Examining the frustration construct: Systematic comparison to stress and framework application

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Abstract

The current study aimed to polish the frustration construct through comprehensive literature review and comparison to stress. This was achieved through semantic analysis of stress and frustration and comparison of these semantic differences to actual conceptualizations of the two constructs as well as their associated situations. Based on Affective Events Theory (Weiss & Copranzano, 1996), the current study also aimed to clarify the affective experiences associated with frustration to better understand how related behaviors and attitudes manifest. Lastly, it tested a model of frustration based in a frustration framework (González-Gómez & Hudson, 2023) and conceptualized it within Effort Reward Imbalance (Siegrist, 1996). Key findings were that frustration and stress were indeed semantically similar and some small nuances in frustration experiences identified; some established frustraters were contributed more to stress. Frustration was best represented by a simplified model, including cognitive antecedents of goal blockage and effort and outcomes of guilt and hostility, and the relationship between cognitive antecedents and frustration was consistently moderated by individual differences.

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Chapter 1- Introduction

Stress and frustration are often linked in popular media, though the two are distinct. Even empirical evidence provides a murky understanding of their relationship. For example, some argue that stress may lead people to vent their frustration through counterproductive work behaviors (Andersen, 2006; Hendy et al., 2019; Leischnig et al., 2015), while others argue that frustration is a stressor (Černe & Aleksić, 2024). The relationship between the two is unclear, as is whether they truly conceptually differ. However, frustration is undoubtedly associated with aggressive, sometimes violent behavior (Berkowitz, 1998; Dollard et al., 1939), stress less so (Berkowitz, 1998; Felson, 1992). This relationship remains true in the workplace (Heacox & Sorenson, 2007; Reio, 2011), where it is essential to reduce frustration to avoid such negative consequences. Because stress and frustration are semantically similar (Chen & Spector, 1992) and both generally regarded as negative affect, it is hard to disentangle them. That said, scholars have been long been calling for a more precise definition of frustration in hopes to clarify its outcomes (e.g., Berkowitz, 1998). The current study aims to comprehensively examine frustration to provide a basis for complete distinction and future attempts at frustration mitigation and prevention. In doing so, this research will improve the frustration construct.

Frustration has been regarded as an emotional state that might be closely linked to counterproductive work behaviors, such as aggression or theft (Fox & Spector, 1999; Hendy, 2019; Norwood, 2018; Spector, 2005). Despite its marked association with considerable negative outcomes, the mechanism by which frustration spurs such behavioral outcomes is unclear. Recently, there have been attempts to reconceptualize frustration within appraisal theory to remedy this issue (e.g., González-Gómez et al., 2021). Regardless, enhancements in the operationalizations of specific attributes and indicators of frustration are necessary for future

efforts developing psychometrically sound measures of frustration and its evidence-based management.

Conceptual ambiguity of frustration revolves around its overlap with the concept of stress in early organizational frustration research, which may partially be explained by use of a common measurement method: physical arousal symptoms (e.g., Ganster & Rosen, 2013; Potegal, 2023). Although a relationship between frustration and stress has been established in the literature (e.g., Černe & Aleksić, 2024; Leischnig et al., 2015), its directionality and intricate interplay remain unclear. Indeed, a quick database search for "work stress outcomes" and "work frustration outcomes" or "work stress antecedents" and "work frustration antecedents" produces largely similar results – mainly stress-related results. Outcomes of frustration are less empirically supported; early occupational frustration scholars sometimes postulated outcomes of frustration without explicitly examining their specific mechanisms (e.g., Eaton, 1952).

Another explanation for overlap is that organizational frustration research does not always concretely distinguish negative emotional experiences from frustration – especially early research. For example, Spector's (1978) Model of Organizational Frustration referenced literature that considered general emotional arousal or emotional disturbances, but did not explicitly consider frustration (e.g., Latané & Arrowood, 1963; Schachter & Singer, 1962). Similarly, Narayanan et al. (1999) prompted participants to recall situations that made them feel frustrated, upset, or anxious to examine job stressors; they were not directly asked to recall a frustrating event. Failing to differentiate frustration from other potentially interrelated emotions, as early research did, can obscure variations in frustration's impact on individuals. Grouping frustration with other negative emotions in research may result in overlooking crucial nuances in how employees respond to it, hindering our understanding of the specific challenges frustration

poses within organizations and impeding the development of targeted interventions for its unique characteristics.

An additional aspect of the conceptual ambiguity of frustration concerns the lack of research regarding affective states uniquely associated with it as outcomes. Emotion is a combination of related reactions (Weiss & Copranzano, 1996). According to Frijda (1993), this combination includes subjective affective experience and cognitive appraisal, physiological change, and action readiness. Though research generally refers to affect and emotion interchangeably, the current paper considers affective dimensions; these dimensions include states that are components of emotional episodes. Guided by appraisal theory (Moors et al., 2013; Smith & Ellsworth, 1985), scholars have extensively examined the appraisal process in frustration, but comparatively little effort has been put forth to systematically identify its associated affective experience. Even commonly used frustration measures discount affective experience (e.g. Peters et al., 1980); measures of frustration are sometimes tautological, meaning that participants are simply asked to indicate whether they are frustrated, or to what extent their tasks are frustrating. This is perhaps because affective states can greatly differ across individuals. However, I contend that if a general pattern of affective states can be identified, it can inform the effectiveness of prevention and mitigation efforts. Neglecting affective outcomes of frustration is a significant oversight considering that they may be useful in explaining different behavioral outcomes associated with frustration (Weiss & Copranzano, 1996).

Due to lack of conceptual clarity and apparent overlaps between frustration and stress, it is essential to concretely compare the two to more precisely distinguish the frustration construct. A distinct understanding of frustration could also help address a major limitation of the stress construct; it may be becoming too broad in psychological literature (Kagan, 2016). Perhaps

differentiating stress from related concepts could lead to more legitimate stress measurement, as recommended by Slavich (2019). Similarly, accurate classifications may offer insight into an issue raised by Potegal (2023), overgeneralization of the Frustration-Aggression Hypothesis. In fact, some propose that frustration only leads to aggression to the extent that the outcome is an expected social norm (Leander et al., 2020), meaning that frustration doesn't necessarily always lead to aggression; it leads to aggression in scenarios where that reaction is deemed appropriate. Proper distinction between stress and frustration could conceivably provide a foundation towards more precise measurement for each.

To this end, the goal of the current research is threefold. First, it aimed to clarify the construct of frustration, specifically whether it is conceptually different from stress based on general exploration of each concept and semantic analysis of general conceptualizations of each term, experiences of each, and some of their measures. A bottom-up approach would help to better understand the perception of frustration. To achieve this, study one aimed to first provide a review of occupational stress and frustration and identify discrepancies between their measurements and conceptualizations. Then, study two adopted a top-down approach to provide a theoretical explanation of occupational frustration by extending stress theory to frustration via components of González-Gómez and Hudson's (2023) framework of Information Technology (IT) frustration, facilitating a comprehensive theoretical synthesis. Finally, study three aimed to build on study two by incorporating the entire range of cognitive appraisals of goal blockage, effort, control, certainty, responsibility, fairness, and attention into the framework of IT frustration.

Chapter 1 - Study One: Semantic Analysis

Part 1: Comprehensive Literature Review

A focused, comprehensive literature review was conducted, informed by PRISMA guidelines, to aid in the survey design (see Appendix A). The purpose of the review was to examine the current state of occupational frustration research, concentrated on the refined definition of frustration and exploring its related affective states, outcomes, and antecedents, while concretely comparing each to stress literature. Though the review was guided by PRISMA guidelines, it did not strictly adhere to them, as it did not need to include the breadth of occupational frustration research for the purpose of analysis; the review aimed to understand the scope and most critical elements of occupational frustration. To conduct the literature review, I searched within psychological databases (e.g., PsycInfo, Google Scholar, and Scopus) using key words relating to frustration and stress, with an emphasis on occupational research (e.g., *frustration, work frustration, stress outcomes, occupational frustration, frustration and emotion, frustration outcomes, frustration antecedents, frustration measurement, frustration scale, stress, work stress, job stress, occupational stress, stress outcomes, job frustration* etc.).

Titles and abstracts were examined for mention of occupational frustration and stress overlaps, emotional states, outcomes, or antecedents. For the focused review, emphasis was placed on occupational frustration (more so than stress). Articles were excluded if they did not meet these criteria, for instance, if they used child samples, clinical samples, or if they fell outside of occupational research, to keep the scope limited. Cited literature for the studies that were included was also examined, using the same criteria. Finally, a supplementary search was conducted with the aid of R RevTools (Westgate, 2019), which uses machine learning techniques to organize multiple database search results, remove duplicate studies, and screen abstracts. The

same exclusion criteria were used during this process. Definitions, antecedents, outcomes, and scales for both stress and frustration were compiled based on this literature review (see Appendix A for a decision-making flowchart and the corresponding applicable PRISMA steps for the RevTools review), yielding over 200 relevant studies, which were further examined for relevance.

Both stress and frustration have been explained in terms of realized or anticipated goal blockage or failure. Extant literature suggests that the concepts have a notable overlap, but it is important to discuss distinctions, especially considering that in an organizational context, employees' affective experiences influence their work-related behaviors (e.g, Ashkansy et al., 2014; Lam & Chen, 2012; Volmer, 2015). The fact that situational variables may carry behavioral and affective consequences (Peters et al., 1980) is evident in the overlaps between stress and frustration antecedents, as seen below. To illuminate the intersection and novel attributes of both constructs, the following summarizes definitions of stress and frustration, along with their antecedents and outcomes.

Brief Overview of Stress

Hans Selye's (1936) General Adaptation Syndrome is regarded as a landmark for stress research, which would continue to grow for decades (O'Connor et al., 2021). Though the term "stress" is only about 90 years old, stress literature has proliferated considerably. Therefore, definitions of stress can be difficult to unite because of variations in key terms; stress can refer to a condition or situation (e.g., Hobfoll, 1989), a reaction, or a response to the environment (Bliese et al., 2017). Additionally, like frustration, stress may be hard to define due to its varying measures (i.e., physiological, conditional, behavioral, etc). In fact, early stress research was fraught with issues of inconsistent terminology and variables (Lazarus, 1993b).

However, stress definitions do have universally accepted components across empirical research (Lazarus, 1993b). Generally, stress outcomes are referred to as "strain," which can include behavioral reactions as well as negative physical and psychological reactions (Spector & Jex, 1998). Stress is a reaction to a stressor, which produces individual responses (Griffin & Clarke, 2011) that may depend on cognition, or how an individual thinks about the stressful event (Lazarus, 1993b). Two widely accepted definitions of stress are "a state of worry or mental tension caused by a difficult situation" (World Health Organization, 2023) and "the physiological or psychological response to internal or external stressors" (American Psychological Association, 2018). However, it should be noted that they fail to directly address the precise essence of stress; instead, they primarily focus on antecedents and outcomes; they don't include the internal experience of feeling or perceiving stress.

Though stress is generally regarded as a negative outcome, this is not always the case. In fact, there are two distinct types of stress often regarded in occupational research: eustress and distress, and though the two may manifest similarly, negating the purpose for distinction (Bienertova-Vasku et al., 2020), they are associated with different experiences. According to Lazarus (1993) Distress is "bad stress," related to feeling threatened, and it is associated with negative experiences such as poor performance and strain. Eustress is "good stress" which might increase performance. There are also distinct types of stressors (Cavanaugh et al., 2000): hinderance stressors, which may be demotivating and are often associated with distress, and challenge stressors, which may be motivating and associated more with eustress. These components are widely accepted and applied in occupational stress literature.

Defining Frustration in the Workplace

A prominent approach to defining frustration in the workplace is typically confined within instances of goal failure (Leander et al., 2020). This is in fact also true of definitions outside of organizational research, perhaps due to Dollard et al.'s (1939) initial conceptualization of frustration: "*interference with the occurrence of an instigated goal response at the proper time in a behavioral sequence"*. Today, frustration is generally defined as both a "*thwarting*" *that prevents people from obtaining a goal that they expect based on previous experience,* and *the emotional state experienced when this goal failure happens* (APA, 2018). However, this definition lacks specificity; though there is consensus that frustration is usually the result of goal failure, defining it as such means that it is not distinguished from other experiences that may arise due to goal failure, such as anger (González-Gómez et al., 2021; Antonetti et al., 2021), guilt (Bohns & Flynn, 2012), and, sometimes, stress (Antoniou & Alkhadim, 2022). Additionally, the "emotional state experienced" is largely unspecified.

Frustration has long suffered from a lack of operational specificity and conceptual distinctiveness in its definition. In fact, Anderson and Bushman (1997) excluded frustration from an early metanalysis because it was "frequently defined in different ways" and therefore was determined an imprecise variable. This variation is exceedingly clear in extant literature. For example, Spector (1978) defined frustration as interference with goal attainment or maintenance in the Model of Organizational Frustration. Similarly, Fox and Spector's (1999) Frustration-Aggression Sequence Model defined frustration as a response to goal interruption. Some define frustration as an emotional response and/ or cognitive state associated with negative events, primarily experienced when unforeseen conditions interfere with goal attainment (Berkowitz, 1978; Fillauer et al. 2019; Lazar et al., 2006; Spector; 1999). There is also considerable argument

that frustration is a discrete emotion arising from cognitive appraisals of control, effort, and required attention, which ultimately is summed up as goal blockage (Roseman, 1979; Roseman, 1991; Smith & Ellsworth, 1985). According to Leischnig et al. (2015) frustration is an emotional reaction caused by an event that interferes with an ability to accomplish daily duties. This definition was adapted from Keenan and Newton's (1984), which states that frustration is interference with any ongoing response. Likewise, Roseman et al. (1994) stated that frustration simply functions to increase awareness of obstacles, since it often engages efforts to overcome obstacles. However, these goal-based definitions lack guidance in elucidating the affective experiences associated with frustration, as they predominantly perceive it as goal interruption.

Goal-based frustration definitions narrow our understanding of associated affect by exclusively focusing on it as a reaction to blocked goals, overlooking related triggers specific to context, such perceived injustice (De Clercq et al., 2021; Harlos, 2001; Wu et al., 2017) and insufficient information (Schweitzer et al., 2023) in the context of organizations, or other cognitive appraisals such as uncertainty, effort, or control. They also demonstrate limited subjectivity, prioritizing the objective case of goal disruption and neglecting individual variations that influence perception of and reaction to obstacles, such as frustration tolerance (e.g., Meindl et al., 2019), goal orientation (Whinghter et al., 2008), cognitive persistence (Jung & Lee, 2015), and locus of control (Brisset & Nowicki, 1973; Libb & Serum, 1974). Additionally, these definitions ignore context, failing to consider the influence of personality, cultural norms, and prior experience – especially related to reward expectations – on how individuals interpret and respond to challenges. Thus, while capturing one aspect of frustration, these extant definitions of frustration provide an incomplete and potentially misleading portrayal of this complex cognitive

and emotional experience. A more comprehensive understanding necessitates acknowledging the diverse emotional spectrum of frustration and the individual and contextual factors that shape it.

Some definitions of frustration do consider emotional experiences. For example, Phan et al. (2023) referred to frustration as being characterized by annoyance, irritation, and exasperation. Recently, González-Gómez et al. (2021) found that frustration may affect satisfaction. Similarly, Britt and Janus (1940) defined frustration as a process including emotion, tension, conflict, aggression, inhibition, and withdrawal. They operationalized frustration much the same way as Lazarus (1993), claiming that it involves an appraisal process, frustrater, and reaction, which aligns with emotion theory. Some argue that frustration might also simply be an emotional outcome (O'Connor et al., 1984) rather than a process, neglecting antecedents. Beckman and Simms (1992) operationalized frustration as disappointment and dissatisfaction with workplace morale and work arrangements (e.g., dissatisfaction with hours and inappropriate resources). Similarly, Harlos et al. (2017) described frustration simply as dissatisfaction. Leischnig et al. (2015) claimed that frustration is a reaction to acute stressors such as role conflict, role ambiguity, supervisor conflict, and intergroup conflict. Jeronimus and Laceulle (2017) stated that frustration is a negative emotion rooted in disappointment. They explained that it is an irritable distress response experienced when people face trials in fulfilling personal goals, desires, drives or needs, which is triggered due to externally attributed omission of a rewarding event.

A final approach to understanding frustration is in discrepancy between expectations and outcomes, emphasizing the role of cognitive processes. For example, the omission of a rewarding event when one is expected is seen in some definitions. According to Libb (1972), frustration is a reaction to non-reward for a behavior that was previously rewarded. A similar definition was

later used by Amsel (1992), who proposed the theory of Frustrative Non-reward. These align with goal-blockage definitions but focus specifically on the experience of unmet expectations. This perspective is important because it suggests that frustration can stem from both external impediments and internal evaluations of goal satisfaction. Relatedly, a small, but distinct area of occupational research focuses on needs frustration. According to Self Determination Theory (SDT), need frustration is a distinct experience that occurs with unmet needs, specifically autonomy, relatedness, and competence (Deci & Ryan, 2000; Longo et al., 2016). Need frustration as a concept has received much attention in broad literature but is still understudied within occupational research (Olafsen et al., 2021). Though, need frustration has been associated with increased stress in an organizational context (Olafsen et al., 2016).

Based on these definitions, it seems that the frustration construct is conceptually like stress in that– as proposed by Britt and Janus (1940) – reactions are situationally dependent. However, frustration seems to be conceptually distinct from stress in that its most salient situational context is interference with goal attainment and expectations, whereas stress can occur due to a wider collection of situational variables. It is important to note that frustration might not arise simply because of goal blockage (González-Gómez et al., 2021).

The current research aims to elucidate the meaning of frustration and enhance understanding of antecedents and outcomes of frustration, accounting for similarities and differences with stress. Specifically, it adopts an appraisal theory approach, positing that general frustration is a full emotional process consisting of a combination of appraisals, behaviors, and affective experiences that may indicate action readiness, instead of simply focusing on goal appraisals. Perhaps defining frustration in this way, rather than with the predominant goal failure perspective, could clarify frustration and allow more precise application within the context of

occupational research. Also, rooted in SDT, identifying specific antecedents may also help to explain needs frustration, clarifying which unmet needs are most salient.

Overlaps in Occupational Stress and Frustration

Antecedents

Both stress and frustration manifestation within organizations can be influenced by non-work factors. For example, work-family conflict has been tied to hinderance stress (Eissa & Wyland, 2018). Additionally, individual differences may be early antecedents of work stress. For example, Fitzgerald et al. (2005) found that social problem-solving skills and anger arousal in adolescence may predict occupational stress in adulthood. Similarly, some research highlights traits that are early indicators of frustration sensitivity, specifically frustration tolerance. The ability to self-regulate is important to frustration management, and is generally fostered in childhood (Chan et al., 2024; Lai et al., 2022). Both Frustration Intolerance and Frustrative Non-reward Responsiveness can be measured at the trait level and may be influenced by other personality traits (e.g., Morillo et al., 2020). Also, Bessière et al. (2004) found that dispositional factors such as self-efficacy may be stronger predictors of frustration than situational constraints, highlighting a need to include individual factors in frustration frameworks. Regarding psychological antecedents of frustration, Fox and Spector (1999) argued that both trait anger and trait anxiety are positively associated with frustration.

In the context of the workplace, there are a finite number of factors that can impact employee emotions and behaviors, so it makes sense that stress and frustration would have a lot of common instigating factors in the workplace. Indeed, extant literature has identified overlap in antecedents of work-related attitudes (Jorde-Bloom, 1988). Antecedents of work-related stress, broadly referred to as “stressors,” include many situational factors. An early stress measure, the

Occupational Stress Indicator, indicated that factors intrinsic to the job, organizational role, interpersonal relationships, organizational structure, and home/work interface might influence stress (Cooper et al., 1988). Low perceived job control is a well-established stressor (Karasek & Theorell, 1990; Marmot et al., 1997). Additionally, job demands created by role ambiguity and conflict might lead to stress (Schaubroek et al., 1989). The National Institute of Occupational Safety and Health (NIOSH; 2014) also identified issues with task design, management style, interpersonal relationships, lack of growth opportunity, and unpleasant or dangerous conditions as common stress sources. Commonly recognized stressors also include job content (e.g., task variety, boring tasks), workload and time pressure, demanding work hours, lack of autonomy, job insecurity, organizational culture, and lack of work-life balance (WHO, 2020). Similarly, frustration antecedents largely include situational constraints (Fox & Spector, 1999; Spector, 1997; Villanova & Roman, 1993). For example, constraints on information, tools and equipment, materials and supplies, budgetary support, required services and help from others, task preparation, time availability, and constraints on the job itself, are well-established antecedents of frustration (O'Connor et al., 1982). They've been associated with greater dissatisfaction and frustration at work (O'Connor et al., 1984).

