratitude at work to colleagues, and receipt of gratitude at work from colleagues predict job satisfaction among employed U.S.-based software developers?

H1₀. Dispositional gratitude at work, expression of gratitude at work to supervisors, receipt of gratitude at work from supervisors, expression of gratitude at work to colleagues, and receipt of gratitude at work from colleagues are not statistically significant predictors of job satisfaction.

H1_A. Dispositional gratitude at work, expression of gratitude at work to supervisors, receipt of gratitude at work from supervisors, expression of gratitude at work to colleagues, and receipt of gratitude at work from colleagues are statistically significant predictors of job satisfaction.

To test the hypothesis, I ran a multiple regression on five independent variables and one dependent variable. I measured how dispositional gratitude at work, expression of gratitude to supervisors, receipt of gratitude from supervisors, expression of gratitude to colleagues, and receipt of gratitude from colleagues predicted overall job satisfaction. The sample included 146 software developers who were full-time employees at a U.S.-based organization for 6 months or

more. I recruited participants by posting a survey invitation on the social media platform LinkedIn to participate in a survey using gratitude and job satisfaction scales. The overall regression had statistical significance, accounting for 52.8% of the variance in the dependent variable, overall job satisfaction ($R^2 = .528$, $F_{(5, 145)} = 31.381$, $p < .001$). Dispositional gratitude at work ($\beta = .509$, $p < .001$) was a statistically significant predictor of overall job satisfaction. None of the other four independent variables predicted job satisfaction.

In this chapter, I discuss the findings. I also discuss some of the present study's limitations and delimitations. Then, I offer recommendations for practitioners and for future research. Finally, I conclude the chapter with a brief overview of the purpose, results, unique contributions, and the importance of this dissertation's successful quantitative investigation.

Discussion of the Findings

The present study examined how dispositional gratitude at work, expression of gratitude at work to supervisors, expression of gratitude to colleagues, receipt of gratitude from supervisors, and receipt of gratitude at work from colleagues predict the overall job satisfaction of software developers. The results showed that the overall multiple regression model was statistically significant, explaining over half (52.8%) of the variance of job satisfaction. Therefore, the null hypothesis can be rejected. There are two parts to the findings discussed in the section. First, the findings indicated that dispositional gratitude at work predicted job satisfaction ($\beta = .509$, $p < .001$). Secondly, none of the other independent variables significantly predicted job satisfaction. In this section, I discuss both but concentrate on the statistically significant finding of dispositional gratitude at work predicting job satisfaction. The higher a software developer's dispositional gratitude at work, the higher their job satisfaction. This is an

exciting and unprecedented discovery that could trailblaze research on gratitude among software developers.

I also include a discussion of the study's two-theory theoretical framework, which consisted of the broaden-and-build theory of positive emotions (Fredrickson, 1998) and the find-remind-and-bind theory of gratitude (Algoe, 2012), which helped inform the study and interpret the findings. Of the two theories, I mostly discuss how the broaden-and-build theory of positive emotions (Fredrickson, 1998) supported the statistically significant finding that dispositional gratitude at work was the one and only independent variable that predicted job satisfaction.

Dispositional Gratitude at Work Predicted Job Satisfaction

Software developers with higher dispositional gratitude at work had statistically significantly higher levels of job satisfaction ($\beta = .509, p < .001$). This result aligns with the broaden-and-build theory of positive emotions (Fredrickson, 2001). Previous studies have found comparable results about the connection between dispositional gratitude at work and job satisfaction (Chong et al., 2017; Cortini et al., 2019; Lanham et al., 2012; Waters, 2012). However, the present study contributed new findings. Namely, the type of gratitude, dispositional gratitude at work, was uniquely measured in an understudied population, software developers. Reasons for the predictive relationship were not within the scope of the study, but I can offer some possible reasons.

The Specific Type of Gratitude: Dispositional Gratitude at Work. Positive psychology researchers continue to dispute even the foundational definition of gratitude (Locklear et al., 2023; Morgan et al., 2017; Tachon et al., 2021; Walsh et al., 2022; Wood et al., 2010; Youssef-Morgan et al., 2022). Consequently, studies have spanned many forms of gratitude, and researchers have qualitatively and quantitatively measured those types of gratitude

with many different scales. For that reason, I will first clarify the type of gratitude that predicted overall job satisfaction in the present study. Gratitude is feeling a positive emotion resulting in recognizing a benefit provided by an agent other than oneself (Emmons et al., 2019; Emmons & McCullough, 2003). Dispositional gratitude is a specific form of gratitude that is defined as a personality trait marked by the tendency to experience gratitude in higher propensity, intensity, and frequency than a person lower in this trait (McCullough et al., 2002). The present study narrowed this form of gratitude further by testing for only how grateful a person feels at work. Hence, the full term for the present study's independent variable was dispositional gratitude at work. I modified the GQ-6 by adding "at work" to the six items of the scale. The present study revealed that higher dispositional gratitude at work predicted higher job satisfaction ($\beta = .509, p < .001$). Taken together, a more detailed statement of the study's finding would be this: The tendency to experience the emotion of gratitude while at work predicted job satisfaction.

Previous Research Supports These Findings. Researchers have consistently found a strong association between dispositional gratitude and life satisfaction, among other indicators of well-being (Portocarrero et al., 2020). Waters (2012) first investigated the link between dispositional gratitude and job satisfaction. Waters (2012) determined that dispositional gratitude predicted job satisfaction and argued for more gratitude in the workplace. Since then, dispositional gratitude has been found to predict job satisfaction in other studies (Chen et al., 2021; Cortini et al., 2019; Kim et al., 2019; Lanham et al., 2012). My study added new findings to the literature. Dispositional gratitude at work was measured with a GQ-6 (McCullough et al., 2002) modified to pertain to the workplace, giving the scale more specificity.

Scarcely any research was found that refutes the connection between dispositional gratitude and job satisfaction. Lanham et al. (2012) found that the GQ-6 did not predict job

satisfaction after controlling for hope, but this measure of job satisfaction was a multidimensional construct (using the MSQ) rather than overall job satisfaction, and they measured dispositional gratitude overall rather than at work. These differences make the refutation less relevant to my findings.

The Broaden-and-Build Theory of Positive Emotions Was Supported. The broaden-and-build theory of positive emotions (Fredrickson, 2001) was the theoretical framework of the present study and formed this part of the hypothesis: dispositional gratitude at work could predict job satisfaction. According to this theory, experiencing a positive emotion like gratitude leads to an increase in one's thought–action abilities, personal resources, and more positive emotions (Fredrickson, 1998). As an example, gratitude promotes well-being (Emmons & McCullough, 2003; Fredrickson, 2001; Portocarrero et al., 2020), including when at work (Mohsin et al., 2023; Patil et al., 2018; Zhao et al., 2022). Not surprisingly, in this study, experiencing gratitude at work led to viewing one's job more positively and satisfyingly. The present study contributes to the ongoing discovery of how gratitude at work might have beneficial consequences at work.

The Build Tenet. The present study highlights the build tenet of the broaden-and-build theory of positive emotions (Fredrickson, 2001). Namely, the tendency to experience dispositional gratitude at work seems to have built up the personal resource of overall job satisfaction among the sample. The build tenet is the part of the theory that states that a positive emotion builds up personal resources that extend beyond the moment of discrete emotions. In the present study, job satisfaction was the personal resource. According to the motivation-hygiene theory (Herzberg, 1959), job satisfaction is having a positive emotional response, a positive attitude, and an intrinsic motivation toward one's job. Hence, job satisfaction is a personal resource. In my view, the upward spiral of human flourishing that can bring about the building of

personal resources (Fredrickson, 2001) is seen in the present study because gratitude built (i.e., predicted) job satisfaction.