Factors intrinsic to work are also frustraters. Early hypotheses of frustration's organizational antecedents were proposed by Eaton (1952), who outlined six sources of frustration: role ambiguity, frustrating nature of work, lack of promotion opportunity, organizational change, job security, and physical isolation, all of which may be associated with negative emotions or goal blockage. Eaton's 1952 hypotheses have not been directly empirically tested; in fact, few have cited the hypotheses since their publication even though others have proposed some of the same antecedents (e.g., organizational change; Potosky & Azan, 2023).

According to Keenan and Newton (1984), issues with the physical environment, organizational structure and climate, rules and procedures, role stress, and people can all be antecedents of frustration. These hypotheses have been indirectly supported in research, but not always purposefully tested.

For example, negative interpersonal experiences, such as abusive supervision, workplace bullying, lack of warmth and support, and interpersonal conflict are established antecedents of frustration (Avey et al., 2015; Buunk & Verhoeven, 1991; Perkins & Oser, 2014; Valentine et al., 2021), along with low person-environment fit (Furnham, 1991), supporting Keenan and Newton (1984) and Eaton (1952). Interestingly, workplace social support can also lead to frustration if said support is considered unhelpful or harmful, regardless of intention (Hughes et al., 2023). General issues with leadership behavior have also been identified as antecedents of frustration, specifically leader procrastination (Legood et al., 2018) and abusive supervision (Harris et al., 2013). On the other hand, leaders can experience frustration because of difficulty managing subordinates (Porras, 1982). Perceptions of organizational politics and power fluctuation, or interacting with individuals of varying power levels, can also lead to frustration (Harris et al., 2009; Sabey et al., 2021; Saei et al., 2023), along with perceived organizational injustice (De Clercq et al., 2021; Harlos, 2001; Wu et al., 2017). Additionally, a self-perceived overqualification might be an antecedent of frustration (Wiegand, 2023), as can slow work progress (Phan et al., 2023), and ineffective meetings (Seaton, 2020). Role conflict role ambiguity, and uncertainty are generally associated with frustration as well (Heacox & Sorenson, 2004; Morris et al., 2022), though it is unclear why (Anselme, 2022).

In summary, the examination of frustration antecedents reveals a notable alignment with situational constraints, mirroring the pattern observed in stress antecedents. Within the

organizational context, frustration is intricately associated with factors such as goal blockage, negative emotions, negative interpersonal experiences, and the loss of anticipated rewards. In comparison to the affective experience of frustration, workplace frustration antecedents are slightly more well-established. However, it seems that outcomes of frustration receive the most attention overall.

General Outcomes

Generally, stress has been associated with unhealthy behaviors such as overeating or eating unhealthy foods (Tomiyama, 2018), decreased physical activity (Deng et al., 2024; Stults-Kolehmainen & Sinha, 2014), and poor sleep hygiene (Akerstedt, 2006). It also has negative long-term health outcomes, such as cardiovascular disease (CVD; Schneiderman et al., 2005), musculoskeletal disorders (MSD; Hartzell et al., 2017; Huang et al., 2002), psychological disorders (Davis et al., 2017), and obesity (Tomiyama, 2018). These outcomes are also applicable to work-induced stress since they're meaningfully associated with stress in general and they can influence work outcomes. In fact, cascading effects of stress are associated with disastrous consequences nationally (APA, 2020; Davis et al., 2017), a phenomenon colloquially referred to as the "stress epidemic" (Newbegin, 2015; Northwestern National Life Insurance Company, 1991).

General health outcomes related to frustration are less extensively studied. However, some evidence indicates that it could be related to smoking behaviors because of its association with anger-related emotions (Rath et al., 2016) and it may encourage alcohol consumption (Donaire et al., 2021). Biological correlates of frustration and their associated behavioral outcomes are well-established in Neuroscience literature. For example, early animal research found that rat samples were more motivated in trials following a reward omission when a reward

was expected (Amsel, 1992; Amsel & Roussel, 1952; Scull, 1973). This was termed frustrative non-reward (Amsel, 1992). It encapsulates the behavioral and physiological experience associated with unexpected reward omission and is largely associated with aversive emotional states (Papini et al., 2022). Even today, Amsel's definition of frustration: experiencing omission of an expectation, is still relevant and largely supported by neuroscience research (Yu, 2016), including some neuroimaging studies (Yu et al., 2014; Abler et al., 2005) and studies demonstrating the activation of specific neural structures in frustrative non-reward (Guarino et al., 2020; 2023). Interestingly, frustrative non-reward may also be important to stress experiences, as indicated by some animal research (Lyons et al., 2000). Similarly, Bierzynka et al. (2016) found a pattern of activation in brain structures similar to that of acute stress during a frustration task, highlighting another area of overlap between stress and frustration. Though, it should be noted that brain activation patterns associated with frustration may differentially depend on individual differences in temperament (Bierzynska et al., 2016). These inconsistencies and overlaps highlight another reason to approach frustration from an appraisal theory perspective; even biological evidence of frustration varies.

Positive Outcomes

Eustress, or positive stress, has received relatively little attention compared to distress (Fevre et al., 2003). However, there is broad support that challenge stressors – those that may promote accomplishment related to job tasks (Hargrove et al., 2013) – may serve to increase eustress, which has been associated with positive work outcomes. Particularly, it might improve performance (Hargrove et al., 2015). From an appraisal approach, challenge stress in combination with task-focused coping can lead to positive work outcomes, such as increased

performance (McGowan et al., 2006). Therefore, increased job performance is sometimes a positive outcome of stress, specifically challenge stress.

Likewise, frustration research has largely revealed negative consequences, but a small subset suggests that there may also be positive outcomes associated with frustration (e.g., Beck et al., 2017). For example, frustration might lead to increased cognition associated with creativity (i.e., problem-solving efforts or idea generation) due to efforts to overcome frustrating situations (Amabile et al., 2005; Baas et al., 2008; Lazar et al., 2006). Additionally, it might motivate people to directly address challenges (Barclay et al., 2021). Frustration might also be functional since it may have an adaptive value such that it encourages disengagement with nonrewarding stimuli (Papini et al., 2022). This research area highlights a similarity to stress research; positive frustration outcomes indicate that there could be "challenge frustration," like eustress, or challenge stress. It also highlights functional aspects of frustration related to creativity. Therefore, understanding how affect related to frustration may differentially lead to positive behavioral outcomes, like motivation, and negative outcomes, like aggression, could help elucidate the experience of "challenge frustration." Based on this subsection of research, frustration may be more goal-specific, sometimes directing attention towards overcoming an obstacle to achieve a desired outcome, while stress can be more diffuse, arising from various internal or external pressures. However, the affective outcomes associated with goal appraisals are important in determining whether frustration will have positive behavioral outcomes. Also, although both can motivate action, frustration aims for goal achievement, while stress focuses on adapting to demands.

Negative Job Outcomes

There is overwhelming evidence that job stress can have negative health impacts (O'Connor et al., 2021). More specifically related to occupational literature, stress can sometimes lead to burnout, an occupational phenomenon resulting from chronic workplace stress that has been unsuccessfully managed (World Health Organization, 2019; Bakker et al., 2014). Burnout is characterized by feelings of exhaustion, increased mental distance or cynicism related to work, and reduced professional efficacy (World Health Organization, 2019) and has long been linked to absenteeism, increased turnover, and reduced productivity (Cordes & Dougherty,1993; Swider & Zimmerman, 2010). Stress has also been associated with other organizational outcomes. For example, it has been linked to decreased productivity (Bui et al., 2021; Hassard et al., 2018), increased turnover (Cavanaugh et al., 2000; Podsokaff et al., 2007) and low organizational commitment (Podsokaff et al., 2007). These all have negative implications for organizational goals. In general, hinderance stress has also been associated with decreased motivation (LePine et al., 2004) and decreased job satisfaction (Fairbrother & Warn, 2003; Schaubroek et al., 1989). There is also some evidence that stress is related to interpersonal conflict (Sassi et al., 2015; Chen & Spector; 1992).

On the other hand, Spector's (1975) six-factor Response to Frustration Scale identified behavioral outcomes associated with frustration at work, including aggression, sabotage, wasting time, interpersonal hostility and complaining, interpersonal aggression, and job apathy. Spector's (1978) model of organizational frustration argued four major behaviors caused by frustration: trying an alternative, aggression, withdrawal, and goal abandonment. Similarly, Britt and Janus (1940) proposed aggression, withdrawal, regression, and resistance. Though these seminal claims were not always explicitly empirically tested, there is consensus of support for these broad behavioral categories as outcomes of frustration.

For example, a large body of organizational frustration research regards its effect on aggression (Fox & Spector, 1999; Heacox & Sorenson, 2004; Spector, 1975**)**. Aggression is both a predictor and outcome of frustration. In an organizational setting frustration is associated with interpersonal hostility, and sometimes physical violence (Ménard et al., 2011; Spector, 1975; Taylor et al., 2020), workplace bullying (Baillien et al., 2009; Zahlquist et al., 2019), and incivility (Azeem et al., 2021): a low-level aggression characterized by rudeness, passivity, or impoliteness, commonly observed in the workplace (Andersson & Pearson, 1999). Fox and Spector's (1999) research supporting their model of work frustration-aggression also found that frustration was an antecedent of personal and organizational aggression. This was supported by Keenan and Newton (1984) who found that frustration was positively associated with both anger and hostility and Eissa and Lester (2017), who found that frustration was positively associated with abusive supervision. Hershcovis et al. (2007) found that frustration was a strong predictor of organizational aggression, but not interpersonal aggression – though they conceptualized situational constraints more as stress than frustration. There is also some argument that people progress from frustration to aggression, and even violence, in response to goal blockage, unless organizations intervene with said blockage (Tobin, 2001). Given the substantial negative impact of aggression, further research is needed to determine whether some types of aggression are more associated with frustration rather than stress.

Frustration has consistently been linked to several aversive behavioral outcomes, emphasizing the need to understand how it spurs these behaviors. It has been linked to counterproductive work behaviors (Fox & Spector, 1999; Spector & Fox, 2005) such as intentionally performing poorly or abusing resources (Hendy et al., 2019) and sabotage (Azeem et al., 2021; Storms & Spector, 1987). Sometimes, frustration is related to increased turnover

(Chang et al., 2018; Spector, 1987). There is also extensive evidence to suggest that frustration affects task performance and goal commitment, though this research is not always within the occupational realm (e.g., Beck et al., 2017; Libb, 1972;). This may be because frustration serves as a competing demand on cognitive capacity (Meyer, 2011). Research has established other effects on task performance, such as procrastination (e.g., Harrington, 2005a) and decreased work engagement (Ugwu & Onyishi 2017). Research also indicates that frustration is associated with general performance losses (e.g., failure to complete a sale or receive promotion; Dubinsky & Lippitt, 1979; Leischnig et al., 2015). Additionally, frustration may lead to shortcut behaviors (Phan et al., 2023) and may affect work outcomes under conditions of high workload (Pindek et al., 2022). However, some levels of frustration may be associated with greater performance (González-Gómez & Hudson, 2023). Admittedly, this pattern of effects unfolds similarly in stress literature (see the Yerkes-Dodson law). Therefore, investigating the distinctions between stress and frustration outcomes and antecedents might further illuminate whether the concepts are truly unique and whether they have exclusive outcomes and antecedents.

Emotions Related to Frustration

It is generally clear that frustration is associated with negative emotional states and increased physiological arousal (Spector, 1978). Britt and Janus (1940) proposed that frustration is associated with guilt, remorse, shame, and embarrassment. In an organizational context, frustration may lead to emotional exhaustion (Sabey et al., 2021). Wilkens et al. (1974) identified states that followed occupational frustration. These include rationalization: making excuses to deal with failure; fixation: repeating behavior that results in goal loss; repression: denying feelings of frustration; regression: giving up attempts at goal attainment; avoidance or noninvolvement following a long period of frustration; and challenging the manager. However,

their claims haven't been widely verified and there is little research regarding the emotional outcomes of frustration, excluding anger.

Anger is perhaps the most frequently associated with frustration; several scholars have supported that frustration is related to anger (Britt & Janus, 1940; González-Gómez et al., 2021; Hennessy, 2017; Keenan & Newton, 1984; Smith & Ellsworth, 1985), highlighting the need to understand the frustration's affective outcomes. The noted relationship with anger explains why situational frustraters can lead to aggression, according to the General Aggression Model (GAM; Anderson & Bushman, 2002). Both state and trait anger are well-established contributors to aggression (Anderson & Bushman, 2002; Veenstra et al., 2018;). Therefore, in line with aggression theory, frustration's association with the volatile emotional state of anger indicates an elevated risk of hostile or harmful organizational behavior, which necessitates definite isolation of frustration from stress. Frustration itself also serves as a motivator for aggressive surges, as evidenced by neuroimaging (Yu et al., 2014).

In sum, frustration, as a trigger for negative behavior and performance, operates through mechanisms such as eliciting aggressive impulses, impairing cognitive function, and decreasing engagement with pro-organizational behaviors. This cycle of negativity perpetuates frustration, since outcomes and antecedents intersect, leading to detrimental outcomes in relationships, progress, effort, and overall performance. A deeper understanding of frustration may help reduce these negative outcomes.

Distinctions

Though stress and frustration have significant overlap, there are a few areas of distinction. For example, one research area in stress is the broad category of coping: an individual's attempt to mitigate stress (Lazarus, 1993a). Coping methods and individual

differences in coping have been researched in occupational stress literature for decades (e.g., Dewe et al., 2010; Latack et al., 1995; Lazarus, 1993a; Lazarus, 1966), but frustration coping methods are not as established. Long-term effects of stress are also well-established (e.g., burnout, engaging in unhealthy behaviors, psychological disorders, sleep issues, and diseases), but long-term effects of frustration are less so. Though it should be noted, if frustration is associated with stress, it might play an essential role in burnout (Černe & Aleksić, 2024; Lewandowski, 2003). Additionally, there have been comprehensive attempts within stress literature to examine stress recovery (e.g., Sonnentag & Fritz, 2007; Sonnentag et al., 2017; Sonnentag et al., 2008) and management (Tetrick & Winslow, 2015) – a considerable distinction from frustration literature. Instead, extant literature on frustration has been predominantly concentrated on behavioral outcomes or reactions, neglecting to address mitigation or recuperation attempts, thus creating both theoretical and practical gaps. This may be because the entirety frustration's emotional experience is not fully understood.

Part two: Scenario Evaluation and Semantic Similarity Comparison

Though stress and frustration have unique characteristics, many similarities were identified based on literature review; for example, both share many antecedents and outcomes. To summarize, cognitive appraisal is an important aspect of stress experiences (Lazarus, 1993b; Lazarus, 2006), even though stress is not necessarily considered an emotion (González-Gómez & Hudson, 2023). Similarly, cognitive appraisals are important to frustration experiences (González-Gómez & Hudson, 2023; Smith & Ellswort, 1984). Situational constraints were identified as key antecedents for both stress and frustration. Also, both are associated with outcomes that are generally regarded as counter-productive work behaviors (CPWB), though frustration seems to be more consistently related to a CPWB of higher valence than stress (e.g.,

aggression; Chen & Spector, 1992). Finally, both frustration and stress seem to suffer from over-extension in research – which is surprising considering the sizable difference in the amount of occupational frustration research. However, the constructs both indisputably include cognitive appraisal and situational factors that serve as catalysts for reaction.

Due to these overlaps, the relationship between frustration and stress in unclear, but one step towards distinction is examining whether conceptualizations of each term are genuinely reflected in their measures. Study one aimed to determine the components of stress and frustration based on comprehensive literature review, determine how individuals define both stress and frustration, and determine the extent to which general definitions relate to existing measures of stress and frustration. An integral component of this research was comparing the current operationalizations and taxonomies of stress and frustration, along with their corresponding behavioral indicators to inform semantic analysis. In doing so, the following study aims to answer the questions:

RQ1: How are individual interpretations of stress and frustration and their associated experiences conceptually similar?

R2Q: How well are existing measures capturing individual interpretations of stress and frustration?

Methods

Overall Study Design

The study employed a survey design to examine how participants define stress and frustration and whether these are conceptually like existing stress and frustration measures. An experimental design with a frustration manipulation was adopted and disseminated in an online

survey format. This was selected over an in-person manipulation to gain rich text data and a sufficient sample size for analyses.

The survey was administered through Qualtrics and included measures of stress and frustration. Participants provided basic demographic information of age, gender, years of work experience, and work industries, then were asked to play the QWOP Frustration game (Foddy, 2008) – which has built in situational constraints – as a frustrating condition. The game involves manipulating a "sprinter" whose legs are controlled by the keys Q, W, O, and P on a standard keyboard. Each key moves only one portion of the sprinter's leg such that the thighs and calves on each leg move in isolation, which makes it difficult to move the sprinter without falling. When the sprinter falls, the game ends, and the goal of the game is simply to move the sprinter as far as possible. However, for the purpose of this experiment participants had an artificial goal of 20 meters. This was chosen based on a pilot test determining how to implement the frustration manipulation, where most participants found the task of reaching 20 meters during QWOP frustrating ($m = 3.53$, $sd = 0.50$).

Though not QWOP is not a direct example of occupational frustration, QWOP affords many associated experiences while providing a salient frustrating experience that participants can rely on during the survey. For example, it has built-in situational constraints (e.g., participants are meant to run as far as possible, but must do so with irregular motion), which were identified as an antecedent of occupational frustration in literature review (Hershcovis et al., 2007; O'Connor et al., 1982). The game also involves slow progress, which is frustrating in occupational settings (Phan et al., 2023), since participants must learn the controls, try to master them to move, and then try to continue to move farther and farther with each attempt. Also, in

open-ended responses, some participants indicated that frustration with games may be similar to that felt at work (see results of study two).

Participants were randomly assigned to one of four conditions: a control condition with no time constraints, or 5, 10, or 15 minutes of required game play. These conditions were also chosen based on a pilot study, where most participants who provided feedback indicated that they would prefer to play the game for ten minutes. Some indicated that they would either get bored with more time, or need more time to complete the task, and/or that they would get frustrated with less time. In each of the timed conditions, participants could not move on until their allotted time ended. A countdown was visible on the screen for each participant so that they knew how much time remained. In the control condition, this changed to a "count up" so participants still saw how much time they spent on the screen but were able to move on at any time. The main goal of the timed conditions was to serve as a constraint on the participants' 20-meter goal. In the control condition, participants received the following instruction:

"To begin, you will play QWOP (see directions below). When you are ready to proceed, please take a screenshot of your screen including your best distance and the timestamp below the game and upload it on the next page. If you reach 20 meters, you will need to upload your screenshot as evidence to be entered into a drawing for a $20 gift card to Amazon."

In the timed conditions, participants received a slightly modified instruction which included their respective time. All participants were asked to submit a screenshot of their best meter achievement, even if it was not 20 meters. The inclusion of a screenshot regardless of achievement was primarily to motivate participants to engage in the game. Following game play, participants completed a measure of cognitive appraisals they made during the game. This measure was included first so that participants didn't gauge the emotion of interest in the study.

Then, participants completed a measure of state frustration, a measure of their affective states, and a measure of state stress. For each of these measures, participants were reminded to think about their experience during the game while answering.