Dispositional Gratitude Could Counteract Negative Emotions. One reason dispositional gratitude at work predicted job satisfaction among software developers might be because dispositional gratitude is a positive emotion involving the appreciation and recognition of the good things in one's life (Emmons & McCullough, 2004; McCullough et al., 2002). As a result of recognizing the good things at one's job, they could feel more satisfied. In other words, having a tendency to spot all the benefits at work accentuates the satisfying aspects of their work, thereby increasing overall job satisfaction. Software developers face obstacles at work, such as task complexity, time pressure, and isolation (Chen et al., 2020; Graziotin et al., 2018; Storey et al., 2019). However, for those people habitually experiencing more gratitude at work, recognizing that they are the beneficiaries of gifts or other benefits might change their perception of even the negative aspects of work.

Indeed, according to the broaden-and-build theory of positive emotions (Fredrickson, 1998), positive emotions counteract lingering negative emotions. In line with this idea, it could be that dispositional gratitude at work was counteracting the stress and unhappiness frequently experienced among software developers that were highlighted by previous studies (Girardi et al., 2020; Graziotin et al., 2014; Graziotin et al., 2018; Sánchez-Gordón & Colomo-Palacios, 2019).

Additionally, Fredrickson (2001), in a presentation of the theory, argued that positive emotions boost the ability to see present and future events in a positive light. For example, to the more grateful person, task complexity could mean they are the beneficiary of more challenging work; time pressure could be interpreted as time efficiency; and isolation at work could be viewed as the opportunity to work alone with more productivity. Taken together, the finding that

dispositional gratitude at work predicted job satisfaction among software developers could be because of the impact gratitude has on the negative emotions and challenges experienced by software developers.

In sum, the broaden-and-build theory of positive emotions (Fredrickson, 1998, 2001) served as the theoretical framework to explain how dispositional gratitude at work predicted job satisfaction. Reciprocally, the findings offer empirical support for the broaden-and-build theory of positive emotions (Fredrickson, 2001). The present study reveals novel information about how the broaden-and-build theory of positive emotions could be applied to the workplace of software developers because it showed how gratitude bolstered job satisfaction.

Dispositional Gratitude Is Not Event-Dependent. Unlike other forms of gratitude like state, episodic gratitude, collective gratitude, or witnessing gratitude (Fehr et al., 2017; Walsh et al., 2022), dispositional gratitude is not dependent on circumstances or the initiations from others (Emmons & McCullough, 2003). Rather, dispositional gratitude is the ability to recognize something positive and attribute its cause to someone else (Emmons & McCullough, 2003; McCullough et al., 2002). The triggering event for experiencing dispositional gratitude is not dependent on circumstance; thus, it is up to the individual. Other researchers have mentioned this. When stating that social support did not mediate the relationship between dispositional gratitude and job satisfaction, Chen et al. (2021) reasoned that it was because dispositional gratitude is an internal resource for activating positive emotions and social function. Their idea aligns with the broaden-and-build theory of positive emotions (Fredrickson, 1998) that framed the present study. Chen et al.'s (2021) assertion was that dispositional gratitude promotes employees' job satisfaction, unmediated by context like levels of social support or other workplace behaviors. The present study's findings parallel those of McCullough et al. (2002) and

Chen et al. (2021) since dispositional gratitude at work predicted job satisfaction out of the five independent variables.

As previously mentioned, though software developers work in teams, much of the software developer tasks involve individual time working on the computer as a primary way to develop software design, coding, testing, and deployment. Therefore, for many software developers, there might be more of an opportunity to feel habitual gratitude inwardly throughout the workday than to socially express, receive, or initiate outward gratitude with colleagues and supervisors.

Expression and Receipt of Gratitude Were Not Predictors

The second part of the findings was that statistical analysis of the multiple regression revealed that the other four independent variables—expression of gratitude to supervisors, receipt of gratitude from supervisors, expression of gratitude to colleagues, and receipt of gratitude from colleagues—were not statistically significant predictors of job satisfaction. Though the correlation matrix had varying degrees of correlation between these variables and job satisfaction, none of these variables had a p -value of less than .05, so they did not predict job satisfaction. I cannot determine why there was no significance. For that matter, the results do not mean that these forms of gratitude have no impact on the strengthening of relationships and other benefits at work. Evidence from previous studies conveys the powerful positive impact that expressing and receiving gratitude has at work on individuals, teams, and the whole organization (Chhajer & Dutta, 2021; Cortini et al., 2019; Di Fabio et al., 2017; Grant & Gino, 2010; Lambert et al., 2010; Locklear et al., 2023; Sun et al., 2019; Watkins & McCurrach, 2021; Wu et al., 2021).

Relational Gratitude. What these four independent variables of the study that did not predict job satisfaction have in common is that they are relational. It requires two people, a benefactor and a beneficiary, in a social exchange of gratitude, with one expressing gratitude to the other who is receiving gratitude (Emmons & McCullough, 2004; Gordon et al., 2012; Tsang & Martin, 2019; Walsh et al., 2022). Both the expressor and recipient of expressed gratitude receive psychological rewards in their strengthening dyadic relationship (Algoe et al., 2013; Algoe et al., 2016; Chang et al., 2021; Davis et al., 2021; Dunaetz & Lanum, 2021; Gordon et al., 2022; Gordon et al., 2011; Kumar & Epley, 2018; Lee et al., 2019; Yoshimura & Berzins, 2017). Studies have supported that expression and receipt of gratitude are contextual factors that connect to job satisfaction (Chen et al., 2021; Cortini et al., 2019; Effendi et al., 2021; Lanham et al., 2012; McKeon et al., 2020; Patil et al., 2018; Pfister et al., 2020; Ritzenhöfer et al., 2019; Stegen & Wankier, 2018; Waters, 2012). Clearly, there is strong evidence for expecting relational gratitude to boost job satisfaction. Based upon previous research and Algoe's (2012) find-remind-and-bind theory of gratitude, the present study explored how expressing and receiving gratitude at work with supervisors and colleagues predicted an increase in job satisfaction. However, that was not the case in the present study. I can speculate as to why.

Addressing the Methods Used to Measure the Correlation. As mentioned, four of the five independent variables of the study (expression of gratitude to supervisors, receipt of gratitude from supervisors, expression of gratitude to colleagues, receipt of gratitude from colleagues) did not predict the dependent variable (job satisfaction). One reason could be because the AIR scale (Gordon et al., 2012) that I modified, using it once to pertain to supervisors and once for colleagues, did not accurately measure the intended variables. Reliability could affect the validity of the scales since validity requires that the scales measure

consistently (Black, 2009). The scale was originally used to measure gratitude in dyadic intimate relationships (Gordon et al., 2012). Each person in the dyad answered the items about the relationship with the other person. In the present study, the AIR scale was applied not to intimate relationships but to professional work relationships and not to dyads but to roles at work that could have represented more than a dyad. Also, the survey was given to individual software developers, and their supervisors and colleagues were not given the survey for comparison. The present study provided evidence for a scenario that the AIR scale might not work. In other words, I modified the AIR scale, and instead of administering it to both people in an intimate dyadic relationship, participants answered the items about work relationships. Therefore, a feasible reason for why I found no statistical significance in the relationship between expression of gratitude to supervisors, receipt of gratitude from supervisors, expression of gratitude to colleagues, and receipt of gratitude from colleagues and job satisfaction could be the novel way in which I used the AIR scale.