They then answered open-ended questions regarding their experiences of stress and frustration (e.g., *"Please describe a time where you felt frustrated at work"*) and their definitions of stress and frustration (e.g., *"How would you define stress?"*). Additionally, participants were presented with a list of scenarios and asked to identify whether they were stressful or frustrating in a forced-choice format. Each scenario was included based on antecedents of stress and frustration identified in literature review **(**see Table 1**)**. Scenarios were created by a team of two graduate students in the Industrial/Organizational psychology program at Kansas State University and edited by a graduate lab. This scenario identification was included as an exploratory measure of which antecedents are more associated with each concept since there is significant overlap between the two. Finally, participants completed global stress and frustration scales and control measures.

Table 1. Frustrating Scenario Identification and Creation

Antecedents	Associated situations
Role ambiguity (Eaton, 1952)	1. Receiving unclear instructions 2. Being asked to help complete someone else's tasks 3. Being asked to complete the tasks of multiple job titles 4. Being asked to work overtime
Frustrating nature of work (Eaton, 1952)	5. Having too much work to do 6. Being asked to perform a task without proper resources 7. Being asked to perform a task without proper training 8. Having boring work

Events frustrating goals (Spector, 1978)	9. Being rushed to finish a task 10. Being asked to complete a task you do not possess the skill to complete 11. Being asked to abandon a project 12. Not having the proper resources to complete a task
Lack of promotion opportunity (Eaton, 1952)	13. Getting passed up for a promotion 14. Being denied for a raise 15. Not being offered promotion opportunity
Organizational change (Eaton, 1952)	16. Getting a new supervisor/manager 17. Changes to company pay policy 18. Changes to company leave policy 19. Changes in company ownership 20. Changes in benefits packages
Job security (Eaton, 1952)	21. Being replaced by automation 22. Being replaced by younger workers 23. Being replaced by outsourcing 24. Being unsure if your job is secure (due to recession, downsizing, change in ownership etc.)
Physical isolation (Eaton, 1952)	25. Working in an environment alone 26. Working virtually with a team 27. Isolation from peers 28. Having to work remotely from home
Interpersonal issues (Fox & Spector, 1999)	29. Being harassed by a coworker 30. Interacting with an upset customer 31. Experiencing discrimination from coworkers 32. Being micromanaged

Participants and Procedure

Participants were recruited via a snowball sample of the researchers' contacts and an undergraduate sample. This was primarily to reach a working sample in a cost-effective manner.

Undergraduates were excluded if they had no previous work experience. Participants were not compensated, but each had the opportunity to be entered into a drawing for a gift card. Of the 328 participants that began the survey, 217 finished the parts of the study used in hypothesis testing, yielding a 66% response rate. After inspection, three participants were removed for failing all attention checks, yielding 214 participants. Of these participants, those who had insufficient text data (e.g., those who did not answer one or more open-ended question, or those who did not provide complete, coherent responses) were removed from this study, resulting in a final sample of 195 participants for study one. The average age was 23.09 years (SD = 10.32), and of those who reported their gender, 50.77% were female, 43.08% were male, and 2.56% were non-binary. The average amount of work experience was 7.03 years (SD = 9.36).

Study one focused on the components state frustration and stress, answers to open-ended questions, rankings of antecedents, and scores from global stress and frustration scales for text analysis.

Measures

State frustration was measured with the Frustration with Work Scale (FWS; Peters et al., 1980). The word "job" was replaced with "task." For example, *"Trying to get this task done was a very frustrating experience."* Items are rated on a 1 to 5 Likert-type scale, with lower scores indicating lower frustration and higher scores indicating higher frustration. This measure was chosen because it directly examines participant frustration with their task.

State stress was measured with an adapted Stress in General Scale (SIG; Stanton, 2001), a measure of work stress rated on a 1 to 5 Likert-type scale, where participants are asked to rate how often items describe their work. Work was again replaced with the QWOP task. Lower

scores indicate lower stress, and higher scores indicate higher stress. An example item is *"[my experience with the QWOP game was] overwhelming."*

The Perceived Stress Scale (PSS; Cohen, 1983), a classic global stress scale measured on a 0 to 4 Likert-type scale, with lower scores indicating lower stress and higher scores indicating higher stress, was used to measure global stress. An example item is *"I have found that I could not cope with all the things that I had to do.*"

Work Stress was measured with the Effort Reward Imbalance Questionnaire (ERI; Siegrist & Montano, 2014), which measures aspects of stress on a 1 to 4 Likert-type scale, with higher scores indicating increased stress, was also used to measure global stress. An example item is *"I have constant time pressure due to a heavy workload."* Also, a supplementary measure of stress was included to directly examine stress, since ERI targets specific aspects of effort, reward, and overcommitment; three items from the Perceived Occupational Stress Scale (POS; Marcatto et al., 2022) were included. Items were rated on a 1 to 5 Likert-type scale with higher scores indicating higher stress. An example item is *"My work is stressful."* A composite of the scores from these scales was used for work stress.

The Frustration Discomfort Scale (FDS; Harrington, 2005b), served as an individual difference measure of frustration, indicating frustration tolerance on a 1 to 5 Likert-type scale, with lower scores indicating lower frustration tolerance and higher scores indicating higher frustration tolerance. An example item is *"I can't stand the hassle of having to do things right now."*

The Frustrative Non-reward subscale of the BIS/BAS (Behavioral Inhibition System/ Behavioral Approach System) extension (FNR; Wright et al., 2009), was also used to measure individual differences in frustration. It examines tolerance of reward omission on a 1 to 4 Likert-

type scale, with lower scores indicating higher tolerance of non-reward and higher scores indicating lower tolerance of non-reward. An example item is "*If I have been working hard at something I lose motivation if I don't get the reward I deserve."*

Analyses

Data was analyzed using the open-source software, R version 4.4.2. Missing data (n=1,175) was addressed using the predictive mean matching (PMM) multiple imputation method at the item level (Little, 1988; Rubin & Schenker, 1986) with the mice package (van Buuren & Groothius-Oudshoorn, 2011) before removing participants with insufficient text data. PMM reconstructs missing data through multiple regression, borrowing observed values from existing data with statistically similar means, thereby maintaining the data's distribution characteristics. It is robust with small samples and non-normal data with up to 30% missing data (Kleinke, 2017; 2018) and is less statistically biased than list-wise deletion and Poisson imputation methods (Bengtsson & Linblad, 2021). PMM was implemented through the multivariate imputation by chained equation (MICE) method, which can handle complex data structures and variable diversity (Van Buuren & Groothuis-Oudshoorn, 2011).

The data exhibited an overall missing data rate of 2.38% across all study measures; of 49,351 cells, 1,175 were imputed. Participants who completed at least 63% of the survey, including the QWOP game and measures of state frustration, state stress, the PANAS-X, and the DRQ were included since they completed portions of the survey crucial to hypothesis testing. The final sample comprised 214 participants, nine of which had large amounts of missing data, and eight of which had random missing cells. Of the 214 participants, five (2.34%) completed 66% of the survey, one (.47%) completed 63% of the survey, two (.93%) completed 71% of the

survey, and one (.47%) completed 97% of the survey. Those who had missing text data were removed, resulting in 195 participants for this study.

Participant ratings of frustration and stress scenarios (see Table 1) were analyzed with simple descriptive statistics to determine which frustrating scenarios were rated as frustrating rather than stressful. The frequency of stressful and frustrating ratings, as well as the proportion of frustrating ratings was calculated for each scenario.

Data was additionally analyzed with the *text* package (Kjell et al., 2023). With this package, answers to open-ended questions can ultimately be used to understand constructs without traditional measures (Kjell et al., 2022). The text package can also be used to examine the relationship between textual data and traditional scale scores. The package transforms open-ended answers into numerical representations called "word embeddings," which are ordered vectors that represent words in a high dimensional space. The default for creating these embeddings in the text package is BERT (bi-directional encoder representations for transformers; Devlin et al., 2018)

Word embeddings for open-ended responses can be used to determine texts' semantic similarity scores, or how similar two texts are in meaning (Kjell et al., 2023). Since word embeddings are represented in a high-dimensional space, semantic similarity refers to how close embeddings are positioned in the word embedding space; this demonstrates how close they are in meaning (Kjell et al., 2023). Here, similarity is measured as cosine similarity, or the cosine of the angle between word embeddings, where a score closer to one indicates higher semantic similarity (Han et al., 2012). For the current study, semantic similarities of stress definitions and stress experiences and frustration definitions and frustration experiences were examined using the *textSimilarity* function. Stress and frustration definitions and stress and frustration experiences

were additionally cross-examined for semantic similarity. Then, a bootstrap test was conducted to evaluate the significance of the observed semantic similarity between constructs, as results of each comparison were non-normally distributed (see Appendix B). The observed mean cosine similarity for each comparison was compared to a bootstrap distribution generated from 5,000 resamples of the similarity scores with replacement. This comparison was conducted to determine whether experiences and definitions are truly semantically similar, as argued in literature (Chen & Spector, 1992).

Word embeddings can also be used to examine the relationship between scores on traditional scales and textual information. Qualitative responses can provide rich information that traditional scales do not capture; a measure can be psychometrically sound but overlook the nuances of a concept. Word embeddings of participant definitions and experiences can be used to examine the relationship between conceptualizations and traditional scores, in this case state frustration scores, state stress scores, work stress, as well as FDS (Harrington, 2005), FNR (Wright et al., 2009), PSS (Cohen, 1983), and POS (Marcatto et al., 2022) scores. This analysis uses the *textTrain* function and can elucidate the relationship between participant conceptualizations and experiences of stress and frustration and their respective scale scores, which will indicate how well each measure is capturing experiences. This comparison can elucidate how well existing measures are supplementing actual experiences (Kjell et al., 2022; 2024), regardless of the measures' validities.

Results

Scenario Analysis

Results of scenario analysis (see Table 2 and Figure 1) revealed that participants found issues related to role ambiguity, the frustrating nature of work, goal blockage, lack of promotion

opportunity, organizational change, job security, physical isolation, and interpersonal issues generally frustrating, with a few exceptions; 11 scenarios were rated as more stressful than frustrating. Most participants found having multiple tasks, too much work, lacking proper training, being rushed, getting a new supervisor, changes in company ownership, lack of job security, isolation, having to work remotely, and interacting with an upset customer stressful, demonstrating some areas where organizational change, job security, physical isolation, and interpersonal issues were more stressful than frustrating.

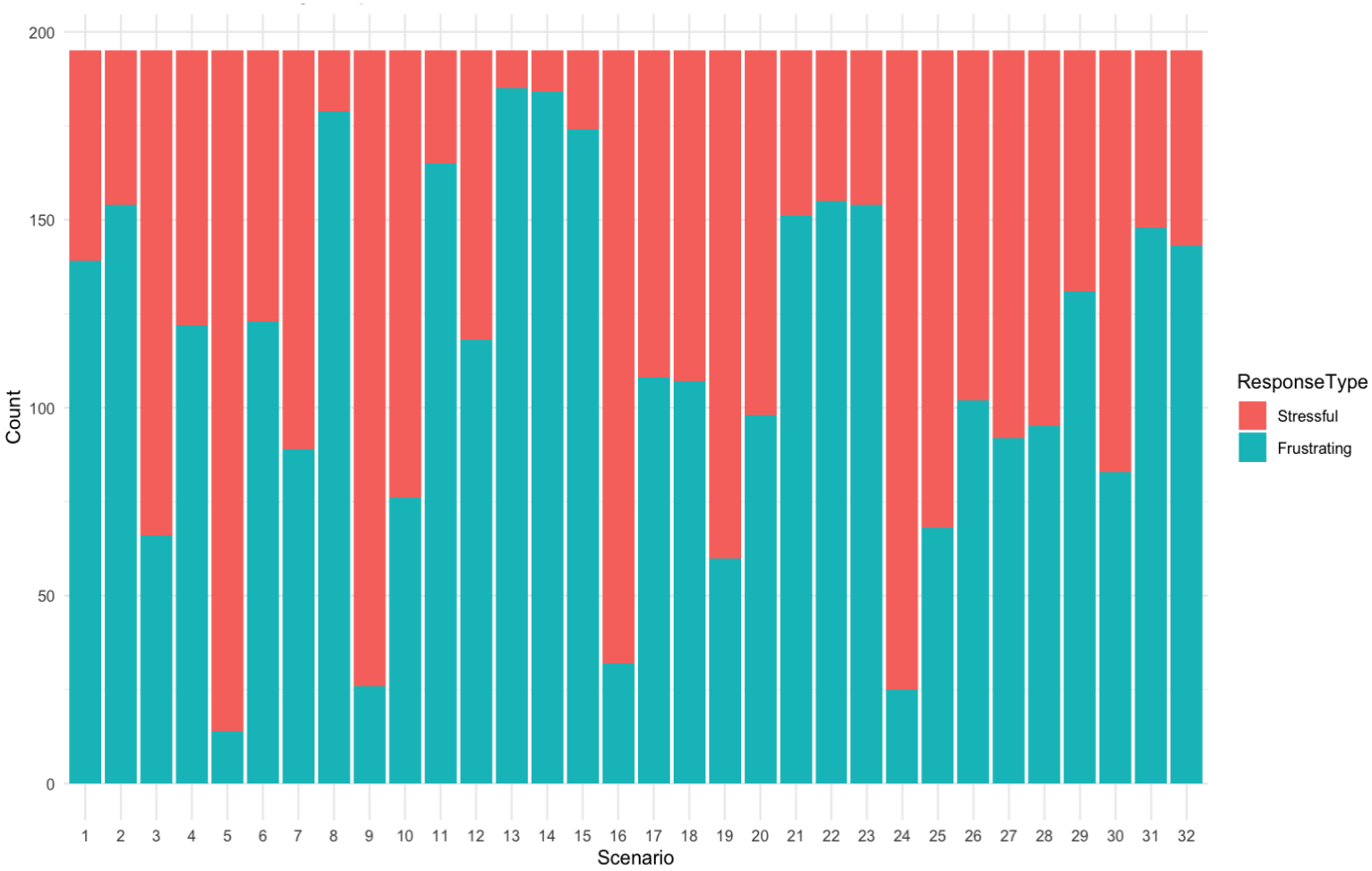
Table 2. Frequency of Ratings for Each Scenario and Percentage of "Frustrating" Ratings

Scenario	Stressful Rating Frequency	Frustrating Rating Frequency	Frustrating Percentage
1. Receiving unclear instructions	56	139	71%
2. Being asked to help complete someone else's tasks	41	154	79%
3. Being asked to complete the tasks of multiple job titles	**129**	**66**	**34%**
4. Being asked to work overtime	73	122	63%
5. Having too much work to do	**181**	**14**	**7%**
6. Being asked to perform a task without proper resources	72	123	63%
7. Being asked to perform a task without proper training	106	89	46%
8. Having boring work	16	179	92%
9. Being rushed to finish a task	**169**	**26**	**13%**
10. Being asked to complete a task you do not possess the skill to complete	**119**	**76**	**34%**
11. Being asked to abandon a project	30	165	84%
12. Not having the proper resources to complete a task	77	118	61%
13. Getting passed up for a promotion	10	185	95%
14. Being denied for a raise	11	184	94%

15. Not being offered promotion opportunity	21	174	90%
16. Getting a new supervisor/manager	**163**	**32**	**16%**
17. Changes to company pay policy	87	108	55%
18. Changes to company leave policy	88	107	55%
19. Changes in company ownership	**135**	**60**	**31%**
20. Changes in benefits packages	97	98	50%
21. Being replaced by automation	44	151	77%
22. Being replaced by younger workers	40	155	79%
23. Being replaced by outsourcing	41	154	79%
24. Being unsure if your job is secure	**170**	**25**	**13%**
25. Working in an environment alone	**127**	**68**	**35%**
26. Working virtually with a team	93	102	52%
27. Isolation from peers	**103**	**92**	**47%**
28. Having to work remotely from home	**100**	**95**	**49%**
29. Being harassed by a coworker	64	131	67%
30. Interacting with an upset customer	**112**	**83**	**43%**
31. Experiencing discrimination from coworkers	47	148	76%
32. Being Micromanaged	52	143	73%

Note. Bold values indicate that most participants rated these scenarios as stressful.

Figure 1. Proportion of Frustrating vs Stressful Responses for Each Scenario



Though each scenario was created based on frustrating antecedents identified in literature review, some were decidedly stressful. Most participants decided that too much work, changes in ownership or management, being rushed or not having the skill to complete a task, lack of job security, isolation, and working with upset customers were stressful, which highlights specific areas of overlap between the two constructs. Organizational change trended more towards being rated as stressful. Additionally, having to work alone was generally regarded as stressful rather than frustrating. Lack of promotion opportunity was overwhelmingly regarded as frustrating rather than stressful, with being replaced showing a similar pattern. These areas highlight

specific instances in which events that are generally frustrating may be considered more stressful, necessitating a need to understand why this may occur.

Semantic Analysis

For semantic analysis, participants' open-ended answers were transformed into word embeddings using the BERT-based-uncased model. Semantic similarity, based on cosine similarity, was computed for frustration definitions and experiences, stress definitions and experiences, frustration definitions and stress definitions, and frustration experiences and stress experiences to determine whether open-ended responses displayed semantic overlap. As expected, based on literature review, stress and frustration conceptualizations were semantically similar, as cosine similarity was not significantly different among any comparison group (see Table 3).

Table 3. Semantic Similarity Comparisons

Comparison Group	**Mean Cosine Similarity**	***sd***	**95% CI**		**Bootstrap *p*-value**
			Lower	***Upper***	
Stress Definitions and Frustration Definitions	.94	.06	.94	.95	.52
Stress Experiences and Frustration Experiences	.94	.06	.93	.95	.52
Stress Definitions and Stress Experiences	.90	.09	.89	.91	.51
Frustration Definitions and Frustration Experiences	.90	.09	.89	.92	.51
Frustration Definitions and Stress Experiences	.90	.10	.89	.91	.51
Stress Definitions and Frustration Experiences	.90	.10	.89	.91	.51

In addition to cosine similarity, I examined how well existing measures were capturing participant conceptualizations of frustration and stress by determining how well word-embeddings predicted state frustration scores, state stress scores, as well as frustration discomfort, frustrative non-reward, perceived stress, effort-reward imbalance, and occupational

stress scores. Emphasis was placed on the relationship between stress definitions and state stress, and frustration definitions and state frustration, as examining participants' responses in their own words in tandem with traditional scores may be useful in improving measurement accuracy and insight (Kjell et al., 2022; 2024). Based on consistently low correlations between word embeddings and scale scores (and insignificant relationships), conceptualizations were not well captured by traditional rating scales (see Table 4), indicating that these measures may be missing some nuances in both stress and frustration concepts discussed by participants.

Table 4. Relationships Between Text and Corresponding Rating Scales

Comparison	***t***	***df***	***p***	***r***	**95% CI**	
					Lower	***Upper***
Frustration Definitions and State Frustration	-0.68	197	.75	-.05	-0.16	1
Frustration Definitions and Frustration Discomfort	-1.87	197	.97	-.13	-0.25	1
Frustration Definitions and Frustrative Non-reward	-1.36	197	.91	-.09	-0.21	1
Stress Definitions and State Stress	-0.82	197	.79	-.06	-0.17	1
Stress Definitions and Perceived Stress	0.27	197	.39	.02	-0.10	1
Stress Experiences and Work Stress	0.66	197	.26	.05	-0.07	1

Chapter 2 - Study Two: Applicability of ERI

Brief Introduction: The Issue of Theory and Affect

Study one provided support for a long-held belief that frustration and stress are semantically similar (Chen & Spector, 1992), but inspecting cosine similarity in isolation may not be highly meaningful (Steck et al., 2024), prompting the need for further examination. Focused literature review also revealed great overlap in antecedents and outcomes. Existing measures of stress and frustration may not be fully capturing aspects that are important to participants, nor their distinctiveness. Minute differences were observed, with the semantic similarity between frustration and stress experiences being slightly weaker than the similarity

between participants' definitions of each construct. Additionally, nuances in antecedents were captured by scenario ratings; for example, poor interpersonal interactions with customers may not be as frustrating as poor interactions with coworkers. In contrast, poor interactions with customers were associated with stressful experiences, but poor interactions with coworkers were considered frustrating. Considering these nuances, a more precise definition of frustration may arise from understanding the pattern of cognitive appraisal and affective outcomes generally associated with frustration. However, theoretical basis for these appraisals and affective outcomes is lacking, especially in an organizational setting.

In comparing frustration and stress, one large discrepancy lies in theory; that is, there are several work-related stress theories, but few occupational frustration theories. For example, one popular stress theory is Conservation of Resources Theory (Hobfoll, 1989), which posits that stress occurs due to loss of resources or threat of resource loss, that resource loss creates a feedback loop resulting in a loss spiral, and that loss is more salient than gain. Similarly, Job Demands Resource Theory (JDR) states that stress occurs when job demands outweigh resources available in one's job (Bakker & Demerouti, 2017). The Stimulus-Response (Selye, 1956) and Challenge-Hindrance models (Cavanaugh et al., 2000) explain stress in terms of how people respond to stimuli and that stressors can be either positively challenging or hindering, respectively. Additionally, the Transactional model (Lazarus & Folkman, 1984), Demand-Control model (Karasek, 1979), and ERI (Seigrist,1996) all include explanations of stress with aspects of cognitive appraisal, or perceptions of the environment. Though these theories were developed by stress scholars, it seems – at least at face value – that many could also be relevant to frustration based on the overlaps between their antecedents. Nonetheless, occupational frustration remains largely unguided by theory. Since the two constructs are similar, it stands to

reason that some stress theories might be appropriate guides frustration theory, namely those that have commonalities with frustration literature.

Frustration theories – specifically why it occurs and what affective outcomes are associated– are not as popular in occupational research compared to stress theories. For example, Spector's (1978) Model of Organizational Frustration posits that organizational sources of frustration affect individuals in ways that spur behavioral reactions such as organizational and interpersonal aggression, turnover, and increased or decreased job performance. This model includes more evidence regarding outcomes of frustration than the actual experience of frustration, without explicitly specifying its uniqueness in comparison to stress or other emotions. Another prominent theory regarding outcomes of frustration is the Frustration-Aggression Hypothesis (Fox & Spector, 1999). This model is rooted in Dollard et al's (1939) Frustration Aggression Hypothesis. The basic postulate is that frustration occurs when a goal-response is interrupted, and when one cannot substitute a response for their prevented goal, they may respond with a counterproductive behavior such as aggression (either interpersonal or organizational). This relationship is mediated by affective responses, which are associated with personality traits, punishment expectations, and perceived control (Fox & Spector, 1999). It is worth noting Berkowitz (1989) suggested that frustration can lead to aggression to the degree that it arouses negative affect. However, little is known about the degree to which frustration is related to negative versus positive affect, perhaps because extant research largely examines aggregated negative affect's association with stress (González-Gómez & Hudson, 2023). Nonetheless, the frustration-aggression sequence model has great implications regarding aggressive outcomes in the workplace – if frustration can lead to aggression, it is important that frustration is mitigated to preserve safety both for the organization and individuals. Thus, a clear

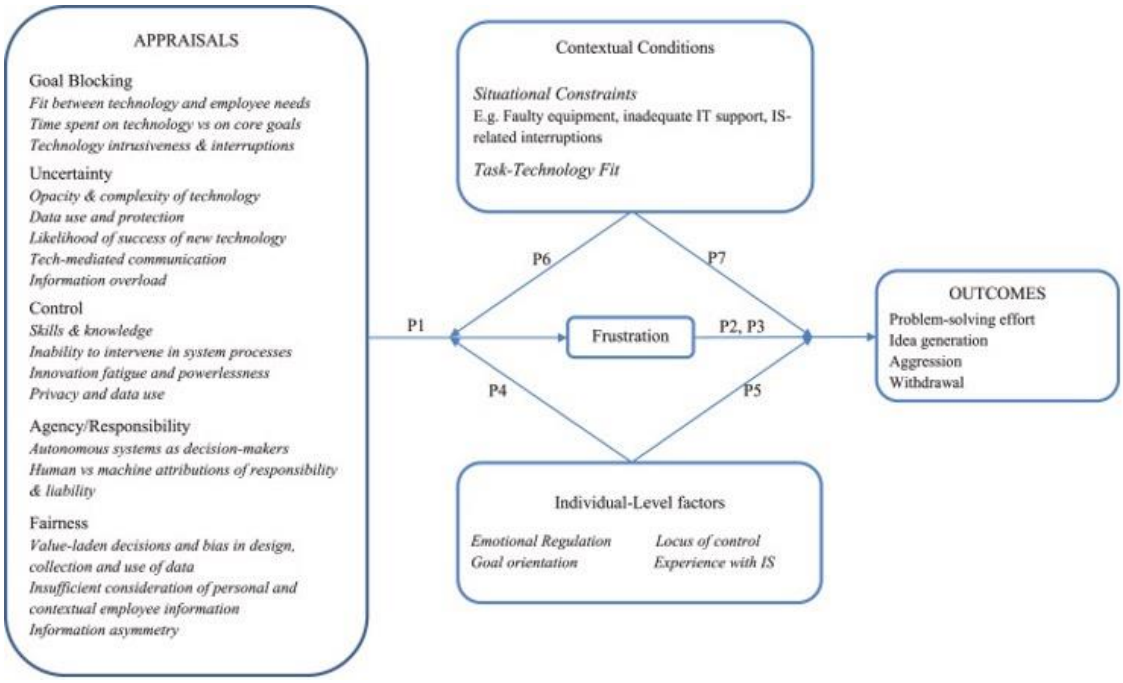
distinction of frustration from similar concepts is necessary for improving outcomes in the workplace. However, to my knowledge, there have been few studies investigating the extent to which frustration arouses negative affect (e.g., Breuer et al., 2015), or indeed the extent to which discrete affective states in general are associated with frustration – and even fewer related to occupational research.

Because of similarities between stress and frustration identified in research, stress theory might be applicable to frustration, specifically in explaining the thought process behind why it might occur (as opposed to situational triggers and its outcomes – the focal point of many occupational frustration theories). ERI (Siegrist, 1996), is most applicable to frustration, based on previous appraisal research contending that effort is important to frustration (Smith & Ellsworth, 1985). ERI was developed specifically to identify negative effects of stressful psychosocial work and employment conditions (Siegrest, 2016). It posits that repeated failed reciprocity at work (i.e., high costs associated with low gain) increases risk of incident stress-related disorders. In other words, strain occurs when there is an imbalance between rewards and effort. ERI applies to frustration because it supports a long-standing Frustration Theory (though one that is mostly applied in Neuroscience research). Amsel's (1992) theory posits that non-reward is surprising if it occurs with signals previously paired with greater reward or incentive. Surprising non-reward induces an internal state called primary frustration, which has immediate consequences for behavior, referred to as aftereffects. The concept of frustrative non-reward supports the main tenet of ERI; if individuals expect that they should receive reward for their efforts, then an imbalance can lead to frustration.

A recently proposed framework of frustration (González-Gómez & Hudson, 2023; Figure 2) includes cognitive appraisals of almost every dimension proposed by Smith and

Ellsworth (1985). However, it excludes effort and attention, which both might be important to frustration. Previous appraisal research supports the importance of effort in frustration experiences (Smith & Ellsworth, 1985), especially considering expected reward, and effort has not received much attention in this context since Smith and Ellsworth's (1985) research. This may be because effort within the context of the workplace is not well understood, besides its relation to motivation, job performance, and perhaps persistence (Van Iddekinge et al., 2022), which highlights an area where effort and frustration could overlap. As identified in literature review, a small amount of research supports a relationship between attention and frustration. In this sense, I conceptualize effort appraisal and goal blockage in terms of ERI to provide a model of frustration where effort and goal blockage appraisals are both important antecedents to frustration. The use of ERI as an explanatory theory may clarify frustration in that it may provide a more comprehensive understanding of the complete frustration experience than current frustration theories, which largely focus on explaining frustration outcomes and situational goal blockage.

Figure 2. González-Gómez and Hudson's (2023) Frustration Framework



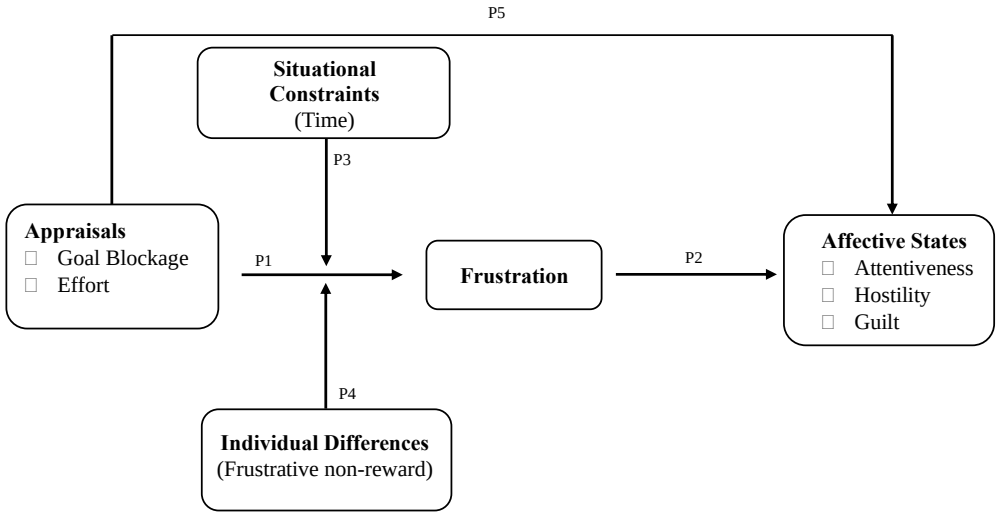
Regarding the importance of understanding affect associated with frustration, Affective Events Theory (Weiss & Copranzano, 1996) posits that work environments and events lead to affective reactions (moderated by personal disposition) that influence work attitudes and behaviors. Research on employee affect has highlighted a need for a deeper understanding of discrete emotional states (Brief & Weiss, 2002; Lee & Allen, 2002) since people indeed experience emotional changes at work which influence their behaviors and attitudes (Grandey, 2008). In fact, there have been calls to define stress in discrete emotional terms, considering the appraisal process (Dewe et al., 2012; Lazarus, 1999) rather than as a reaction to some stimuli. In answer, Harwood et al. (2019) identified that discrete emotions of excitement and happiness were associated with stress when context was positively appraised versus emotions of dejection and anger in stress experiences when context was negatively appraised – note that frustration was not explicitly considered in this examination of stress, despite their linkage.

Though there is research attempting to identify emotional outcomes of stress, no such attempts have been made for affective outcomes of frustration. Research tends to aggregate affective dimensions to study organizational outcomes (González-Gómez & Hudson, 2023), combining some dimensions into overall negative affect, which can contribute to broad definitions. In general, frustration is associated with negative emotions (González-Gómez et al., 2021), but precise affective dimensions associated with frustration are unclear. Therefore, I seek to examine the affective dimensions that are generally associated with frustration, specifically focusing on negative dimensions of guilt and hostility because of their association with goal blockage and frustration, respectively. Additionally, I hope to examine the relationship between the positive dimension of attentiveness and frustration, because it may be related to positive

outcomes of creativity. This is akin to Harwood et al. (2019) examining the emotions that are generally associated with stress, and in line with emotion theory (Frijda, 1986).

Based on AET (Weiss & Copranzano, 1996), understanding affective outcomes of frustration may be useful in that they could serve as a path through which specific behavioral and attitudinal frustration outcomes manifest (e.g., aggression or creativity). Also, examining which affective dimensions are associated with frustration might serve as a first step towards creating a hierarchy of affect and emotion associated with stress. To this end, the current study attempted to identify which discrete (non-aggregated) affective outcomes are associated with the general experience of frustration. Additionally, it verified the applicability of ERI by testing a proposed model of frustration (Figure 3), based González-Gómez and Hudson's (2023) existing frustration framework.

Figure 3. Proposed Conceptual Model (Model One)



In testing the proposed model, hypotheses are the following: Based on the evidence of from neuroscience research and evidence summarized by González-Gómez and Hudson (2023), I expect *cognitive appraisals of effort (H1), and goal blockage (H2), to be positively related to*

frustration. I also expect, based on the framework, that individual differences will moderate the appraisal-frustration relationship, specifically *frustrative non-reward will moderate the relationship between frustration and cognitive appraisals such that higher levels of frustrative non-reward will be associated with an enhanced relationship between cognitive appraisal and frustration (H3),* and based on consistent effects of situational constraints on frustration established in prior research, *situational constraints will moderate the relationship between frustration and cognitive appraisals such that higher levels of situational constraints will be associated with an enhanced relationship between cognitive appraisal and frustration (H4).* These moderators were chosen over others (e.g., task fit) because situational constraints were simple to manipulate with the study design, and frustrative non-reward might indicate an emotional regulation specifically related to reward appraisals.

Additionally, regarding the affective dimensions that should generally be associated with frustration: Based on established patterns of association between frustration and physiological arousal, aggression, and anger *frustration will be significantly, positively associated with the PANAS-X component of hostility (H5).* Additionally, based on frustrative non-reward and limited literature regarding guilt and frustration, *I expect that frustration will also be associated with the negative dimension of guilt (H6),* since goal failure may be associated with guilt. Also, because of some evidence for positive outcomes of frustration, *frustration will be associated with increased attentiveness (H7)* since attention may be required for positive outcomes related to motivation and creativity.

Methods

Design

This study followed the same design as study one, since it is part of the larger data collection. However, the goal of this study is to test the proposed model of frustration (Figure 3), which was informed by a recently proposed frustration framework (Figure 2) within the context of ERI (Siegrist, 1996). Specifically, goal blocking and effort appraisals were included as predictors of frustration since they are most associated with ERI, especially since goal blocking seems the most salient to frustration based on literature review. The study conditions, indicating varying levels of time constraints, were treated as a contextual moderator (situational constraints) while frustrative non-reward was introduced as an internal, individual level moderator, considering that it is concerned with tolerance to non-reward, which may be important to conceptions of effort-reward imbalance, in line with ERI theory. Outcomes of interest for this study are the specific affective dimensions associated with frustration, which may be associated with behavioral outcomes. Though the PANAS-X includes many affective dimensions, only those that were consistently related to frustration antecedents or outcomes in literature review were included for the purpose of this study (guilt, hostility, and attentiveness).

Participants and Procedure

At least 250 participants would have been ideal based on the ideal number of participants per predictor for path analysis (Kline, 1998). Participants were recruited via a snowball sample of the researchers' contacts and an undergraduate sample. This was primarily to reach a working sample in a cost-effective manner (not all participants are paid, but each may win a gift card if they participate). Undergraduates were excluded if they had no previous work experience. Participants were not compensated, but each had the opportunity to be entered into a drawing for

a gift card. Of the 328 participants that began the survey, 217 finished the parts of the study used in hypothesis testing, yielding a 66% response rate. After inspection, three participants were removed for failing all attention checks, yielding a final sample of 214 participants. Remaining data was imputed (see study one) for those who completed at least the first half of the study, which was to be used in hypothesis testing.

The average age was 23.76 years (SD = 11.4), and of those who reported their gender, 50% were female, 42% were male, and 3% were non-binary. Most participants were White (74.39%), 8% were Black or African American 4.67% were Asian, 4.67% were Hispanic or of Latin heritage, 2.33% listed multiple ethnicities, 0.47% were Native American or Alaskan, and 0.47% were Native Hawaiian or Pacific Islander. The average amount of work experience was 7.57 years (SD = 10.02), and most participants reported working in multiple industries (23.36%). Many participants listed "other" as their industry (19.06 %), and many were students (18.60%), 14.02% worked in education and training, 10.28% worked in retail and ecommerce, and the remaining 14.68% worked in technology and software, finance and banking, manufacturing and engineering, media and entertainment, agriculture and farming, or travel and hospitality.

For this study, model one was based on the Dimensional Ratings Questionnaire (Cognitive Antecedents), Frustration with QWOP (state frustration), and PANAS dimensions (Affective outcomes). The Frustrative Non-Reward Scale was also included as an individual difference measure, and condition was included as a situational constraint. To verify that the model is uniquely predicting frustration, state stress (SIG; Stanton, 2001), and VGSE were included as covariates. All measures showed satisfactory internal consistency.

Measures

State Frustration was measured as frustration with the QWOP game (Foddy, 2008) and assessed using an adapted Frustration with Work Scale (Peters et al., 1980). The word "job" was replaced with "task." For example, *"Trying to get this task done was a very frustrating experience."* Items are rated on a 1 to 5 Likert-type scale, with lower scores indicating lower frustration and higher scores indicating higher frustration.

State Stress was measured with the adapted Stress in General Scale (SIG; Stanton, 2001), described in study one. Work was again replaced with the QWOP task. Lower scores indicate lower stress, and higher scores indicate higher stress. An example item is *"[my experience with the QWOP game was] overwhelming."* State stress served as a control.

The PANAS-X, or Extended Positive and Negative Affect Scale (Watson & Clark, 1994), was used to determine which affective states are associated with frustration experienced during game play. The PANAS-X is a 60-item measure that includes words or phrases associated with emotions. The PANAS-X was chosen over the PANAS to address the limitation of aggregation into negative affect often seen in extant frustration literature (González-Gómez & Hudson, 2023); it includes comprehensive dimensions of both negative emotions and positive emotions. For example, fear, hostility, guilt, and sadness are all dimensions that constitute negative emotion. Items are rated on a 1 to 5 Likert-type scale with higher scores indicating greater affective magnitude. For example, participants might rate how *"Cheerful"* they feel on a 1 to 5 scale.

The Dimensional Rating Questionnaire (Smith & Ellsworth, 1985) was used to measure cognitive appraisals of game play, since cognitive appraisal is important to frustration experiences. The measure includes dimensions of pleasantness, attention, control, certainty, goal-

blockage, fairness, responsibility, and anticipated effort. However, pleasantness was dropped because it was double-barreled and not included in the proposed framework. Attention is also double barreled, but I included an adapted attentional item *("To what extent did you try to devote your attention to this task?")* to assess the efficacy of the frustration manipulation and to test the framework. Though effort was not included in González-Gómez and Hudson's (2023) framework, I included it to extend ERI and because effort perceptions may be important to frustration (Smith & Ellsworth, 1985), though they have not been revisited often. Items are rated on a 1 to 11 scale with lower scores indicating weaker cognitive appraisals and higher scores indicating stronger cognitive appraisals for each dimension. An example item is *"To what extent did you feel that you needed to exert yourself to deal with this situation?"* Goal blockage and effort (Table 5) were measured using the DRQ.

The Frustrative Non-reward scale (Wright et al., 2009), described in study one was included as an individual difference measure, since threat of reward omission was inherent to the assigned task. It examines tolerance of reward omission on a 1 to 4 Likert-type scale, with lower scores indicating higher tolerance of non-reward and higher scores indicating lower tolerance of non-reward. An example item is "*If I have been working hard at something I lose motivation if I don't get the reward I deserve."*

Video Game Self Efficacy (VGSE; Allan, 2010) was also measured as a control. Items are rated on a 1 to 5 Likert-type Scale, with higher scores indicating higher video game self-

efficacy. An example item is "*I can quickly and easily learn the buttons and controls for a new game."*

Analyses

Data was analyzed using the open-source software, R version 4.4.2 and the lavaan package (Rosseel, 2012). Missing data had already been handled in study one (see study one analyses). To assess the measurement model, Confirmatory Factor Analysis (CFA) was conducted on each variable prior to path analysis. The comparative fit index (CFI), the Tucker Lewis Index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR) were used to assess fit. The recommended, acceptable thresholds from Hu and Bentler (1999) are CFI and TLI values ≥ .90 and RMSEA and SRMR ≤.08. A series of multi-group confirmatory factory analyses was conducted to assess measurement invariance across sampling methods for each variable (see Appendix C for detailed results), since sampling pools generally had different age ranges and industry experience. Multi-group CFAs tested for configural, metric, and scalar invariance. Invariance was evaluated according to change in CFI with $\Delta CFI \leq .01$ and overlap between RMSEA confidence intervals indicating that invariance holds (Cheung & Rensvold, 2002; Wang & Russell, 2005). Variables with poor fit to the measurement model were evaluated for appropriateness to the model, then dropped from analysis to reduce Type I error (e.g., Cole & Preacher, 2014) if the model improved without them.