The Dark Side of Gratitude. Another reason the relational gratitude variables did not predict job satisfaction could be due to what researchers have referred to as the dark side of gratitude (Beck, 2016; Locklear et al., 2023; Quinn, 2015). Dark side is a term that means that the practice of gratitude is ineffective and could even produce negative outcomes. The dark side of gratitude includes issues like gratitude expressions are perceived as insincere (Pillay et al., 2020), could be used as conflict avoidance (Quinn, 2015), could cause an overpowering sense of indebtedness to the beneficiary (Watkins et al., 2006), or could be ineffective because the expression of gratitude was delivered via an unpreferred medium to the benefactor (Beck, 2016). If the dark side of gratitude were being experienced by the sample, it would mean that exchanges of gratitude between the participants and their supervisors and colleagues are not improving job

satisfaction, which would align with the findings that showed that this relational gratitude did not predict job satisfaction.

Limitations

There were limitations to the present study. First, it was cross-sectional. Therefore, it only captured how the respondents thought and felt about their jobs at the time of taking the survey. In contrast, a longitudinal study could measure changes in levels of gratitude and job satisfaction over time. However, this limitation provided a more cost-effective approach and yielded findings about how gratitude predicted job satisfaction at the same time, which allowed for testing the hypothesis that addressed the research question of this study. A second limitation of the study was the self-reporting method of measuring all variables in the study. Self-report instruments are limited because participants' biases could affect the accuracy of the findings (Vogt, 2007). A third limitation was the modification of the scales used to measure the variables of the study. The modifications to the GQ-6 scale (McCullough et al., 2002) and AIR scale (Gordon et al., 2012) were to change the context of gratitude to pertain to the workplace. However, this limitation provided a novel approach to examining workplace gratitude.

I chose to delimit the study in a few ways. First, the target population was software developers working full-time at a U.S.-based organization and recruited through social media. In contrast, previous research has consisted of employees from other fields; the most related field seen often has been the field of Information Technology as a whole, which includes many tech jobs besides direct work in software development (Eckhardt et al., 2016; Kurian & Thomas, 2021; McMurtrey et al., 2002; Moquin et al., 2019; Shaikh & Joseph, 2020). With the present study's focus on participants with the job of working directly in software development, the

findings should not be universally applied. However, the gain of this delimitation was insight into gratitude at work for this new group of workers previously infrequently studied.

Furthermore, I delimited the recruitment strategy to a purposive sampling method, which was dispersed using invitation posts on LinkedIn, exclusively. However, by doing so, the participants had more in common, being users of a particular social media. To the benefit of finding the right population with more confidence than other types of recruitment platforms, LinkedIn is a place where one's profile is primarily characterized by one's job. That gave me an opportunity to invite people by posting in chat rooms dedicated to software developers. This is a specific population, and the recruitment and sampling method was successful.

A final noteworthy delimitation of the study was the selection of scales to measure the independent variables and the dependent variable. There was no shortage of gratitude scales (Araz & Erdugan, 2017; Bernabe-Valero et al., 2020; Gulliford et al., 2013; Lee et al., 2019; Locklear et al., 2020; Morgan et al., 2017; Portocarrero et al., 2020; Spence et al., 2014; Youssef-Morgan et al., 2022) nor job satisfaction scales (Brayfield & Rothe, 1951; Buitendach & Rothmann, 2009; Hoff et al., 2020; Judge et al., 1998; Lakatamitou et al., 2020; Lemelle & Scielzo, 2012; Weiss et al., 1967). However, I chose the scales (GQ-6, AIR, OJS) that I determined would most accurately measure the specific types of gratitude for the study, best lend themselves to modifications to pertain to the workplace and had the best reliability and validity in other studies.

Recommendations

Recommendations for Practice

The goodness of gratitude for organizations is well-documented (Al-Hadrawi & Al-Zulfi, 2022; Baker, 2011; Cain et al., 2019; Chen et al., 2020; Chhajer & Dutta, 2021; Cortini et al.,

2019; Emmons & McCullough, 2003; Fehr et al., 2017; Guzzo et al., 2022; Khan et al., 2022; Kim & Oh, 2020; Komase et al., 2022; Locklear et al., 2023; Locklear et al., 2020; McKeon et al., 2020; Pillay et al., 2020; Sood et al., 2015; Stegen & Wankier, 2018; Stocker et al., 2019; Waters, 2012; Youssef-Morgan et al., 2022; Zhao et al., 2022). The present study furnished additional empirical evidence for the importance of gratitude at work and particularly for how it predicts software developers' satisfaction at work. The findings indicated that dispositional gratitude at work was a statistically significant predictor of job satisfaction. Therefore, I recommend employees and leaders foster dispositional gratitude at work.

To reiterate the context in which the study focused, I am referring specifically to fostering dispositional gratitude at work. An increase in levels of dispositional gratitude at work could antecede higher levels of job satisfaction. Consequently, higher job satisfaction leads to other key markers of success for employees as well as organizations including performance (Cho et al., 2021; Gabini & Salessi, 2019; Katebi et al., 2022; Petty et al., 1984), productivity (Bakker & Oerlemans, 2012; Judge et al., 2021), and lowered burnout and turnover (Cho et al., 2021; Leider et al., 2016; Srimindarti et al., 2017). All these outcomes are needed among software developers, who often experience job dissatisfaction, stress, burnout, and turnover (Butler & Jaffe, 2021; Graziotin et al., 2014; Sánchez-Gordón & Colomo-Palacios, 2019). Fortunately, previous studies involving methods of fostering dispositional gratitude at work have conveyed specific methods. This subsection expounds upon these methods for improving gratitude at work. I discuss gratitude interventions and gratitude work culture.

Gratitude Interventions. One way shown to be effective in increasing gratitude is gratitude interventions (Davis et al., 2016; Dickens, 2017; Fehr et al., 2017; Locklear et al., 2020; Watkins & McCurrach, 2021). The effectiveness of gratitude interventions is well-

documented (AL-Hashimi & Al-Barri, 2017; Baker, 2011; Cunha et al., 2019; Davis et al., 2016; Drażkowski et al., 2017; Komase et al., 2022; Locklear et al., 2020; O’Leary & Dockray, 2015; Redwine et al., 2016; Renshaw & Olinger Steeves, 2016). Gratitude interventions have shown to be effective in increasing one’s gratitude and subsequent additional benefits (Davis et al., 2016; Wong et al., 2017). For example, Wong et al. (2017) found that their gratitude intervention decreased the psychological distress level of their participants. As another example, Zhao et al. (2022) concluded that dispositional gratitude at work facilitated workers’ organizational commitment and well-being. Gratitude interventions are also cost-effective (Boggiss et al., 2020; Cunha et al., 2019; Drażkowski et al., 2017; Locklear et al., 2020; O’Leary & Dockray, 2015).

One reason that gratitude interventions at work can be an effective strategy to improve job satisfaction is because gratitude is so highly malleable; a person’s level of gratitude can be developed (AL-Hashimi & Al-Barri, 2017; Emmons & McCullough, 2003; Kleiman et al., 2013; Wood et al., 2010). As researchers like Fehr et al. (2017) and Zhao et al. (2022) explained, gratitude interventions at work trigger episodic gratitude that could accumulate over time into a more persistent and collective gratitude at work.

Dispositional gratitude is improved through interventions focused on gratitude practices (Grant & Gino, 2010; Komase et al., 2022; Wood et al., 2010). Moreover, as the present study demonstrates, it is worth developing dispositional gratitude at work because it enhances job satisfaction. Therefore, leaders could consider implementing a gratitude intervention as a strategy for improvement. Given that gratitude programs that are haphazardly constructed could end up unsuccessful and even cause needless financial burdens (Fehr et al., 2017), it is important to look to specific interventions that have shown effectiveness in previous studies. The present study found that dispositional gratitude at work predicted job satisfaction, so I make

recommendations that are specific to interventions designed to increase one's state and trait gratitude versus activities for relational gratitude. Namely, gratitude journaling has shown great promise for stimulating and cultivating a person's gratitude.