Then, the proposed model (Figure 3) was assessed via path analysis. Model specification included direct pathways; for indirect effects see Appendix F. Path coefficients were estimated using the Maximum Likelihood Estimation (MLE) method lavaan (Rosseel, 2012). Model fit was assessed according to CFI and TLI ≥ .90 and RMSEA and SRMR ≤.08. Model indices were also

examined to determine any necessary refinements. See Appendix E for these refinements and justifications.

Model one included frustration directly influenced by cognitive appraisals of goal blockage and effort. It also included interaction terms for both goal blockage and effort with the experimental conditions (Conditions 0, 1, 2, and 3). Interaction effects between these predictors and FNR were also included as interaction terms. Model one also tested the mediating role of frustration in the relationships between these appraisals and affective states, with hypothesized effects from frustration to attentiveness, goal blockage, and hostility. Finally, direct effects of appraisals (goal blockage and effort) on the affective states of attentiveness, hostility, and guilt were also modeled. Outcome and predictor variables were correlated (see Appendix D for variance and covariance matrix for outcome variables).

Results

Participants found the QWOP game moderately frustrating (M = 3.43, SD = .52*)*, and of those who reported their progress during the QWOP game (n = 174), only 46 reached the goal of 20 meters. A manipulation check was conducted to examine the effectiveness of the frustration manipulation, revealing no significant differences across conditions F (3,2 10) = 2.07, p=.105. However, frustration effects were still felt for all participants. In fact, some mentioned the QWOP game in their open-ended responses as examples of frustration. For example, one said "*I would say this game is the perfect definition of frustration. my definition of frustration would be trying something over and over again but failing and losing hope and getting angry. frustration would be associated to anger, and lack of patience,"* while another mentioned, *"Feeling frustration is to feel dissatisfied with the outcome of a task you are performing when you had higher expectations for the outcome. Such as for this game, though it seems like it would be easy,*

the controls are not, making the desired and anticipated outcome harder to achieve." Some participants even highlighted how experiences with games generalized to work, indicating the appropriateness of the manipulation. For example, "*Frustration occurs when you feel like you are helpless in any given situation because you think you have no control. Many people experience this through different circumstances like when they don't understand the rules for a game or an assignment. This can also be applied in the workplace when things aren't going as planned*."

Participants felt similar levels of state stress (*M* = 3.16, *SD* = .87*)*. On average, they appraised high levels of goal blockage (*M* = 8.21, *SD* = 1.97*)* and moderate levels of effort (*M* = 7.22, *SD* = 2.29*)*. Generally, participants felt low levels of hostility (*M* = 1.91, *SD* = 0.78*)*, guilt (*M* = 1.93, *SD* = 0.72), and attentiveness (*M* = 3.60, *SD* = 0.91*)*. Participants were moderately tolerant of non-reward (*M* = 2.38, *SD* = .51*)* and had moderate video game self-efficacy (*M* = 3.20, *SD* = .53*)*. Correlations and descriptive statistics can be found in Table 5. Interestingly, it seems that goal blockage is more strongly associated with stress (r = .47) than frustration (r = .27), which potentially opposes the mainstream view that frustration is primarily a mechanism of goal blockage. In fact, stress was more associated with many other variables, which could indicate the necessity for a hierarchical organization of stress and frustration.

Table 5. Correlations and Descriptive Statistics: Study Two

Variable	*M*	*SD*	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Age	23.76	11.4	-	-	-	-	-	-	-	-	-	-	-
2. Work Experience	7.57	10.02	0.96	-	-	-	-	-	-	-	-	-	-
3. Goal Blockage	8.21	1.97	0.08	0.11	-	-	-	-	-	-	-	-	-
4. Effort	7.22	2.29	-0.06	-0.11	0.37	-	-	-	-	-	-	-	-
5. Frustration	3.43	0.52	-0.23	-0.20	0.27	0.35	.88	-	-	-	-	-	-
6. Hostility	1.91	0.78	-0.08	-0.07	0.20	0.34	0.30	.82	-	-	-	-	-
7. Guilt	1.93	0.72	-0.20	-0.20	0.13	0.33	0.32	0.66	.86	-	-	-	-
8. Attentiveness	3.60	0.91	-0.07	-0.06	0.28	0.34	0.21	0.27	0.17	.79	-	-	-
9. State Stress	3.16	0.87	-0.04	-0.05	0.47	0.53	0.41	0.61	0.57	0.36	.83	-	-
10. FNR	2.38	0.51	0.12	0.19	-0.01	-0.19	-0.08	-0.03	-0.05	0.03	-0.11	.73	-
11. VGSE	3.20	0.53	-0.27	-0.25	-0.03	0.09	-0.01	0.07	0.05	0.18	0.03	-0.03	.79

Note. Chronbach's alpha (where available) is presented along the diagonal.

CFA revealed most measures were a good fit to the data (see Appendix C for full CFA results). The Dimensional Ratings Questionnaire proved difficult to model, since it is a measure with notably varying number of items across dimensions, most of which are represented by fewer than three items. Therefore, the DRQ was modeled as an overarching, latent factor of Cognition, with composites of each dimension, which demonstrated the best fit, though it still wasn't satisfactory $\chi^2 = 67.82$ (14), $p < .001$, CFI = .884, TLI = .827, RMSEA= .132, SRMR =.084. Both control measures demonstrated poor fit to the data; state stress had poor fit $\chi^2 = 624.51$ (89), $p < .001$, CFI = .715, TLI = .663, RMSEA= .168, SRMR =.107, even when specified with item parceling. Video Game Self Efficacy also demonstrated poor fit. Its factor structure was not specifically outlines, so it was modeled both with and without item parceling. Neither model demonstrated a good fit to the data, though a model with item parceling was slightly better $\chi^2 = 20.13$ (2) $p < .001$, CFI = .899, TLI = .697, RMSEA= .207, SRMR = .066. Supplementary analyses were conducted to determine whether these measures greatly influenced model fit (See Appendix E). Overall model fit was improved without controlling for state stress and VGSE. Therefore, they were removed from the model.

Tests of measurement invariance across sampling methods revealed similar patterns. Dimensional Ratings had poor configural invariance ($\chi^2 = 105.01$, $p < .001$, CFI = 0.842), but reasonable metric (Δ CFI = -0.01) and scalar invariance (Δ CFI = -0.00). State frustration demonstrated perfect configural invariance ($\chi^2 = 0.00$, CFI = 1.00), good metric invariance (Δ CFI = -0.00), and good scalar invariance (Δ CFI = -0.01). State stress had poor configural invariance ($\chi^2 = 796.74$, $p < .001$, CFI = 0.688), slightly improved metric invariance (Δ CFI = 0.00), but worsened scalar invariance (Δ CFI = -0.01). PANAS-X: Hostility demonstrated good configural invariance ($\chi^2 = 38.44$, $p = .003$, CFI = 0.955), but poor metric invariance (Δ CFI = -

0.03), and poor scalar invariance (Δ CFI = -0.03). PANAS-X: Guilt demonstrated poor configural invariance ($\chi^2 = 71.65$, $p < .001$, CFI = 0.887), good metric invariance (Δ CFI = -0.01), but poor scalar invariance (Δ CFI = -0.04). PANAS-X: Attentiveness had good configural invariance ($\chi^2 = 2.74$, $p = 0.603$, CFI = 1.00), metric invariance (Δ CFI = 0.00), and scalar invariance (Δ CFI = 0.00). Frustrative non-reward demonstrated good configural fit ($\chi^2 = 9.59$, $p = .477$, CFI = 1.00), but dropped in metric (Δ CFI = -0.02) and scalar invariance (Δ CFI = -0.02). VGSE had acceptable configural invariance ($\chi^2 = 21.65$, $p < .001$, CFI = 0.900), slightly improved metric invariance (Δ CFI = 0.005), and good scalar invariance (Δ CFI = -0.005). PANAS-X: Guilt and the DRQ showed significant issues with scalar invariance, and PANAS-X: Hostility and state stress demonstrated issues when more constraints were applied, but state frustration, FNR, and PANAS-X: Attentiveness demonstrated invariance across sampling methods.

The tests of measurement invariance revealed that while some constructs, such as State Frustration and PANAS-X: Attentiveness, demonstrated strong invariance across sampling methods, others like PANAS-X: Hostility, PANAS-X: Guilt, and State Stress showed issues with scalar invariance or worsened fit under more restrictive models. Overall, Dimensional Ratings and state frustration had mixed results, with some constructs exhibiting acceptable metric and scalar invariance, while others faced significant issues with measurement invariance, particularly at the scalar level. While general caution is needed in interpreting the scores from measures with incomplete measurement invariance, it is important to note that if the focus is on testing the measurement model structure or assessing relationships between variables, metric invariance is more important than scalar invariance. This is because metric invariance ensures consistent

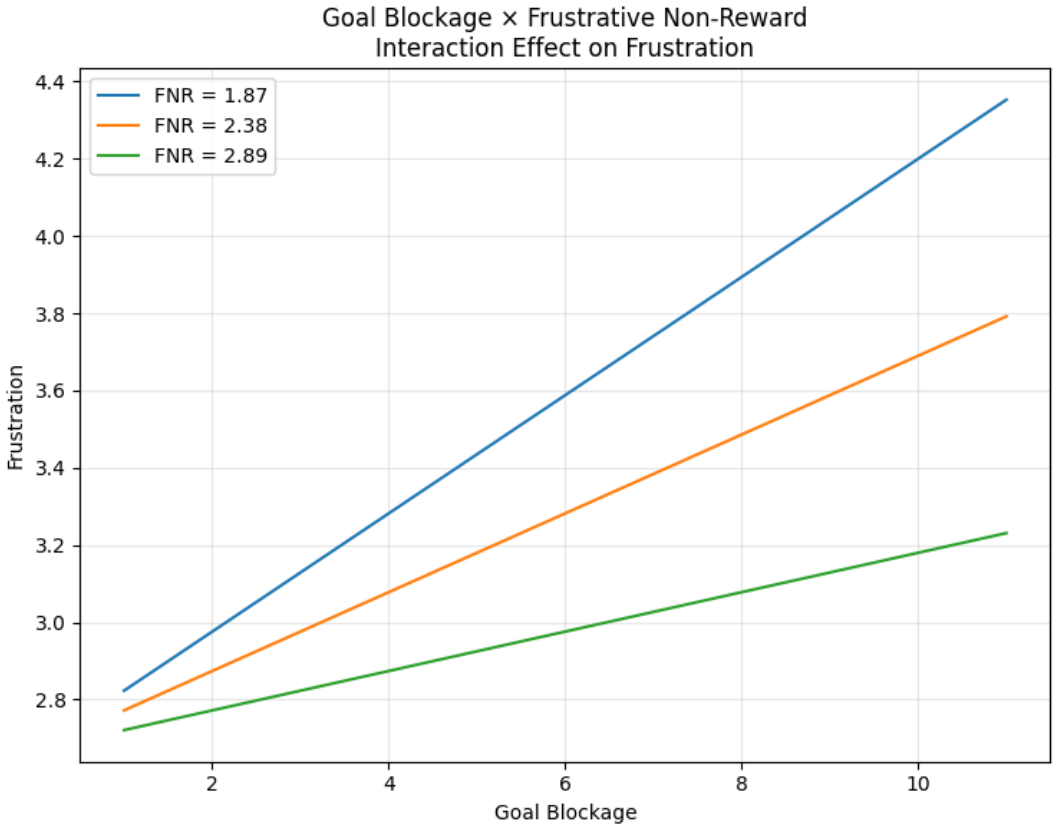
factor loadings across groups, making scalar invariance less crucial in this case. Full MI testing results are presented in Appendix C.

Results of path analysis for Model one (see Table 6) revealed that the model had good fit, χ^2 = 23.78 (24), p = .474, CFI = 1.00, TLI = 1.00, RMSEA= .00 [.00, .05], SRMR = .03. In terms of hypothesis testing for individual paths, cognitive appraisals of goal blockage (B = 0.34, SE = 0.07, *p* <.001) and effort (B = -0.24, SE = 0.07, *p* =.001) were significantly associated with frustration, supporting hypothesis one, but not two, since effort was negatively related to frustration. However, it is critical to note that the main effects are of less importance when significant interactions are present.

Frustrative non-reward moderated the relationship between goal blockage and frustration (B = -0.10, SE = 0.03, *p* < .001), and effort and frustration (B = 0.10 SE = 0.03, *p* < .001), supporting hypothesis three. This indicates that when FNR is high, individuals generally experienced less frustration associated with goal blockage, and more frustration associated with effort (see Figures 4 and 5 for visualizations of these patterns).

The negative interaction between goal blockage and FNR (B = -0.10, *p* < .001; see Figure 4) suggests that as FNR increases, the positive effect of goal blockage on frustration diminishes; goal blockage is less likely to lead to frustration when Frustrative Non-Reward is higher. Simple slopes analysis was conducted for low (-1 SD below the mean), moderate (mean), and high (+1 SD above the mean) levels of FNR. Each of the simple slope tests revealed a positive association between goal blockage and frustration, but goal blockage was more weakly associated to frustration at higher levels of FNR (B = .051) than moderate (B = .102) or lower levels (B = .153).

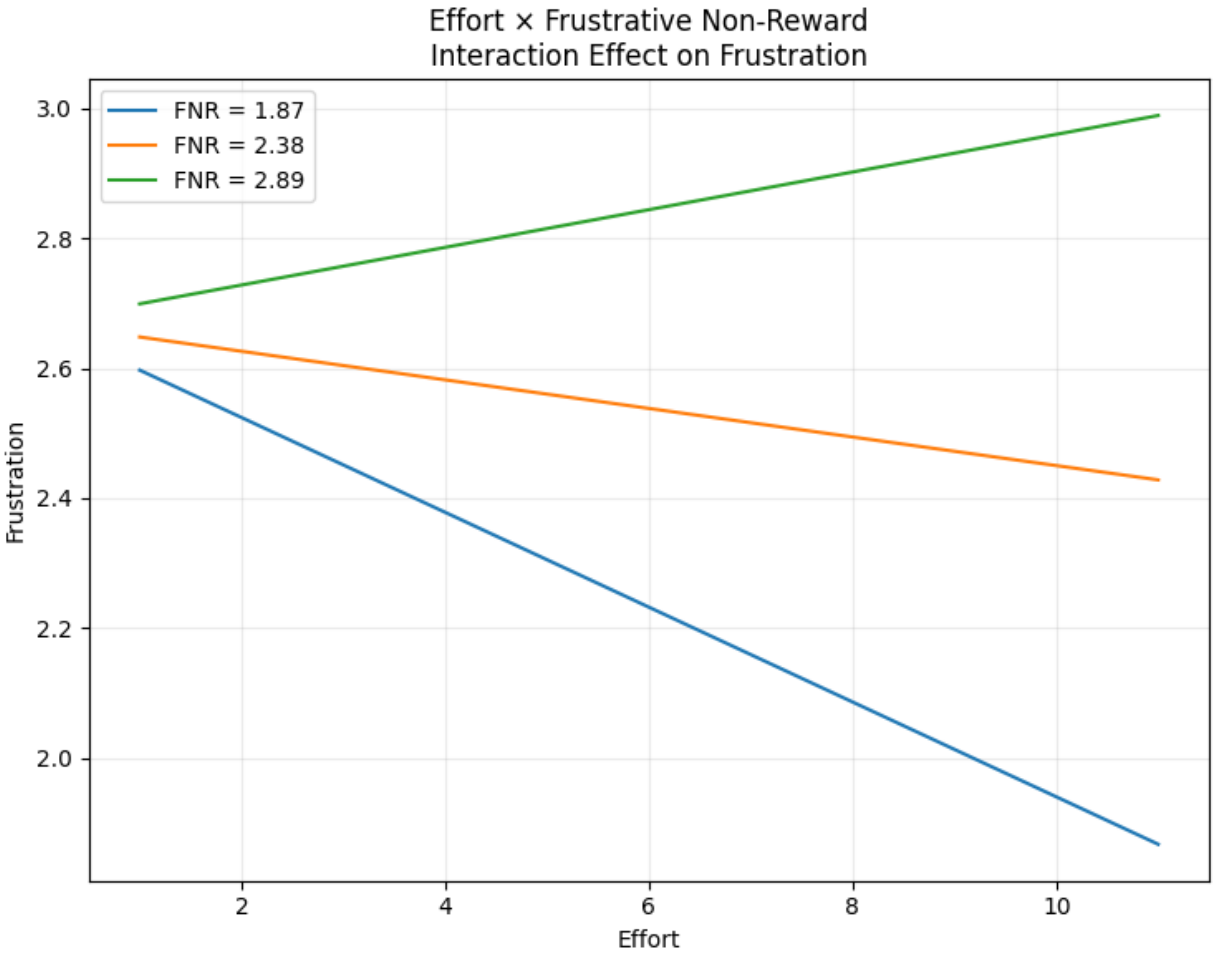
Figure 4. Interaction Between Goal Blockage and Frustrative Non-Reward



Note. Lines represent +1 SD, mean, and -1SD for FNR.

The positive interaction between effort and FNR (B = .10, $p < .001$; see Figure 5) suggests that as Frustrative Non-Reward increases, the effect of effort on frustration becomes stronger; when individuals experience greater FNR, the higher their effort, and the more frustrated they become. As before, simple slopes for the association between distance and satisfaction were tested for low (-1 SD below the mean), moderate (mean), and high (+1 SD above the mean) levels of FNR. Each of the simple slope tests revealed an association between effort and frustration, but effort was more positively associated with frustration at higher levels of FNR (B = .029) than moderate (B = -.022) or lower levels (B = .-.073). This indicates that at lower levels of tolerance to reward omission, the effect of effort on frustration is increased, while this isn't necessarily the case at higher levels of tolerance to reward omission.

Figure 5. Interaction Between Effort and Frustrative Non-Reward



Note. Lines represent +1 SD, mean, and -1SD for FNR.

Situational constraints moderated the relationship between goal blockage and frustration in condition two (B = -0.11, SE = 0.03, p =.001) and the relationships between effort and frustration in conditions one (B = 0.09, SE = 0.04, p =.007) and two (B = 0.13, SE = 0.04, p < .001), which means hypothesis four was not supported, as situational constraints did not moderate relationships as expected. The inconsistent interaction effect makes sense since similar levels of frustration were felt across all conditions. Still, interactions between goal blockage and Conditions (time limits) reveal how the relationship between goal blockage and frustration varies across the conditions. In Condition 1 (5 minutes), the interaction between goal blockage and

frustration is nearing significance (p = .053), indicating that goal blockage has a slightly reduced impact on frustration compared to the no time limit condition (Condition 0), though this effect is not significant. In Condition 2 (10 minutes), the interaction is significant (p < .001), showing a more pronounced negative effect of goal blockage on frustration. This suggests that with more time, participants may be able to better manage their frustration. In Condition 3 (15 minutes), the interaction is not significant (p = .234); the larger time window does not further moderate this relationship, similar to the no time limit condition.

Regarding interactions between effort and the Conditions, Condition 1 (5 minutes) shows a significant positive effect of Effort on frustration (p = .007), indicating that higher effort leads to increased frustration, perhaps due to time pressure. In Condition 2 (10 minutes), the positive effect is even stronger (p < .001), indicating that more time leads to greater frustration as the effort required increases. In Condition 3 (15 minutes), the interaction is not statistically significant (p = .082), but trends suggest that as effort increases, frustration increases, albeit to a lesser extent than in Condition 2.

In sum, goal blockage has a reduced impact on frustration in Condition 2 (10 minutes), where participants have more time to manage frustration, but its effect is less clear in Condition 3 (15 minutes). Effort, on the other hand, consistently increases Frustration across all conditions, with the strongest effect observed in Condition 2 (10 minutes), where the combination of time pressure and effort may lead to higher frustration levels.

Frustration was significantly related to guilt (B = 0.34, SE = 0.09, $p < .001$) and hostility (B = 0.30, SE = 0.10, $p = .004$), supporting hypotheses six and seven. Additionally, appraisals of attentiveness were directly associated with goal blockage (B = 0.08, SE = 0.03, $p = .018$) and

effort (B = 0.10 SE = 0.03, $p < .001$). Hostility was directly associated with effort (B = 0.08, SE = 0.02, $p < .001$), and guilt was directly associated with effort (B = 0.08, SE = 0.02, $p < .001$).

These findings support a model where frustration acts as a key emotional mediator between effort, goal blockage, and negative affective outcomes such as hostility and guilt. Specifically, effort and goal blockage contribute to higher frustration, which, in turn, leads to stronger feelings of hostility and guilt. Both effort and goal blockage are also positively associated with attentiveness, suggesting that more focused individuals may both work harder and perceive more obstacles. The relationships between negative emotions of hostility and guilt, and effort underscore the idea that greater investment in a task might lead to emotional strain, particularly in challenging situations where goals are blocked. Additionally, results demonstrate that the model accounts for approximately 27% of the variation in frustration (see Table 7).

Table 6. Path Analysis Results for Model One

Path	**Estimate**	**95% CI (B)**		**SE**	**z-value**	***p***
		Lower	***Upper***			
Frustration ~						
Goal Blockage	**0.34**	**0.21**	**0.48**	**0.07**	**4.92**	**.000**
Effort	**-0.26**	**-0.40**	**-0.12**	**0.07**	**-3.57**	**.000**
Goal Blockage*Condition 1	-0.06	-0.12	0.00	0.03	-1.94	.053
Goal Blockage*Condition 2	**-0.11**	-0.17	-0.05	**0.03**	**-3.40**	**.001**
Goal Blockage*Condition 3	-0.05	-0.12	0.03	0.04	-1.19	.234
Effort*Condition 1	**0.09**	**0.03**	**0.16**	**0.04**	**2.68**	**.007**
Effort*Condition 2	**0.13**	**0.06**	**0.20**	**0.04**	**3.76**	**.000**
Effort*Condition 3	0.08	-0.01	0.16	0.04	1.74	.082
Frustrative Non-Reward*Goal Blockage	**-0.10**	**-0.16**	**-0.05**	**0.03**	**-3.73**	**.000**
Frustrative Non-Reward*Effort	**0.10**	**0.05**	**0.16**	**0.03**	**3.59**	**.000**
Attentiveness~						
Goal Blockage	**0.08**	**0.01**	**0.14**	**0.03**	**2.37**	**.018**
Effort	**0.10**	**0.04**	**0.15**	**0.03**	**3.52**	**.000**
Hostility~						
Goal Blockage	0.02	-0.03	0.07	0.03	0.80	.426

Effort	**0.08**	**0.04**	**0.13**	**0.02**	**3.51**	**.000**
Guilt~						
Goal Blockage	-0.01	-0.06	0.04	0.03	-0.42	.673
Effort	**0.08**	**0.04**	**0.12**	**0.02**	**3.68**	**.000**
Attentiveness ~						
Frustration	0.14	-0.09	0.38	0.12	1.20	.229
Hostility ~						
Frustration	**0.30**	**0.10**	**0.50**	**0.10**	**2.91**	**.004**
Guilt ~						
Frustration	**0.34**	**0.15**	**0.52**	**0.09**	**3.55**	**.000**

Note. Bolded values indicate significance.

Table 7. Model One R^2 Statistics

Variable	R^2
Frustration	0.27
Attentiveness	0.15
Hostility	0.15
Guilt	0.16

Chapter 3 - Study Three: Verifying the Frustration Framework

Methods

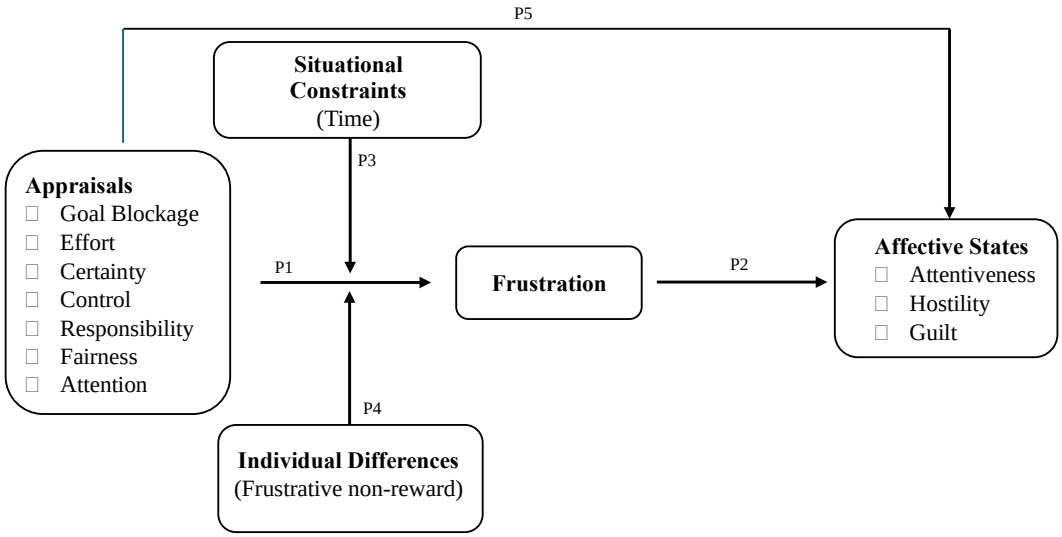
Design

This study followed the same design as studies one and two, since it is part of the larger data collection. However, it aimed to test the full battery of cognitive appraisals, including all those proposed by González-Gómez et al. (2021), and compare this model to model one to determine which model is preferrable in terms of fit and parsimony. Study three therefore adopted the entire battery of cognitive dimensions for testing to examine model fit, since these were not tested upon framework proposal (see Figure 2). Each of these dimensions have been shown to contribute to frustration experiences in prior research (González-Gómez & Hudson, 2023), though specifically in an IT context. For example, uncertainty, low control, other-attributed responsibility for outcomes, and unfairness have been associated with work frustration

(González-Gómez et al., 2021), and attention is preliminary to emotion (Smith & Ellsworth, 1985).

As to which model is a better representation of frustration, *model two will provide better fit than model one (H8),* since it encompasses more cognitive dimensions, some of which may have a more direct contribution to hypothesized associated affective states (e.g., control and responsibility may be associated with guilt more than effort or goal blockage). However, just because this model may provide better fit does not make it superior; model parsimony should also be considered.

Figure 6. Theoretically Embellished Model (Model Two)



Participants and Procedure

Study three used the same participants as study two (n=214). For this study, model two was based on the Dimensional Ratings Questionnaire (Cognitive Antecedents), Frustration with QWOP (state frustration), and PANAS dimensions (Affective outcomes). The Frustrative Non-Reward Scale was also included as an individual difference measure, and condition was included as a situational constraint. Because state stress and VGSE were a poor fit to the measurement

model and were dropped from model one, they were not included in this study to allow for model comparison (see Appendix E for supplementary analysis).

Measures

State Frustration was measured as frustration with the QWOP game (Foddy, 2008) and assessed using an adapted Frustration with Work Scale (Peters et al., 1980).

The PANAS-X, or Extended Positive and Negative Affect Scale (Watson & Clark, 1994), was used to determine which affective states are associated with frustration experienced during game play.

The Dimensional Rating Questionnaire (Smith & Ellsworth, 1985) was used to measure cognitive appraisals during game play. For this study, additional dimensions were included (certainty, control, responsibility, fairness, and attention).

The Frustrative Non-reward scale (Wright et al., 2009), described in study two was included as an individual difference measure, since threat of reward omission was inherent to the assigned task.

Analyses

Data was analyzed with the same software as study two. The proposed model (Figure 6) was assessed via path analysis, using the same index cutoffs from study two: CFI and TLI $\geq .90$ and RMSEA and SRMR $\leq .08$. As before, model specification included direct pathways and coefficients were estimated using the MLE method. Model indices were also examined to determine any necessary refinements. See Appendix E for these refinements and justifications. See Appendix E for these refinements and theoretical justifications.

Model specification included direct pathways; for indirect effects see Appendix F. Model two included frustration directly influenced by cognitive appraisals of goal blockage, effort,

certainty, control, responsibility, fairness, and attention. It also included interaction terms for each of these appraisals with the each of the experimental conditions (Conditions 0, 1, 2, and 3). Interaction effects between these predictors and FNR were also included as interaction terms. As before, Model two tested the mediating role of frustration in the relationships between appraisals and affective states, with hypothesized effects from frustration to attentiveness, goal blockage, and hostility. Finally, direct effects of appraisals (goal blockage, effort, certainty, control, responsibility, fairness, and attention) on the affective states of attentiveness, hostility, and guilt were also modeled. Outcome and predictor variables were correlated (see Appendix D for variance and covariance matrix for outcome variables).

Then a chi-square difference test of model one, from study two (Figure 3) and model two, from study three (Figure 6) was conducted to assess which had the best fit. For this test, significant difference in chi-square, AIC, and BIC were used as to determine which model is best, with lower AIC and BIC values generally indicating the better model if there is no significant difference.

Results

Descriptive statistics and correlations for study three can be found in Table 8.

Table 8. Correlations and Descriptive Statistics: Study Three

Variable	M	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Age	23.76	11.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2. Work Experience	7.57	10.02	0.96	-	-	-	-	-	-	-	-	-	-	-	-	-
3. Goal Blockage	8.21	1.97	0.08	0.11	-	-	-	-	-	-	-	-	-	-	-	-
4. Effort	7.22	2.29	-0.06	-0.11	0.37	-	-	-	-	-	-	-	-	-	-	-
5. Control	5.10	1.66	0.01	-0.01	0.23	0.18	-	-	-	-	-	-	-	-	-	-
6. Certainty	5.63	1.67	0.04	0.05	-0.04	0.05	0.14	-	-	-	-	-	-	-	-	-
7. Fairness	5.16	3.33	-0.08	-0.08	0.26	0.36	0.37	-0.09	-	-	-	-	-	-	-	-
8. Responsibility	4.60	5.03	0.93	0.99	0.12	-0.13	-0.01	0.04	-0.08	-	-	-	-	-	-	-
9. Attention	8.55	2.52	0.01	0.00	0.14	0.23	-0.01	-0.04	0.04	0.00	-	-	-	-	-	-
10. Frustration	3.43	0.52	-0.23	-0.20	0.27	0.35	0.16	0.05	0.41	-0.20	0.21	.88	-	-	-	-
11. Hostility	1.91	0.78	-0.08	-0.07	0.20	0.34	0.15	-0.13	0.48	-0.07	0.06	0.30	.82	-	-	-
12. Guilt	1.93	0.72	-0.20	-0.20	0.13	0.33	0.11	-0.12	0.39	-0.20	0.03	0.32	0.66	.86	-	-
13. Attentiveness	3.60	0.91	-0.07	-0.06	0.28	0.34	0.01	0.04	0.08	-0.08	0.56	0.21	0.27	0.17	.79	-
14. FNR	2.38	0.51	0.12	0.19	-0.01	-0.19	-0.11	-0.04	-0.19	0.18	-0.09	-0.08	-0.03	-0.05	0.03	.73

Note. State stress and VGSE were excluded. Chronbach's alpha (where available) is presented along the diagonal.

Results of path analysis for Model two (see Table 9) revealed that the model had good fit χ^2 = 112.15 (84), p =.022, CFI = .93, TLI = .87, RMSEA= .04 [.02, .06], SRMR = .02. Though results should be interpreted with caution considering the small sample size, they offer some unique findings. As before, cognitive appraisals of goal blockage (B = 0.33, SE = 0.08, *p* <.001) and effort (B = -0.24, SE = 0.08, *p* =0.004) was significantly associated with frustration. Frustration was again significantly related to guilt (B = 0.28, SE = 0.10, *p* =.004) and hostility (B = 0.29, SE = 0.11, *p* =.006). Frustrative non-reward again moderated the relationship between goal blockage and frustration (B = -0.09, SE = 0.03, *p* =.006), and effort and frustration (B = 0.09, SE = 0.03, *p* =.004). The significant moderating effect of FNR on the relationship between goal blockage and frustration, and the relationship between effort and frustration mirrors that in study two, with similar magnitude, direction, and statistical significance. The negative interaction between FNR and goal blockage once again suggests that goal blockage's effect on frustration becomes weaker as FNR increases. The positive interaction between effort and FNR again suggests that when individuals experience greater FNR, they also exert greater effort and become more frustrated.

Situational constraints moderated the relationship between goal blockage and frustration (B = -0.13, SE = 0.04, *p* = .002), the relationship between effort and frustration (B = 0.14, SE = 0.04, *p* < .001), and the relationship between certainty and frustration (B = 0.11, SE = 0.04, *p* = .010), such that these relationships were enhanced with moderate situational constraints (Condition 2). The interactions between goal blockage and time constraints (conditions) demonstrate how the relationship between goal blockage and frustration varies across conditions. In Condition 1 (5 minutes), the interaction is marginally significant (p = .099), indicating a slightly reduced impact of goal blockage on frustration compared to the no time limit condition,

though this effect is not statistically significant. In Condition 2 (10 minutes), the interaction is significant (p = .002), suggesting that goal blockage has a more pronounced negative effect on frustration, potentially due to moderate time pressure. In Condition 3 (15 minutes), the interaction remains significant (p < .05), indicating that goal blockage continues to have a strong effect on frustration even under longer time constraints, though slightly less than in Condition 2.

Regarding the interactions between effort and the conditions, Condition 1 (5 minutes) shows a significant positive effect of effort on frustration (p = .054), suggesting that higher effort combined with a shorter time limit leads to increased frustration. In Condition 2 (10 minutes), the positive effect is even stronger (p < .01), indicating that with more time, the relationship between effort and frustration becomes more pronounced, perhaps due to increased investment in achieving goals. In Condition 3 (15 minutes), the interaction is still statistically significant (p = .967), suggesting that, under extended time limits, the effect of effort on frustration diminishes, maybe because participants have more time to manage their emotions.

In sum, goal blockage appears to have the most significant effect on frustration in the 10-minute condition, with the 5-minute condition showing a weaker effect. The 15-minute condition does not significantly amplify the relationship between goal blockage and frustration, but it is still significant. Meanwhile, effort consistently increases frustration across all conditions, with the strongest effect in Condition 2 (10 minutes), where the combination of time pressure and effort demands leads to heightened frustration.

Additionally, attentiveness was directly associated with goal blockage (B = 0.08, SE = 0.03, p = .004), effort (B = 0.06 SE = 0.03, p = .016), and attention (B = 0.18 SE = 0.02, p < .001). Hostility was directly associated with effort (B = 0.09, SE = 0.02, p < .001) and certainty (B = -0.08 SE = 0.03, p = .004), and guilt was directly associated with effort (B = 0.07, SE =

0.02, p = .001), certainty (B = -0.07, SE = 0.03, p = .006), and fairness (B = 0.07, SE = 0.03, p = .016).

Compared to study two, results of study three remain largely consistent. Frustration was still significantly related to guilt and hostility. Frustrative non-reward again moderated the relationship between goal blockage and frustration, and effort and frustration. Goal blockage and effort were still directly associated with attentiveness, and effort was still directly associated with both hostility and guilt. In both studies, effort increased frustration across all conditions.

However, unlike in study two, attention was also directly related to attentiveness, which is as expected – attention and attentiveness should be related. Negative relationships between certainty and negative emotions may indicate that uncertainty is related to increased emotional strain. The relationship between fairness and guilt might indicate that internalized perceptions of a task's fairness may lead to guilt if individuals perceive that task performance is unaffected by outside influences such as fairness; increased fairness perceptions may increase guilt because any shortcomings may be attributed more to one's own effort. The interaction between goal blockage and condition also slightly differed from study two to study three. In study two, it had the most significant effect on frustration in the 10-minute condition. In study three, goal blockage had the most significant effect on frustration in the 10-minute condition, and remained significant in the 15-minute condition, demonstrating that goal blockage affects frustration even under longer time constraints, though the effect slightly diminishes.

Table 9. Path Analysis Results for Model Two

Path	**Estimate**	**95% CI (B)**		***SE***	**z-value**	***p***
		Lower	***Upper***			
Frustration ~						
Goal Blockage	**0.33**	**0.17**	**0.50**	**0.08**	**3.97**	**.000**
Effort	**-0.24**	**-0.41**	**-0.08**	**0.08**	**-2.92**	**.004**
Certainty	0.09	-0.06	0.24	0.08	1.19	.235
Control	-0.12	-0.31	0.07	0.10	-1.22	.223

Responsibility	-0.03	-0.09	0.04	0.03	-0.81	.416
Fairness	0.09	-0.10	0.28	0.10	0.93	.354
Attention	0.02	-0.09	0.12	0.05	0.34	.738
Goal Blockage*Condition 1	-0.07	-0.15	0.01	0.04	-1.65	.099
Goal Blockage*Condition 2	**-0.13**	**-0.21**	**-0.05**	**0.04**	**-3.10**	**.002**
Goal Blockage*Condition 3	**-0.12**	**-0.22**	**-0.02**	**0.05**	**-2.37**	**.018**
Effort*Condition 1	0.07	-0.00	0.14	0.04	1.93	.054
Effort*Condition 2	**0.14**	**0.06**	**0.22**	**0.04**	**3.56**	**.000**
Effort*Condition 3	0.00	-0.09	0.09	0.05	0.04	.967
Certainty*Condition 1	0.05	-0.02	0.13	0.04	1.33	.182
Certainty*Condition 2	**0.11**	**0.03**	**0.19**	**0.04**	**2.58**	**.010**
Certainty*Condition 3	-0.08	-0.22	0.07	0.07	-1.02	.310
Control*Condition 1	-0.02	-0.12	0.08	0.05	-0.44	.658
Control*Condition 2	0.01	-0.08	0.11	0.05	0.27	.791
Control*Condition 3	0.01	-0.12	0.14	0.07	0.15	.884
Responsibility*Condition 1	0.01	-0.02	0.04	0.02	0.74	.457
Responsibility*Condition 2	0.02	-0.01	0.05	0.02	1.42	.156
Responsibility*Condition 3	0.03	-0.01	0.07	0.02	1.37	.170
Fairness*Condition 1	0.01	-0.08	0.11	0.05	0.29	.775
Fairness*Condition 2	-0.02	-0.13	0.08	0.05	-0.46	.643
Fairness*Condition 3	0.15	-0.02	0.31	0.09	1.70	.089
Attention*Condition 1	0.00	-0.06	0.06	0.03	0.00	.999
Attention*Condition 2	-0.06	-0.11	-0.00	0.03	-2.01	.045
Attention*Condition 3	0.07	-0.01	0.15	0.04	1.75	.080
Frustrative Non-Reward*Goal Blockage	**-0.09**	**-0.16**	**-0.03**	**0.03**	**-2.77**	**.006**
Frustrative Non-Reward*Effort	**0.09**	**0.03**	**0.16**	**0.03**	**2.90**	**.004**
Frustrative Non-Reward*Certainty	-0.05	-0.11	0.02	0.03	-1.46	.145
Frustrative Non-Reward*Control	0.05	-0.03	0.13	0.04	1.32	.187
Frustrative Non-Reward*Responsibility	0.00	-0.02	0.02	0.01	0.12	.905
Frustrative Non-Reward*Fairness	-0.02	-0.10	0.05	0.04	-0.63	.532
Frustrative Non-Reward*Attention	0.01	-0.03	0.05	0.02	0.50	.619
Attentiveness ~						
Goal Blockage	**0.08**	**0.03**	**0.14**	**0.03**	**2.88**	**.004**
Effort	**0.06**	**0.01**	**0.11**	**0.03**	**2.40**	**.016**
Certainty	0.04	-0.02	0.09	0.03	1.19	.232
Control	-0.03	-0.10	0.03	0.03	-1.06	.291
Responsibility	-0.02	-0.04	0.01	0.01	-1.51	.132
Fairness	0.01	-0.06	0.08	0.04	0.35	.730
Attention	**0.18**	**0.14**	**0.22**	**0.02**	**8.91**	**.000**
Hostility ~						

Goal Blockage	0.01	-0.05	0.06	0.03	0.29	.769
Effort	**0.09**	**0.04**	**0.13**	**0.02**	**3.50**	**.000**
Certainty	**-0.08**	**-0.14**	**-0.03**	**0.03**	**-2.87**	**.004**
Control	0.03	-0.03	0.09	0.03	0.95	.344
Responsibility	0.00	-0.02	0.02	0.01	0.34	.738
Fairness	0.04	-0.03	0.11	0.03	1.16	.247
Attention	-0.02	-0.06	0.02	0.02	-0.88	.380
Guilt ~						
Goal Blockage	-0.01	-0.06	0.04	0.03	-0.43	.671
Effort	**0.07**	**0.03**	**0.12**	**0.02**	**3.39**	**.001**
Certainty	**-0.07**	**-0.13**	**-0.02**	**0.03**	**-2.77**	**.006**
Control	-0.00	-0.06	0.06	0.03	-0.03	.973
Responsibility	-0.01	-0.03	0.00	0.01	-1.48	.138
Fairness	**0.07**	**0.01**	**0.14**	**0.03**	**2.40**	**.016**
Attention	-0.02	-0.06	0.02	0.02	-1.20	.232
Attentiveness ~						
Frustration	-0.02	-0.23	0.19	0.11	-0.18	.860
Hostility ~						
Frustration	**0.29**	**0.09**	**0.50**	**0.11**	**2.77**	**.006**
Guilt ~						
Frustration	**0.28**	**0.09**	**0.47**	**0.10**	**2.92**	**.004**

Note. Bolded values indicate significance.