Gratitude Journaling. Gratitude journaling is an effective method for building one's dispositional gratitude, and it also leads to other positive outcomes like well-being, life satisfaction, and job satisfaction (Cortini et al., 2019; Emmons & McCullough, 2003; Hartanto et al., 2023; Locklear et al., 2020; Stegen & Wankier, 2018). There are several ways to journal that could increase dispositional gratitude at work.

Emmons and McCullough (2003) explored how a gratitude journal might impact well-being. This was a three-study experiment, and all three involved a gratitude journal (Emmons & McCullough, 2003). The first study involved 192 undergraduate students journaling weekly for 10 weeks. The second study involved 157 undergraduate students who journaled daily for 2 weeks. The third study involved 65 participants with muscular disease who journaled daily for 2 weeks. They were randomly selected for three conditions. One was the gratitude condition, and the other two groups were responding about hassles and social events. In each study, participants were asked to write responses to prompts. The findings included that weekly and daily journaling were both effective in inducing gratitude. Therefore, the study provides useful examples of gratitude journaling.

Emmons and McCullough (2003) crafted a gratitude intervention based on specific journaling methods that I can suggest accordingly to build dispositional gratitude at work. The gratitude group journaled five things in their life they were grateful for. Their prompt could be used: "There are many things in our lives, both large and small, that we might be grateful about. Think back over the past week and write down on the lines below up to five things in your life

that you are grateful or thankful for” (Emmons & McCullough, 2003, p. 379). To improve gratitude at work instead of one’s general life, the prompt should be modified to read: “There are many things at work, both large and small, that we might be grateful about. Think back over the past week and write down on the lines below up to five things at your work that you are grateful or thankful for” so gratitude at work could be increased. Notably, the journaling does not have to take long. This took participants as little as five minutes in a gratitude journal (Emmons & McCullough, 2003). Their study provides examples of methods that could be used to journal about gratitude.

Cortini et al.’s (2019) study determined that dispositional gratitude and relational gratitude predicted job satisfaction, which I covered in more detail in Chapter 2. A key part of their study is pertinent to this subsection on gratitude journaling to build dispositional gratitude at work. In their mixed-methods study with a sample of 96 people at work, they initiated a gratitude journal intervention. The specifics of how the gratitude diary was designed to serve as a model for gratitude journaling that I recommend. The format was to keep a daily journal in which participants were to list at least five things they are grateful for. It is worth noting that the number of grateful things, five, was the same number used in Emmons and McCullough’s (2003) study. However, Cortini et al.’s (2019) journal intervention offered participants sentence stems and useful questions. These included the following:

- (1) Overall, my working day has been ...
- (2) Today I am grateful for ...
- (3) Concerning the above grateful reasons, for how many do you actually express explicit thanks? How did you do?
- (4) Does anyone express thanks for something in this working day? (pp. 4–5)

I recommend these options for gratitude intervention, as well as for improving dispositional gratitude at work; practitioners could modify these sentence stems so that each one

pertains to one's job and workplace. For example, "Today, I am grateful for..." could be modified to read "Today, I am grateful at work for..." Organizational leaders and software developer employees should use this or similar forms of daily gratitude journaling for at least 10 days as a starting point as per Cortini et al.'s (2019) successful method.

Researchers have even found gratitude journaling to be effective with a similar population to the present study, software development workers (Butler & Jaffe, 2021). As was discussed in Chapter 2, Butler and Jaffe's study was one of the rare studies that addressed gratitude among software workers. Unlike the present study's nonexperimental methodology, theirs was an experimental study involving a gratitude intervention, the results of which conveyed benefits to participants. Their intervention was keeping a diary (i.e., journaling) that incorporated gratitude (Butler and Jaffe, 2021). For 10 weeks, participants were instructed to journal at night about their daily experiences, thoughts, and feelings. These nightly diaries had open text sections where participants could write about what they were thankful for if they chose. They found that the more often gratitude was mentioned in their journal, job satisfaction was also present. Therefore, to foster dispositional gratitude at work with the hope of also improving job satisfaction as a result, software developers and their leaders could try this form of nightly journaling. They should use the journal to record their work challenges and work gratitude for at least 10 weeks, as was found to be effective in Butler and Jaffe's (2021) intervention.

Harness a Work Culture of Gratitude. Workplace culture is the collective philosophical beliefs and understood behaviors of an organization (Cameron & Winn, 2012; Schein & Schein, 2016). A positive, virtuous workplace culture provides companies with a sweeping competitive advantage in the market, leading to higher performance and larger profit margins (Cameron, 2021; Cameron & Winn, 2012; Groysberg et al., 2018; Quinn, 2015). I

suggest that leaders could elevate a culture of gratitude at work as a means to support employees' efforts toward increasing dispositional gratitude at work, which will, in turn, increase job satisfaction of software developer teams collectively (Komase et al., 2022; Muceldili et al., 2015; Su et al., 2021).

Organizational leaders of software developers could embed gratitude into the work culture for a deeper-rooted and long-term strategy for fostering gratitude at work. Making a virtue or positive emotion like gratitude part of the work culture means infusing concepts of thankfulness into official culture statements and core beliefs, the organization's daily processes and procedures, assessments, and team and organization-wide decision-making (Cameron, 2021; Cameron et al., 2004; Cameron & Winn, 2012). Positive emotions and positive work culture elements like gratitude lead to positive outcomes, creating an upward spiral of flourishing (Cameron, 2012; 2013; Quinn, 2015; Seligman & Csikszentmihalyi, 2000). Gratitude is one such virtuous emotion that Di Fabio et al. (2017) specifically called out as a key to healthy organizations. Furthermore, given that job satisfaction has also been shown to be vital to a positive work culture (Chung & Ahn, 2019), the fact that gratitude predicted job satisfaction in the present study serves as more reason to focus on building a culture of gratitude in the workplace. Simply put, not only does gratitude matter to work culture, but the other positive outcomes it predicts are also important to have a healthy culture. Although the gratitude interventions I have discussed could improve workplace culture, there are other methods for fostering a work culture of gratitude.

Creating a culture of gratitude in an organization requires a multifaceted approach. Gratitude is multidimensional: it can be a virtue or emotion (Van Cappellen et al., 2016; O'Byrne, 2019), episodic, persistent, or collective (Di Fabio et al., 2017; Fehr et al., 2017), and

can be directed at life, objects, or people (Di Fabio et al., 2017). Furthermore, strategies for gratitude intertwine. Dispositional gratitude-building practices and relational gratitude levels operate in tandem, both impacting the level of job satisfaction (Cortini et al., 2019).

Recommendations for Future Research

Despite the progress made in the field of gratitude research over the last 30 years since the revival of positive psychology (Locklear et al., 2023; Seligman, 2012; Seligman & Csikszentmihalyi, 2000; Subramanian & Thakur, 2022), the impact of gratitude at work and its role in positive outcomes like job satisfaction is nevertheless still in the nascent phase of development. The overall regression model in the present study explained 52.8% of the variance in job satisfaction. On the other hand, 47.2% of the variance in job satisfaction was unexplained by the multiple regression model in the present study; thus, future research should explore how forms of gratitude might predict job satisfaction. More research is needed to further understand how dispositional gratitude and relational gratitude at work predict job satisfaction. Based on my findings, I suggest a few avenues to explore in the future.