Additionally, results demonstrate that model two accounts for approximately 41% of the variation in frustration (see Table 10); the additional cognitive appraisals account for more variation in frustration. This highlights the unique aspects of model two compared to model one, though results of chi-square difference test on nested models will determine the better model.

Table 10. Model Two R^2 Statistics

Variable	R^2
Frustration	0.41
Attentiveness	0.39
Hostility	0.19
Guilt	0.22

Results of chi-square difference test on nested models revealed a significant difference between models, $\Delta\chi 2 = 88.37$ (60), $p < .05$. (see Table 11 for model comparison). Model one had better fit indices, slightly lower AIC and BIC values (AIC=1,561, BIC=1,717), and is more parsimonious. Model two additionally did not demonstrate large differences in model output, so

model one is likely more practically meaningful and a better model of frustration. Hypothesis eight is therefore unsupported.

Table 11. Results of Chi-square Difference Test on Nested Models

Model	χ^2	df	p	CFI	TLI	RMSEA	90% CI (RMSEA)		SRMR	AIC	BIC
							Lower	*Upper*			
One	23.78	24	.474	1.00	1.00	.00	.00	.02	.03	1561	1717
Two	112.15	84	.022	.93	.87	.04	.05	.06	.02	1629	1783

Chapter 4 - Discussion

Study one involved an exploration of stress and frustration topics, including scenario ratings and semantic analysis. Though scenarios were all based on frustration antecedents, some were regarded as stressful. These highlight specific instances in which events that are generally frustrating may be considered more stressful, providing a starting point for determining when to focus on stress vs frustration prevention and mitigation. For example, work overload, organizational change, lack of job security, isolation, and upset customers were rated as stressful, even though similar scenarios were rated as more frustrating. These results suggest that perhaps lack of social support is more stressful than frustrating, as is poor interactions with customers compared to coworkers. Ambiguity about job security was considered stressful, while certainty of being replaced was considered frustrating. Together, these areas may point to one frustration antecedent that may be more stressful: uncertainty. Unsurprisingly, participant definitions and experiences of stress and frustration were semantically similar, which may be unavoidable since frustration and stress sometimes feel similar. However, traditional measures did not seem to be supplementing actual experiences very well, indicating some room for improvement in how stress and frustration are measured. Perhaps traditional measures can be revisited, or can be accompanied by long-form, open-ended measures to truly encapsulate experiences. Regarding

research question one, participant conceptualizations of stress and frustration seemed to differ in that frustration was referred to as an emotion, while stress was not explicitly associated with that word. Instead, it was regarded as mental or psychological and was associated with other emotions such as anxiety. Interestingly, participants did not significantly mention physicality when discussing frustration but did so when discussing stress. Also, mirroring results of scenario analysis, customer service jobs seemed to be mentioned often as stressful. Regarding research question two, existing measures of stress and frustration could benefit from some revising, or semantic measures could be included to supplement them, as participant conceptualizations and their scores were not well aligned.

Results of studies two and three suggest that a simplified model of frustration, including only effort and goal blockage appraisals, may capture it effectively. However, these results should be interpreted with caution considering the small sample size. Studies two and three highlighted the importance of effort and goal blockage appraisals in frustration experiences. These results cement the importance of goal blockage appraisals to the frustration experience, supporting past research. They also provide an addition to the theoretical basis of frustration, extending our current understanding by suggesting that effort appraisals may also be important to frustration experiences, though not as expected. Effort was negatively associated with frustration when frustrative non-reward was not high, suggesting that increased effort may reduce frustration provided individuals perceive a fair reward based on their efforts, which is an interesting finding. This may perhaps be explained by required attention or motivation, or task engagement. It is also possible that liking the task may have reduced frustration, or that wanting to learn and master the task reduced frustration (Litman, 2005). If this is the case, this finding could have significant implications for the importance of goal blockage to frustration. If goal

blockage can be superseded by motivation, effort, task engagement, or perhaps task enjoyment, then effects of goal blockage may be reduced before they lead to behavioral manifestations of frustration. However, this would have to be explored further in future research since task enjoyment and motivation were not measured.

The consistent moderating role of frustrative non-reward is not necessarily surprising but supports prior research suggesting that individual differences affect frustration experiences. When frustrative non-reward was high, individuals generally experienced less frustration associated with goal blockage, and more frustration associated with effort, highlighting that individual differences affect frustration experiences such that the relationship between some cognitive appraisals and frustration is dependent on sensitivity to reward omission. This finding supports extending ERI to frustration, suggesting that effort-reward imbalance is indeed important to frustration experiences. Furthermore, these results imply that interpretations of reward contingencies play a crucial role in frustration experiences, with individuals more sensitive to lack of reward becoming more prone to frustration. This aligns with theories of cognitive appraisal, where emotional outcomes are influenced by personal evaluations, emphasizing the need to consider individual variations in frustration models.

More surprising is the inconsistent moderating role of situational constraints, which have usually been shown to increase frustration, but frustration was felt similarly across conditions. In study one, situational constraints moderated the relationship between goal blockage and frustration and the relationship between effort and frustration, such that the relationships were most affected by modest, and high situational constraints. In study two the relationships between goal blockage and frustration, effort and frustration, and certainty and frustration were moderated by situational constraints, such that these relationships were enhanced with moderate situational

constraints. These findings should be explored further but could indicate an optimal number of constraints to avoid frustration. For example, in this case, perhaps moderate time constraints are more frustrating than low or high time constraints because low time constraints could have resulted in eventual loss of attention, or disengagement. High constraints could have resulted in complete loss of effort or giving up. In any case, since these moderation effects were inconsistent, future research could examine them more closely to determine exactly how situational constraints affect frustration experiences.

Results regarding affective outcomes of frustration were consistent, with frustration generally predicting hostility and guilt. In line with to prior research establishing links between frustration and feelings of anger, a significant association was found between frustration and hostility. This poses interesting implications considering the general aggression model (GAM; Anderson & Bushman, 2002) and the frustration-aggression hypothesis (Fox & Spector, 1999). Generally, affect, arousal, and cognition affect an individual's appraisal process, which can lead to aggression (Anderson & Bushman, 2002). The current study found evidence that frustration is associated with increased hostility, which suggests that it could influence affect more than arousal, meaning that it may serve principally as a provocation that produces aggression, in line with suggestions from Anderson and Bushman (2002). This finding elucidates frustration's precise relationship with anger, addressing a recent criticism that the frustration-aggression hypothesis has become overly broad, generally assuming frustration produces aggression, but overlooking how (Potegal, 2023).

The findings regarding guilt were a bit more unexpected but suggest that frustration perhaps may be associated with guilt due to goal failure (Bohns & Flynn, 2012). This points to internalization of frustration; while hostility can manifest as an external response (e.g.,

aggression), guilt may be an internal response to frustration. Guilt therefore poses an interesting area to target to mitigate frustration outcomes, as it may manifest in unexpected work behaviors and attitudes compared to hostility. Future research could help identify the interplay between guilt and hostility associated with frustration.

Theoretical Implications

The current study offers many theoretical contributions. First, it tested two proposed models of frustration based on an existing framework, while including previously excluded cognitive appraisal dimensions that may be relevant to frustration. Results demonstrate that individual paths of low effort and high goal blockage are associated with frustration, which in turn is related to increased hostility and guilt, proposing a distinct model of frustration, based in an existing framework. Also, model comparison results offer valuable information regarding the utility of including additional cognitive appraisals. Testing the full battery of cognitive appraisals proposed in the existing framework and new model revealed that they were generally not meaningful, meaning that a more parsimonious frustration model may be sufficient.

Additionally, this study confirms existing perspectives on goal blockage's role in frustration experiences and advances this finding by confirming it with an experimental design. It also incorporated additional cognitive appraisals, highlighting that goal blockage may not be solely responsible for frustration experiences, which is highly meaningful. Prior conceptualizations of frustration prioritized goal blockage, but effort appraisals may also be relevant.

The current study also synthesized appraisal theory and occupational theory. Appraisal theory considers emotions "episodes" (Moors et al., 2013), so they may represent short-term states. The current study addressed a gap in literature by focusing on unaggregated affective

outcomes, demonstrating that frustration was associated with reduced attentiveness and increased guilt. Examining frustration episodes at the state level provided insight that was unafforded by simple considerations of their antecedents and outcomes. This insight may be useful in guiding occupational frustration research, and more nuanced approaches to mitigating and preventing negative behavioral outcomes.

Results provide some support for extending an existing stress theory, ERI, to frustration, since effort was consistently found to be a significant predictor of frustration (though not in the direction that was expected). The moderating effect of tolerance to reward omission cements this conclusion. Findings may also support the Emotion Regulation Impairment (Gross, 2008) theory, since the consistent effect of frustrative non-reward highlights relevance of emotion regulation in understanding the mechanisms underlying frustration experiences.

The current study provides groundwork for developing a taxonomy of frustration, highlighting the importance of reduced goal obstacles and increased effort appraisals to reducing frustration. It also provided some support that the relationship between specific appraisals and frustration is moderated by situational constraints and individual differences in frustration. Finally, frustration generally led to reduced attentiveness and increased guilt. This provides a burgeoning picture of frustration, which will ultimately improve its measurement and potentially help determine different types of frustration (positive or negative). Research on long-term effects of frustration, frustration coping, and recovery research could potentially benefit from more precise understanding and measurement as well.

Finally, results suggest that frustration may be distinct from stress, as frustration is associated with emotional states like both hostility and guilt, whereas some types of stress may be associated with guilt (e.g., PTSD; Bub & Lommen, 2017), but less so with hostility; in line

with general strain theory, stress is associated with increased aggression mostly in criminology context (Agnew, 2007), but not in occupational contexts. Frustration may produce unique combination of both guilt and hostility. Moreover, previous models of frustration characterized it primarily in terms of anger or aggression, which are externalized behaviors. In contrast, findings of all studies suggest that frustration might also be linked to self-orientation or internalized behaviors such as guilt, which could lead to withdrawal or other internalized issues that undermine psychological well-being. While future research is needed, these findings imply important implications for employee well-being. Findings also point to new avenues for measurement to ensure that these issues are addressed; frustration measures could be revisited.

Practical Implications

Results of study one indicate that frustration and stress are indeed similar, but could perhaps be better understood with the inclusion of new measures or open-ended responses, as existing measures seemed to be lacking in capturing distinctiveness or detailed experiences. For organizations, this could mean that fully understanding employee experiences, to improve them, could include asking for more detailed accounts of frustration or stress.

Results of studies two and three verify the importance of cognitive appraisals to frustration, consistently demonstrating that effort may reduce frustration, and goal blockage may increase it. Additionally, significant interactions between frustrative non-reward and goal-blockage, and FNR and effort imply that individuals who experience high levels of FNR may be less sensitive to Goal Blockage in terms of frustration, meaning other factors might contribute more to their frustration. Also, those who experience high FNR may exhibit an enhanced relationship between their effort and frustration, implying that high effort may lead to greater frustration when individuals perceive non-rewarding outcomes. If this effect is verified, specific

attempts aimed at these appraisals and/or targeting frustrative non-reward may lead to reduced frustration, and in turn decrease negative behaviors associated with it. For example, organizations could focus on ensuring that goal obstacles are minimized when necessary, or that tasks are sufficiently mentally engaging and or/ enjoyable to reduce frustration. They also may be able to provide guidance directed at cognitive reappraisal, or reframing situations, which can be useful in frustrating conditions (Spann et al., 2019). Alternatively, organizations could focus on moderators of the effort-frustration or goal-blockage-frustration relationship. For example, increasing organizational support or fairness (organizational justice) could reduce threat of non-reward, targeting tolerance to reward omission to reduce frustration.

Additionally, organizations may be able to target affective outcomes of frustration to prevent negative behaviors. For example, since frustration generally led to increased guilt, organizations could develop programs to either mitigate the effects of guilt or reframe the guilt and provide motivational assistance (as suggested by Bohns & Flynn, 2012). They could additionally focus on hostility, since frustration increased it.

Limitations

Though the current study is concerned with occupational frustration, I did not manipulate frustration in an organizational setting – rather I examined a generally frustrating proxy event (QWOP). This was due to availability and to ensure that the emotion of frustration was salient for participants while they were responding to the rest of the survey. Frustration experienced during a game may differ from that experienced at work, but well-established principles of frustration guided the choice of manipulation; similar frustration experiences could occur in the workplace, as previously outlined. Though this is a limitation of the current research, the experimental design and temporal ordering of the variables was a strength, allowing participants

to draw from a relevant frustrating experience, and the broad theoretical implications afforded by this study can be applied to occupational frustration research. Additionally, if future research can test the developing model of frustration suggested by these results in an occupational setting, a tangible, complete concept of frustration will emerge, and can be used in future research.

Regarding study one, only two measures for stress and frustration were used for semantic comparison. This decision was made based upon a pilot study and to reduce survey fatigue, but future research could compare more to examine their similarity and determine whether concepts are being captured by existing measures. Additionally, though the frustration manipulation was generally regarded as frustrating in a pilot study and subsequent study, it has not been widely tested, and did not differ between conditions. The DRQ had poor fit to the measurement model compared to other measures but was included anyways since it was a focal variable in the model. Also, a measure of goal blockage was included to assess ERI tenets rather than a measure of expected reward, though this was done because participants theoretically all had the same expected reward based on the study design.

The study was also limited by its sampling method and size. The sample size was insufficient for the complexity of models. A snowball and convenience sample were used for this research. The snowball sample was based on graduate students' and academic professionals' contacts, which may not be representative of all industries. Also, most of the sample held at least one student role, which may not generalize to a larger working sample. Considering these limitations, implications of the current study should be interpreted with extreme caution.

Future Directions

Future research could address the limitation of the small sample, replicating study three with more participants. It could also include a more explicit expected reward measure to test the

applicability of ERI, as that was not done since all participants were offered the same reward. The exact relationship and extent of association with stress is unknown, but examining the relationship will help to clarify the taxonomy of stress; delineating the frustration construct could help to narrow the broad concept of stress. Therefore, future research could replicate this study with the inclusion of a stress manipulation and compare the two, though stress might include full emotional outcomes rather than simple affective outcomes. Future research might also implement a frustration manipulation within an occupational setting or use a manipulation that is more relevant to an occupational setting. Future iterations of model testing could include more PANAS-X dimensions. The current study focused on attentiveness, hostility, and guilt since those had established patterns in literature, but the model could be modified with more dimensions to determine whether unexpected affective outcomes arise.

Future research should examine the valence of frustration, frustration coping and recovery methods, whether there are long-term effects of frustration, and improving frustration measurement to capture more nuanced experiences. The current study focused on cognitive appraisals and affective outcomes associated with frustration, but a complete emotional experience would include action readiness and physiological arousal. Future research could add these aspects to gain a complete picture of frustration. If the emerging model is verified through replication, future research could add an additional step and examine whether different combinations of cognitive appraisals and/or specific affective states differentially manifest in positive versus negative behavioral and attitudinal outcomes, which would ultimately help with prevention and mitigation, as well as promoting positive behavioral outcomes.

Conclusion

Frustration carries important implications for both behavioral and attitudinal outcomes, and stress in the workplace. Frustration has been consistently associated with negative behaviors; its benefits are far outweighed by its drawbacks. Frustration's relationship with affect is not quite understood (Breuer et al., 2015), but affective events can impact these negative behavioral outcomes. Therefore, the current study illuminated associated affect by testing a model based on an existing frustration framework.

A more complete understanding of frustration arose due to the bottom-up approach of verifying the cognitive appraisal and associated affective experiences, which are important to emotion theory. Though not entirely as expected, results provide a promising, comprehensive explanation of frustration, taking steps towards explanatory theory. This could advance attempts to identify and mitigate frustration outcomes, provide a more nuanced approach to frustration measurement, and provide more direction for research on coping, recovery, and long-term effects. Results illuminate frustration experiences, emphasizing some commonly associated experiences that may be less associated with frustration, which could address overgeneralization issues for stress.