Researchers Should Use Other Scales to Measure the Variables. The present study used the GQ-6 (McCullough et al., 2002) to measure dispositional gratitude at work. The reliability of the modified version of the GQ-6 (McCullough et al., 2002) used in the present study did not have as high of a Cronbach's alpha as the unmodified version in previous studies. Moreover, the GQ-6 has been the most used measure (Card, 2019; Gallagher & Lopez, 2019; Portocarrero et al., 2020), but in Portocarrero et al.'s (2020) systematic review, they reported 11 other frequently used scales for measuring dispositional gratitude. Other scales should be used in future studies.

Likewise, the present study modified the AIR scale (Gordon et al., 2012) to measure expression of gratitude to supervisors and colleagues and receipt of gratitude from supervisors and colleagues. The scale was originally created to measure gratitude in romantic dyadic relationships, but I used it for work relationships. Other scales have been used in previous studies to measure expression of gratitude and found correlations with job satisfaction. For example, Ritzenhöfer et al. (2019) found that leaders' expressions of gratitude increased followers' level of satisfaction while decreasing turnover intention. In another study, McKeon et al. (2020) measured expression of gratitude from supervisors (i.e., receipt of gratitude when asking the recipient of the gratitude) by using a single item, "My direct supervisor shows his or her gratitude towards me" on a 7-point Likert scale (McKeon et al., 2020, p. 275). McKeon et al. reported that expressed gratitude from supervisors (i.e., receiving gratitude) positively predicted perceived organizational and supervisor support, affective organizational commitment, and job satisfaction among 278 participants of varying careers. Relational gratitude at work among software developers should continue to be investigated using other scales and even using the same scale with and without modifications different from the present study.

Finally, the present study used the OJS scale (Judge et al., 2000; Judge et al., 1998) to measure overall job satisfaction, but other scales could be used to measure this variable. As Gallagher and Lopez (2019) noted, the job satisfaction construct has at least two different models. One, job satisfaction can be modeled as an overall unitary construct, or how satisfied a person feels about their job overall (Gallagher & Lopez, 2019; Judge et al., 1998). Two, job satisfaction can be a multicomponent construct, involving more specific job feature dimensions such as satisfaction with one's salary, work conditions, and security. For example, one commonly used scale that measures job satisfaction as a multicomponent construct instead of a

unitary construct is the MSQ (Weiss et al., 1967, as cited by Gallagher & Lopez, 2019). By measuring job satisfaction as a multicomponent construct using a scale made for it, researchers could explore how dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work predict a multicomponent construct of job satisfaction, whereas the present study measured overall job satisfaction as a unitary construct with the OJS scale (Judge et al., 1998).

Researchers Should Explore Other Forms of Gratitude. The present study measured dispositional gratitude at work and relational gratitude at work. Dispositional gratitude at work predicted job satisfaction, but relational gratitude (the expression of gratitude and receipt of gratitude) with supervisors and colleagues did not predict job satisfaction. The results gave some information about gratitude among software developers at work. However, there are other forms of gratitude left to investigate. Future researchers should investigate if other types of gratitude predict job satisfaction more than dispositional gratitude at work did in the present study. Dispositional gratitude at work only accounted for about half of the variance, giving further reason to explore other forms of gratitude.

Future studies could explore state gratitude, collective gratitude, and witnessing gratitude at work among software developers. For example, as Chapter 2 expounded upon, even though both state and dispositional gratitude are emotion-based, there is a difference. State is a discrete emotion, whereas dispositional gratitude is a trait-level emotion (McCullough et al., 2002; McGuire et al., 2021). Those forms of gratitude differ from many others. To name a few more, collective gratitude measures the gratitude of the organization, and witnessing gratitude is the experience of gratitude by a third party not involved in the dyadic exchange of socially expressed gratitude (Di Fabio et al., 2017; Komase et al., 2022; McGuire et al., 2021; Walsh et al., 2022),

and workplace or organizational gratitude has been defined and measured in various combinations of types of state, dispositional, collective, witnessing, and other forms of gratitude (Cain et al., 2019; Morgan et al., 2017; Portocarrero et al., 2020; Walsh et al., 2022; Waters, 2012). Measuring state gratitude could be useful especially with experimental methodologies that involve inducing gratitude experiences. It is also a promising idea to measure state and dispositional gratitude together with workplace gratitude measures to control for those forms of gratitude. For example, Cain et al. (2019) measured gratitude at work with a new scale, the Gratitude at Work Scale (GAWS). They used their version of workplace gratitude and found that it predicted employee burnout after controlling for state and trait gratitude (Cain et al., 2019). Likewise, the present study could be repeated but with adding and controlling for state gratitude. In brief, different forms of gratitude could predict the job satisfaction of software developers besides what the present study found, which was dispositional gratitude at work.

Conclusions

Organizations often neglect to recognize employees' emotions as an integral factor of success and instead focus more on employee behaviors, skills, and performance (Barsade & O'Neill, 2016). However, investing in a positive emotional and virtuous workplace culture is a significant and economical competitive advantage (Groysberg et al., 2018; Quinn, 2015; Zhao et al., 2022). Gratitude is an emotion and a virtue that creates positive, virtuous organizations (Cameron, 2012; Emmons & McCullough, 2003). Leaders should focus more on the emotional culture. Pertaining to the population of the present study, emotions are critical among software developers (Anany et al., 2019; Girardi et al., 2022; Girardi et al., 2020; Graziotin et al., 2018; Graziotin et al., 2014, 2015; Kurian & Thomas, 2022, 2023; Liu et al., 2021; Masood et al., 2022). Previous studies have found a lack of gratitude in the workplace (Kaplan, 2012).

Gratitude has correlated with job satisfaction under varied populations like nurses, students, and adult employees in many sectors (Chen et al., 2021; Chen et al., 2020; Cortini et al., 2019; Lanham et al., 2012; Stegen & Wenkier et al., 2018; Waters, 2012). The present study contributes to these findings. In the present study, dispositional gratitude at work predicted job satisfaction among a newly surveyed population, software developers, in an overall regression model that explained 52.8% of the variance in job satisfaction.

Limited research has explored the potential positive impact that gratitude might have on the job satisfaction of software developers (Butler & Jaffe, 2021). No literature existed about the impact of dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work on the job satisfaction of software developers. The problem addressed by the present study is that software developers experience negative emotions at work. The purpose of the study was to explore how dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work with supervisors and colleagues predict job satisfaction among software developers.

The present study provided new evidence for the connection between dispositional gratitude at work and job satisfaction. First, the connection had never been established by using a modified version of the GQ-6 (McCullough et al., 2002) so that it pertained to only the workplace with a sample of software developers. To reiterate the specificity of this form of gratitude, the present study did not measure how dispositional gratitude predicted job satisfaction but instead how dispositional gratitude at work predicted overall job satisfaction. Secondly, even though dispositional gratitude has been shown to be a predictor of job satisfaction in other studies, the present study was a multiple regression that simultaneously measured other forms of gratitude: expression of gratitude to supervisors, receipt of gratitude from supervisors, expression

of gratitude to colleagues, and receipt of gratitude from colleagues, which was a combination of gratitude forms that was unique to this study. The results of the multiple regression showed that dispositional gratitude at work predicted job satisfaction among software developers when relational forms of gratitude did not. A positive emotion like gratitude creates an upward spiral of positive emotions (Fredrickson, 1998, 2001), which, in the present study, could explain why consistently experiencing this internal positive emotion at work (i.e., dispositional gratitude at work; as an emotional trait) can consistently lead to experiencing another positive outcome, overall job satisfaction. In sum, this quantitative, correlational study provided evidence for leaders of software developer teams to foster dispositional gratitude at work as a way of increasing job satisfaction and the associated subsequent positive outcomes.

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Descriptive Questions About Gratitude:

I feel appreciated at work.


Yes

No



Neither Yes nor No

How often do you express gratitude to the following: 

	One or more times a day	Several times a week	At least once a month	A couple times a year	Once a year	Never
Your supervisor/boss	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your colleagues at work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your students	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How often do you receive gratitude from the following: 

	One or more times a day	Several times a week	At least once a month	A couple times a year	Once a year	Never
Your supervisor/boss	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your colleagues at work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your students	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If my boss were more grateful or showed more appreciation for my work...  

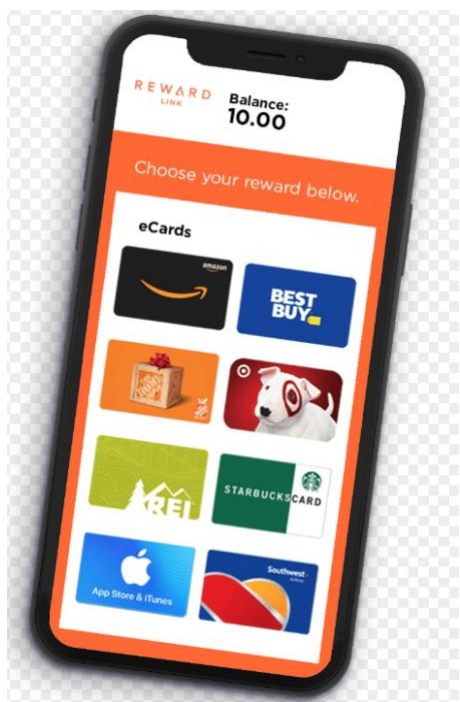
	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I would want to work harder.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would feel better about myself.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The Raffle

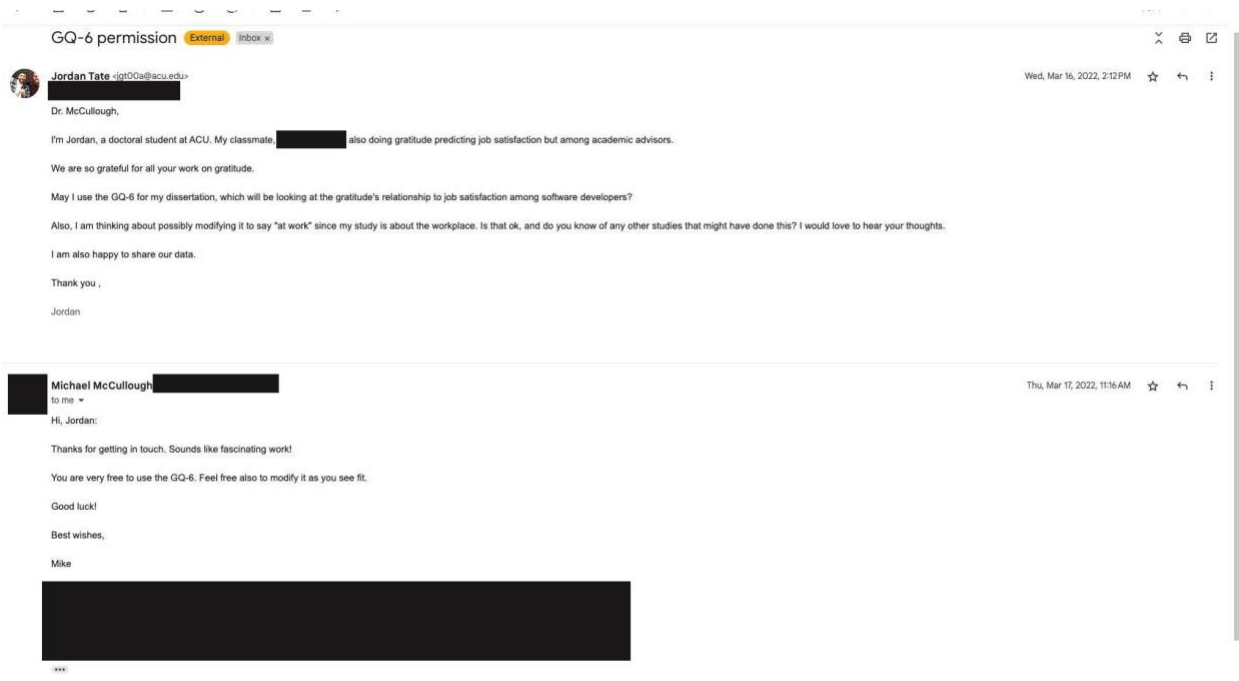
Would you like to enter a raffle for a 20.00 dollar gift card? (Your information is anonymous and WILL NOT BE TIED TO YOUR SURVEY ANSWERS. You will provide an email you want the gift card sent, but not your name.)

- Yes
- No

Example of a Rewards Screen for Raffle Winners





Appendix B: Permission to Use and Alter the Gratitude Questionnaire-6





Appendix C: Permission to Use and Alter the Appreciation in Relationships Scale

Fwd: permission for AIR External Inbox x

 Jordan Tate 
to me

Mar 21, 2022, 8:00 AM ☆ ↶ ⋮

----- Forwarded message -----

From: Amie Gordon 
Date: Mon, Mar 21, 2022 at 6:22 AM
Subject: Re: permission for AIR
To: Jordan Tate 

Hi Jordan,

That seems fine to me, as long as the items seem face valid to you (e.g., there may be items that are too strong for a work context, such as... "I tell my partner often that they are the best" and "I am sometimes struck with a sense of awe and wonder when I think about my partner being in my life". If it is helpful, I recently ran a factor analysis to identify the highest loading items on each factor because I needed to use a shortened version of the scale for a project. I think most of those items would be appropriate for the work context. They are:

***Appreciative:**


often tell my partner how much I appreciate him/her.
make sure my partner feels appreciated.

Appreciated:

When I am with my partner, sometimes he/she will look at me excitedly and tell me how much he/she appreciates me.
-This first one seems like it may not be appropriate for a work context
My partner makes sure I feel appreciated.
My partner makes me feel special.

I think it is also important to include a reverse-scored item for each, so we used:
"I often take my partner for granted" and "My partner often takes me for granted"

I hope this helps!
Amie

On Sun, Mar 20, 2022, 7:11 PM Jordan Tate  wrote:
Dr. Gordon,

Hi, I'm Jordan Tate, a doctoral student at Abilene Christian University.
My colleague  and I are both working on our dissertations on gratitude in the workplace, seeing if it predicts job satisfaction. We will measure dispositional gratitude with the GQ-6, but we are really interested in measuring the receipt and expression of gratitude at work.
We came across your scale, AIR and think it's great. Our question for you - Can AIR be modified to change "partner" to "immediate boss"? In addition, in a separate scale from immediate boss, could "partner" be modified to "colleague/co-worker" or better yet - "colleagues/co-workers,?" We realize the latter is tricky as it is plural unlike partner.

If you think it is appropriate to modify accordingly, we hope that our data will help validate AIR in other situations and (possibly) provide convergent validity with job satisfaction and the GQ-6.

Jordan Tate

Appendix D: Demographic Questions

Select the option that best describes the industry of your organization:

- Mining, Quarrying, and Oil and Gas Extraction
- Utilities; Construction
- Manufacturing
- Wholesale Trade
- Retail Trade
- Transportation and Warehousing
- Information
- Finance and Insurance
- Real Estate and Rental and Leasing
- Professional, Scientific, and Technical Services
- Management of Companies and Enterprises
- Administrative and Support and Waste Management and Remediation Services
- Educational Services
- Health Care and Social Assistance
- Arts, Entertainment, and Recreation
- Accommodation and Food Services
- Other Services (except Public Administration)
- Public Administration
- I'm not sure
- I do not prefer to disclose

Select the option that best describes the size of your organization:

- Micro-sized business: less than 10 employees
- Small-sized business: 10–49 employees
- Medium business: 50–249 employees
- Large-sized business: more than 250 employees
- Unsure
- I do not prefer to disclose

How long have you worked at your organization?

- Less than 6 months
- 6 months–1 year
- 1–5 years
- 6–10 years
- 10–20 years
- Over 20 years
- I do not prefer to disclose

How long have you been a software developer?

- Less than 6 months
- 6 months–1 year
- 1–5 years
- 6–10 years
- 10–20 years
- Over 20 years
- I do not prefer to disclose

Select the option that best describes your age:

- Under 18 years of age
- 18–29 years of age
- 30–39 years of age
- 40–49 years of age
- 50–59 years of age
- 60–69 years of age
- 70 years of age or over
- I do not prefer to disclose

Select the option that best describes your ethnicity:

- American Indian or Alaskan Native
- Asian/American
- Black/African American
- Hispanic/Latino/Latina or Spanish origin
- Middle Eastern and North African (MENA)
- Native Hawaiian or Pacific Islander
- White
- Other
- I do not prefer to disclose

Appendix E: Survey Invitation

You are invited to participate in an online survey on job satisfaction and gratitude at work among software developers.

PURPOSE OF THE STUDY: The aim of this study is to explore the relationship between job satisfaction and dispositional gratitude at work, receipt of gratitude at work, and expression of gratitude at work among software developers.

QUALIFICATIONS TO PARTICIPATE: To qualify as a study participant, you must have worked as a full-time software developer for a minimum of 6 months at your current institution based in the United States and be at least 18 years of age. Please share this with software developers you know who might be interested in participating.

PRIVACY: If you meet the above criteria and want to participate, please click on the link below to confirm eligibility and begin the survey. The survey also includes personal demographics and professional/institutional demographics, and it should take approximately 10 to 15 minutes to complete. No identifiable information is collected in the demographic questions, and no IP addresses are collected at all. Responses will remain anonymous and kept confidential and will only be shared as part of aggregate data to support this dissertation.

BENEFIT and RISKS: The study hopes to benefit software developers by offering data that can direct organizations and their employees to promote gratitude at work as an effective way to increase job satisfaction.

The risk to participants by taking the survey is they may answer questions about positive emotions that seem unlikely to stir emotional harm, thus very low risk. Being online, you are free to take it in a private and safe environment that will decrease risk of discomfort.

START HERE:

<https://abilenechristian.qualtrics.com/xxxxxx>

You may exit the survey at any time for any reason. You must click submit/next to submit your responses.

RAFFLE: After finishing the survey, you will have the option to enter a raffle to win a \$20 Amazon gift card as thanks for participating. You will have at least a five percent chance of winning. The raffle is anonymous, and your personal information will not be recorded. You can also choose not to participate in the raffle.

If any questions arise, please email me at xxxxx@acu.edu.

Thank you for your participation in this study.

The image shows a screenshot of a LinkedIn mobile application interface. A 'Create a post' dialog box is open in the foreground, partially obscuring the background news feed. The dialog box is titled 'Create a post' and has a close button (X) in the top right corner. It displays the profile of 'Jordan Tate' with a dropdown menu set to 'Anyone'. The main text of the post is an invitation to participate in an online survey on job satisfaction and gratitude at work among software developers. The text includes sections for the purpose of the study, qualifications to participate, and privacy information. The background shows a 'LinkedIn News' section with several news items, including 'FTX goes to court, contagion s...', 'Flight chaos mires accessible t...', 'Where homebuyers need \$200...', 'Musk pauses Twitter layoffs', and 'Biden extends student loan pa...'. At the bottom of the screen, there are navigation icons for Home, My Network, Jobs, Messaging, Notifications (with a 26 badge), Me, and Work.

Home My Network Jobs Messaging Notifications Me Work

Sort by: Top

LinkedIn News

FTX goes to court, contagion s
Top news · 42,107 readers

Flight chaos mires accessible t
2h ago · 1,934 readers

Where homebuyers need \$200
4h ago · 64,020 readers

Musk pauses Twitter layoffs
4h ago · 27,988 readers

Biden extends student loan pa
1h ago · 704 readers

Show more

Jordan, unlock your full potential with
Premium

See the full list of who's viewed
profile

Try for Free

About Accessibility Help Ce
Privacy & Terms Ad Choic
Advertising Business Services
Get the LinkedIn app More

Create a post

Jordan Tate
Anyone

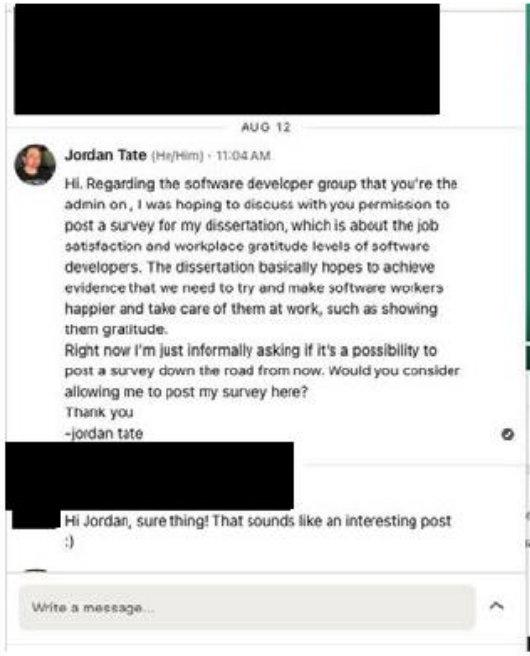
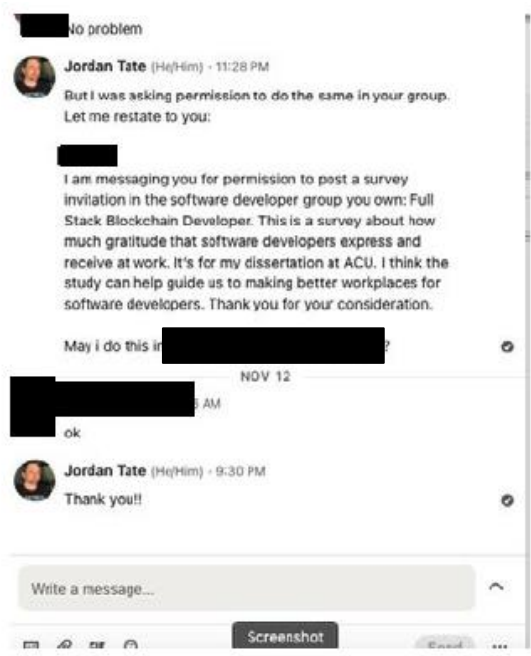
You are invited to participate in an online survey on job satisfaction and gratitude at work among software developers.

PURPOSE OF THE STUDY: The aim of this study is to explore the relationship between job satisfaction and dispositional gratitude at work, receipt of gratitude at work, and expression of gratitude at work among software developers.

QUALIFICATIONS TO PARTICIPATE: To qualify as a study participant, you must have worked as a full-time software developer for a minimum of 6 months at your current institution based in the U.S., and be at least 18 years of age.

PRIVACY: If you meet the above criteria and want to participate, please click on the link below to confirm eligibility and begin the survey. The survey also includes personal demographics and professional/institutional demographics, and it should take approximately ten to fifteen minutes to complete. No identifiable information is collected in the demographic questions, and no IP addresses are collected at all. Responses will remain anonymous and kept confidential, and will only be shared as part of aggregate data to

Appendix F: LinkedIn Approvals to Post Invitations in Groups



Appendix G: Inclusionary Criteria

The below text appears on the first screen of the present study's Qualtrics survey:

To confirm your eligibility in this survey, please respond to the following statements, and you can then review the informed consent and give your consent:

I confirm that I am a full-time employee for an organization based in the U.S. and work directly with software development.

- Yes
- No

I confirm I am 18 years of age or older.

- Yes
- No

Appendix H: Informed Consent

Research Title: Gratitude at Work Predicts the Job Satisfaction of Software Developers

You may be able to take part in a research study. This form provides important information about that study, including the risks and benefits to you as a potential participant. Please read this form carefully. You may also wish to discuss your participation with other people, such as your family doctor or a family member.

Your participation in this research is entirely voluntary. You may refuse to participate or stop your participation at any time and for any reason without any penalty or loss of benefits to which you are otherwise entitled.

PURPOSE AND DESCRIPTION: Gratitude is commonly assumed to be a positive force in our lives. This seeks to understand more about how it could benefit software developers at work.

The purpose of this study is to measure if gratitude at work has a positive impact on the job satisfaction of people working in software development. Put more precisely, the purpose of this study is to explore how dispositional gratitude at work, expression of gratitude at work, and receipt of gratitude at work predicts job satisfaction among software developers employed full-time by a U.S.-based organization.

This study uses a multiple-choice survey to ask anonymous software developers about gratitude at work and their job satisfaction. If, after analyzing all completed surveys, gratitude is shown to predict job satisfaction, then the study could provide evidence that supports the cultivating of more gratitude at work to significantly improve work environments, organizational success, and software developers' sense of satisfaction with their jobs.

RISKS AND BENEFITS: There are minimal risks to taking part in this research study. Below is a list of the foreseeable risks. The risks are minimal and unlikely:

- It is unlikely, but possible, you could experience negative emotions while taking the survey in this study. The risk is minimal because the survey is about your level of gratitude and satisfaction, which are positive emotions. However, if the survey reminds you of the lack of gratitude or lack of satisfaction you might experience at work, you could experience brief and light negative affect or feelings of uneasiness. If this happens, you are free to end the survey at any time.

There are potential benefits to participating in this study. Such benefits may include feeling gratitude, feeling job satisfaction, feeling inspired and happy, or otherwise positive affects and emotions; there is also the possibility that you will know more about yourself in relation to the nature of gratitude at work and job satisfaction since most of the survey is about gratitude and job satisfaction, and this could inadvertently prompt you to look for and practice gratitude at work and job satisfaction. The researchers cannot guarantee that you will experience any personal benefits from participating in this study.

PRIVACY AND CONFIDENTIALITY: Your participation in this survey will be confidential to the extent allowable by law. Your personal identity is not requested nor otherwise recorded. It is anonymous. It is received by researchers only after survey tools in Qualtrics have anonymized responses. Your IP address will not be collected because the survey has been set in Qualtrics to be completely anonymized. Qualtrics encrypts all data coming in. Qualtrics uses a firewall system monitored 24/7 by security personnel designed to prevent others from accessing your survey. You may read more about the security of the survey here:
<https://www.qualtrics.com/security/>.

CONTACTS: If you have questions about the research study, the lead researcher is Jordan Tate, EdD Doctoral Candidate at Abilene Christian University, and may be contacted at xxxxx@acu.edu. If you are unable to reach the lead researcher or wish to speak to someone other than the lead researcher, you may contact Dr. Kristen O’Byrne, Associate Professor of Organizational Leadership, Abilene Christian University. If you have concerns about this study, believe you may have been injured because of this study, or have general questions about your rights as a research participant, you may contact ACU’s Chair of the Institutional Review Board and Executive Director of Research,

Megan Roth, Ph.D. Dr. Roth may be reached at
(xxx) xxx-xxxx
xxxxx@acu.edu
320 Hardin Administration Bldg, ACU Box 29103
Abilene, TX 79699

Additional Information

If you are located in the state of California, you may review your rights under the California Consumer Privacy Act.

Please click the button below if you voluntarily agree to participate in this study. Click only after you have read all of the information provided and your questions have been answered to your satisfaction. If you wish to have a copy of this consent form, you may print it now. You do not waive any legal rights by consenting to this study.

- Yes, I consent
- No, I do not consent

Appendix I: Qualtrics Security Setting for Anonymous Response and Duplicate Response Prevention

The screenshot displays the Qualtrics survey configuration interface for a survey titled "Software Developers' Job Satisfaction and Gratit...". The left sidebar shows the "Options" menu with "Security" selected. The main content area shows the following settings:

- Allow people to take your survey only if they select a survey link included on a specific website.** Off
- Prevent multiple submissions**
Prevent respondents from taking your survey multiple times. You can choose to end the survey, redirect them to a website or flag the response. On
- Bot detection**
We'll look for bots that might be taking your survey and flag their responses with an embedded data field (reCAPTCHA). [Learn more about bot detection](#) On
- Security scan monitor**
Prevent security scanners from accidentally starting surveys when they test your link (reCAPTCHA). [Learn more about security scan monitor](#) On
- RelevantID**
Analyze a respondent's browser, operating system, and location to prevent fraudulent responses. [Learn more about RelevantID](#) Off
- Prevent indexing**
Block search engines from including your survey in their search results. On
- Uploaded files access**
Indicate who should be able to view files uploaded by respondents:
 - Only users with permission to view responses
 - Anyone with the link to the file
- Anonymize responses**
Don't record respondents' IP Address, location data, and contact info. On

Two blue arrows point to the "Prevent multiple submissions" and "Anonymize responses" settings. A "Screenshot" button is visible at the bottom center.

Appendix J: IRB Approval

4/24/24, 10 22 AM

myACU Mail IRB 2023 204 Initial Initial Exempt ACU



Jordan Tate [REDACTED]

IRB-2023-204 - Initial: Initial - Exempt – ACU

1 message

Mon, Sep 18, 2023 at 10:43 AM

TO: [REDACTED]

Date: September 18, 2023**PI:** Jordan Tate**Department:** ONL-Online Student, 17250-EdD Online**Re:** Initial - IRB-2023-204*The Impact of Gratitude on Software Developer Job Satisfaction*

The Abilene Christian University Institutional Review Board has rendered the decision below for *The Impact of Gratitude on Software Developer Job Satisfaction*. The administrative check-in date is --.

Decision: Exempt

Category: Category 2.(ii). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met:

Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation; or

Research Notes:**Additional Approvals/Instructions:**

If at any time the details of this project change, please resubmit to the IRB so the committee can determine whether or not the exempt status is still applicable. All approval letters and study documents are located within the Study Details in Cayuse IRB.

The following are all responsibilities of the Primary Investigator (PI). Violation of these responsibilities may result in suspension or termination of research by the Institutional Review Board. If the Primary Investigator is a student and fails to fulfill any of these responsibilities, the Faculty Advisor then becomes responsible for completing or upholding any and all of the following:

- When the research is completed, inform the Office of Research and Sponsored Programs. If your study is Exempt, Non-Research, or Non-Human Research, email orsp@acu.edu to indicate that the research has finished.
- According to ACU policy, research data must be stored on ACU campus (or electronically) for 3 years from inactivation of the study, in a manner that is secure but accessible should the IRB request access.
- It is the Investigator's responsibility to maintain a general environment of safety for all research participants and all members of the research team. All risks to physical, mental, and emotional well-being as well as any risks to confidentiality should be minimized.

For additional information on the policies and procedures above, please visit the IRB website <http://www.acu.edu/community/offices/academic/orsp...> or email orsp@acu.edu with your questions.

<https://mail.google.com/mail/u/0/?ik=a529c0fb09&view=pt&search=all&permthid=thread-f:1777390624299960708&simpl=msg-f:1777390624299960708>

1/2