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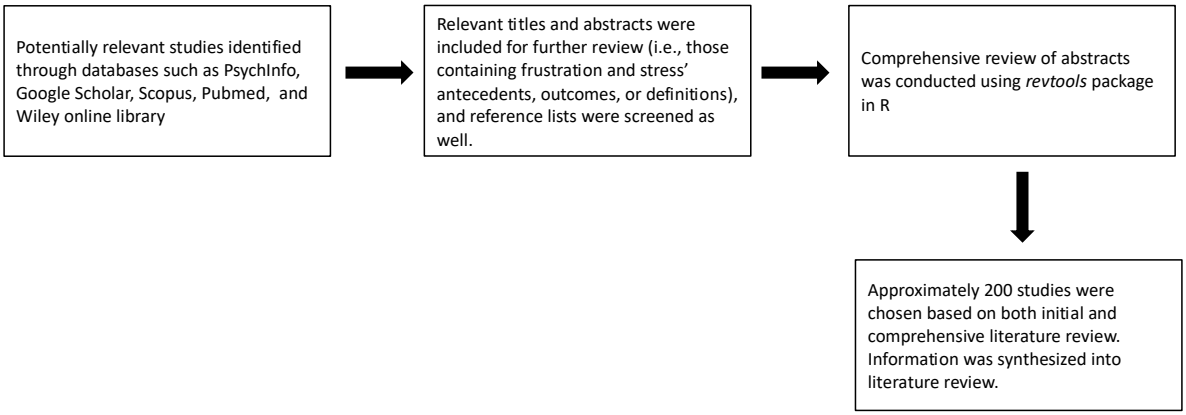
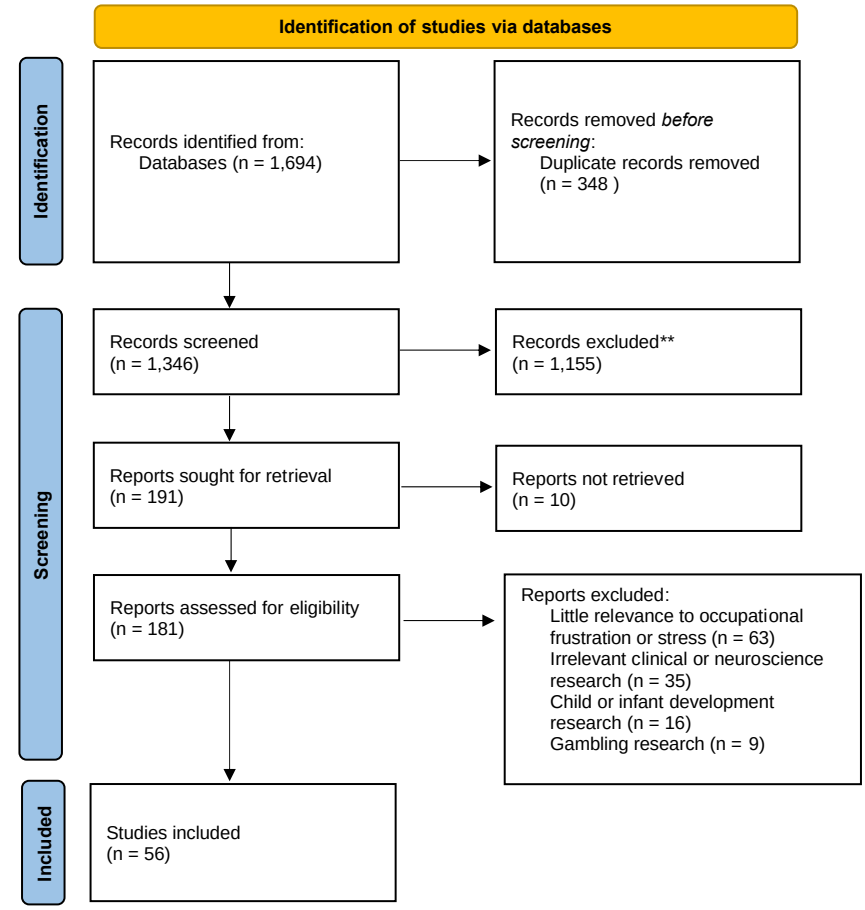
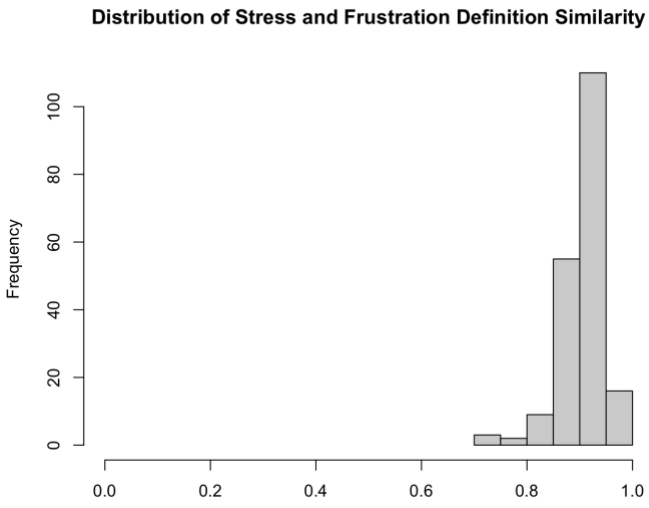
Appendix A - Literature Review: Inclusion Flowchart and PRISMA Guidelines

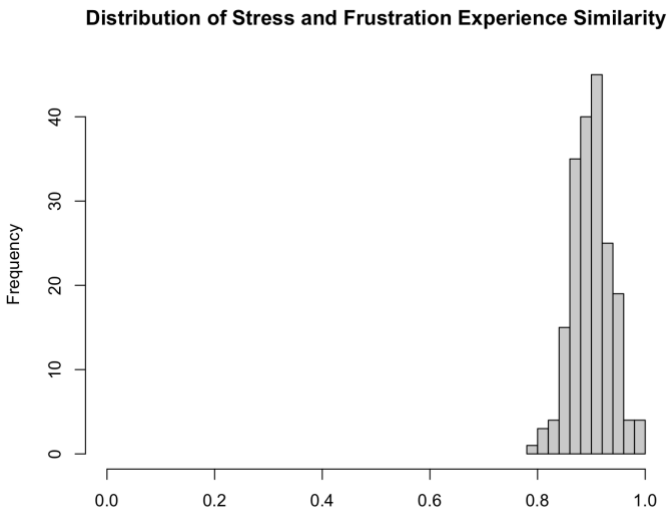


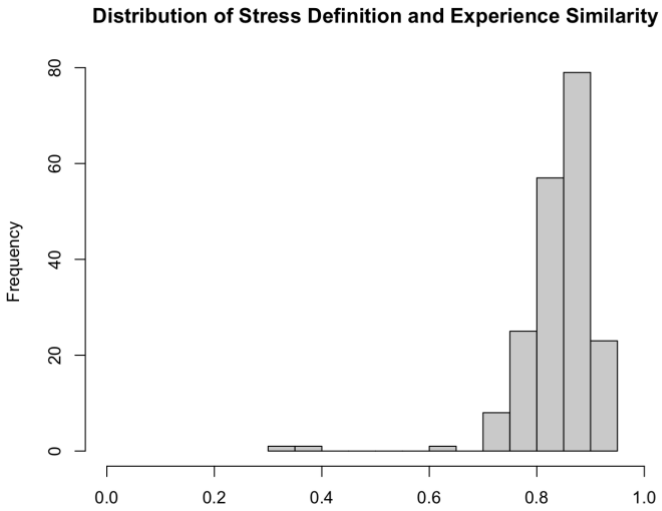


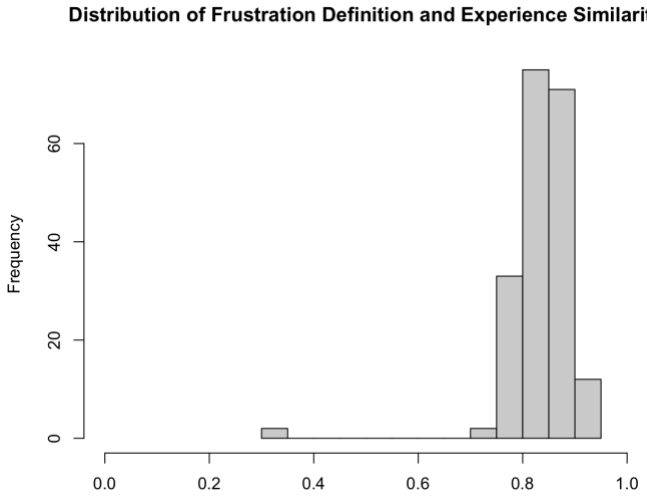
**Records were screened with revtools (Westgate, 2019)

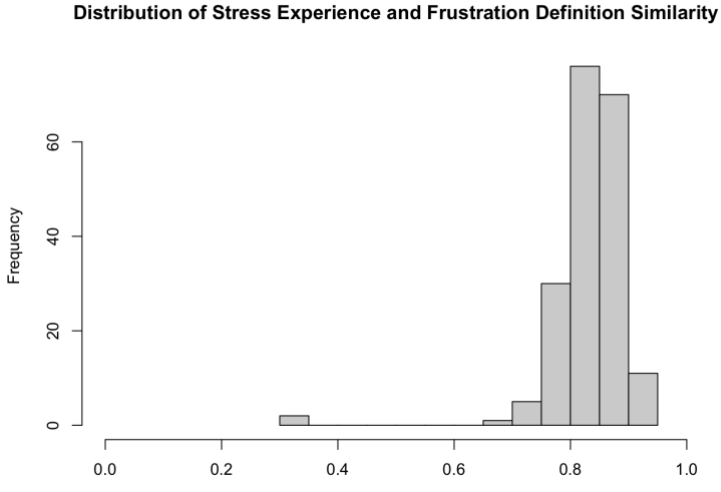
Appendix B - Cosine Similarity Distributions

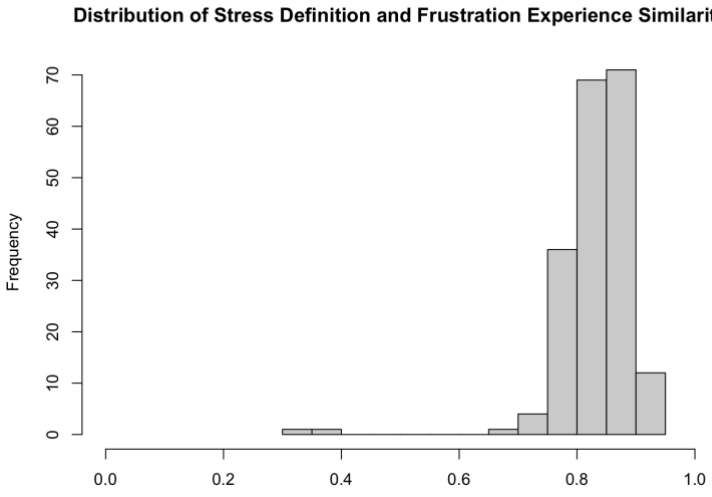












Appendix C - CFA and MI Testing on Variables for Studies Two and Three

Table 12. Results of Confirmatory Factor Analysis (CFA) on All Study Variables

Measure	$\chi 2$	df	p	CFI	TLI	RMSEA	SRMR
State Frustration (adapted Frustration with work; O'connor & Rudolph, 1980)	**0**	**0**		**1.00**	**1.00**	**0**	**0**
Dimensional Ratings Questionnaire (Smith & Ellsworth,	67.82	14	.000	.884	.827	.134	.084
PANASX: Hostility	**24.88**	**9**	**.003**	**.963**	**.938**	**.091**	**.042**
PANASX: Guilt	**39.99**	**9**	**.000**	**.929**	**.882**	**.127**	**.052**
PANASX: Attentiveness	**2.29**	**2**	**.318**	**.999**	**.997**	**.026**	**.017**
Frustrative Non-reward (Wright et al., 2009)	**5.81**	**5**	**.325**	**.992**	**.985**	**.027**	**.031**
State Stress (adapted Stress In General; Stanton et al., 2001)	624.51	89	.000	.715	.663	.168	.107
Video Game Self Efficacy (Allan, 2010)*	20.13	2	.000	.899	.697	.206	.066

Note. Asterisks indicate item parceling was used for CFA because the factor structure was unknown. Fit for the Dimensional Ratings Questionnaire was assessed with composite measures of each dimension, since the general cognitive antecedents of frustration were of interest in this study. Only PANAS measures included in hypothesis testing were assessed for goodness of fit.

Table 13. Results of Multigroup CFA for Measurement Invariance (MI)

Measure	Model	$\chi 2$ ($\Delta \chi 2$)	df (Δdf)	P (Δp)	CFI (ΔCFI)	RMSEA	90%CI (RMSEA)
State Frustration (adapted Frustration with work; O'connor & Rudolph, 1980)	M1 (configural)	0.00	0.00	.000	1.00	.00	.00, .00
	M2 (metric)	**(2.36)**	**(2)**	**(.316)**	**(-.00)**	**.04**	**.00, .20**
	M3 (scalar)	**(4.95)**	**(2)**	**(-.196)**	**(-.01)**	**.09**	**.00, .19**
Dimensional Ratings	M1 (configural)	105.01	28	.000	.84	.16	.13, .19
	M2 (metric)	**(12.29)**	**(6)**	**(.000)**	**(-.01)**	**.15**	**.12, .18**

Questionnaire (Smith & Ellsworth)	**M3 (scalar)**	**(7.69)**	**(6)**	**(.000)**	**(-.00)**	**.14**	**.11, .17**
	M1 (configural)	38.44	18	.003	.96	.10	.06, .15
PANASX: Hostility	M2 (metric)	(18.67)	(5)	(-.003)	(-.03)	**.12**	**.08, .16**
	M3 (scalar)	(17.45)	(5)	(.000)	(-.03)	**.13**	**.09, .16**
	M1 (configural)	71.65	18	.000	.89	.17	.13, .21
PANASX: Guilt	**M2 (metric)**	**(9.34)**	**(5)**	**(.000)**	**(-.01)**	**.15**	**.12, .19**
	M3 (scalar)	(25.43)	(5)	(.000)	(-.04)	.16	.13, .20
	M1 (configural)	2.74	4	.603	1.00	.00	.00, .12
PANASX: Attentiveness	**M2 (metric)**	**(3.25)**	**(3)**	**(-.062)**	**(0.00)**	**.00**	**.00, .11**
	M3 (scalar)	**(2.04)**	**(3)**	**(.085)**	**(0.00)**	**.00**	**.00, .09**
Frustrative Non-reward (Wright et al., 2009)	M1 (configural)	9.59	10	.477	1.00	.00	.00, .10
	M2 (metric)	(6.52)	(4)	(-.170)	(-.02)	**.04**	**.00, .10**
	M3 (scalar)	(5.69)	(4)	(-.066)	(-.02)	**.04**	**.00, .10**
State Stress (adapted Stress In General; Stanton et al., 2001)	M1 (configural)	796.74	178	.000	.69	**.18**	**.17, .19**
	M2 (metric)	**(8.98)**	**(13)**	**(.000)**	**(.00)**	**.17**	**.16, .19**
	M3 (scalar)	(43.55)	(13)	(.000)	(-.02)	**.17**	**.16, .18**
Video Game Self Efficacy (Allan, 2010)*	**M1 (configural)**	**21.65**	**4**	**.000**	**.89**	**.17**	**.09, .26**
	M2 (metric)	(2.03)	(3)	(.001)	(-.11)	**.18**	**.12, .25**
	M3 (scalar)	(3.95)	(3)	(.001)	(-.03)	**.16**	**.11, .22**

Note. $\Delta CFI \leq .01$ indicates that the invariance assumption holds (Cheung & Rensvold, 2002).

Groups were based on sampling method. Boldface indicates invariance holds.

Appendix D - Covariance and Variance Matrices for Studies Two and Three

Table 14. Model One Covariance Matrix

	Estimate	***SE***	**z-value**	***p***
Attentiveness~				
Hostility	0.09	0.04	2.13	.033
Guilt	0.03	0.04	0.69	.489
Hostility~				
Guilt	0.28	0.04	7.49	.000

Table 15. Model One Variance Matrix

	Estimate	***SE***	**z-value**	***p***
Frustration	0.19	0.02	10.34	.000
Attentiveness	0.70	0.07	10.34	.000
Hostility	0.51	0.05	10.34	.000
Guilt	0.43	0.04	10.34	.000

Table 16. Model Two Covariance Matrix

	Estimate	***SE***	**z-value**	***p***
Attentiveness~				
Hostility	0.11	0.04	3.31	.001
Guilt	0.05	0.03	1.62	.105
Hostility~				
Guilt	0.26	0.04	7.37	.000

Table 17. Model Two Variance Matrix

	Estimate	***SE***	**z-value**	***p***
Frustration	0.16	0.02	10.34	.000
Attentiveness	0.50	0.05	10.34	.000
Hostility	0.48	0.05	10.34	.000
Guilt	0.40	0.04	10.34	.000

Appendix E - Supplementary Analyses

Supplementary analyses were conducted to determine whether including control measures had a significant impact on each of the proposed models. Results confirmed that the models including the control measures had worse fit and slightly worse AIC and BIC indicators than those without controls. Therefore, these measures were dropped to ensure parsimony, considering the sample size. Additionally, both models one and two were first modeled without direct paths from cognitive appraisals to affective states, but had poor fit according to CFI and TLI indices. Models with direct paths from cognitive appraisals to affective states were run for comparison, resulting in improved fit without much change to model output. The original models are detailed below, for comparison to the final model output reported in the current study.

For study one, a model including controls had worse fit $\chi^2 = 153.74$ (36), $p < .001$, CFI = .66, TLI = .48, RMSEA= .12 [.10, .10], SRMR = .08 than a model without controls $\chi^2 = 62.33$ (30), $p < .001$, CFI = .87, TLI = .80, RMSEA= .071 [.05, .10], SRMR = .07. Additionally, the model output did not greatly differ from that without controls; see Tables 18 and 19 for results of path analyses. Thus, controls were dropped from subsequent model testing, considering both their poor fit to the measurement model and model parsimony. However, a model without controls yielded poor fit according to CFI and TLI values. Therefore, subsequent testing added direct paths from cognitive appraisals to affective outcomes, to model some additional variance. The resulting model had comparatively better fit, $\chi^2 = 23.78$ (24), $p = .474$, CFI = 1.00, TLI = 1.00, RMSEA= .00 [.00, .05], SRMR = .03, so it was reported in the current study.

Table 18. Supplementary Path Analysis Results: Model One (Controls Included)

Path	**Estimate**	***SE***	**z-value**	***p***
Frustration ~				
Goal Blockage	**0.29**	**0.07**	**4.06**	**.000**
Effort	**-0.24**	**0.07**	**-3.41**	**.001**

VGSE	0.00	0.06	0.00	.996
SIG	**0.13**	**0.04**	**3.05**	**.002**
Goal Blockage* Condition 1	-0.05	0.03	-1.60	.110
Goal Blockage* Condition 2	**-0.10**	**0.03**	**-3.04**	**.002**
Goal Blockage* Condition 3	-0.03	0.04	-0.91	.365
Effort* Condition 1	**0.08**	**0.03**	**2.38**	**.017**
Effort* Condition 2	**0.12**	**0.03**	**3.43**	**.001**
Effort* Condition 3	0.06	0.04	1.51	.130
Frustrative Non-Reward*Goal Blockage	**-0.09**	**0.03**	**-3.33**	**.001**
Frustrative Non-Reward*Effort	**0.09**	**0.03**	**3.23**	**.001**
Attentiveness ~				
Frustration	**0.37**	**0.12**	**3.17**	**.002**
Hostility ~				
Frustration	**0.45**	**0.10**	**4.56**	**.000**
Guilt ~				
Frustration	**0.45**	**0.09**	**4.97**	**.000**

Note. Bolded values indicate significance.

Table 19. Supplementary Path Analysis Results: Model One (Controls Removed)

Path	**Estimate**	***SE***	**z-value**	***p***
Frustration ~				
Goal Blockage	**0.34**	**0.07**	**4.92**	**.000**
Effort	**-0.26**	**0.07**	**-3.57**	**.000**
Goal Blockage*Condition 1	-0.06	0.03	-1.94	.053
Goal Blockage*Condition 2	**-0.12**	**0.03**	**-3.40**	**.001**
Goal Blockage*Condition 3	-0.05	0.04	-1.19	.234
Effort*Condition 1	**0.09**	**0.04**	**2.68**	**.007**
Effort*Condition 2	**0.13**	**0.04**	**3.76**	**.000**
Effort*Condition 3	0.08	0.04	1.74	.082
Frustrative Non-Reward*Goal Blockage	**-0.10**	**0.03**	**-3.73**	**.000**
Frustrative Non-Reward*Effort	**0.10**	**0.03**	**3.59**	**.000**
Attentiveness ~				
Frustration	**0.37**	**0.12**	**3.17**	**.002**
Hostility ~				
Frustration	**0.45**	**0.10**	**4.56**	**.000**
Guilt~				
Frustration	**0.45**	**0.09**	**4.97**	**.000**

Note. Bolded values indicate significance.

For study two, a model including controls had worse fit χ^2 = 345.74 (111), p <.001, CFI = .51, TLI = .33, RMSEA= .10 [.09, .11], SRMR = .05 than a model without controls χ^2 = 250.40 (105), p<.001, CFI = .62, TLI = .48, RMSEA= .09 [.07, .09], SRMR = .04. Therefore, a model

without controls was chosen for the same reasons as above. Additionally, the model output did not greatly differ from that without controls; see Tables 20 and 21 for full details of path analysis output, to compare to the model without controls. Therefore, controls were dropped from subsequent model testing, considering both their poor fit to the measurement model and model parsimony. However, a model without controls yielded poor fit according to CFI and TLI values. Therefore, subsequent testing added direct paths from cognitive appraisals to affective outcomes, to model some additional variance. The resulting model had comparatively better fit, $\chi^2 = 112.15$ (84), p =.022, CFI = .93, TLI = .87, RMSEA= .04 [.02, .06], SRMR = .02, so it was reported in the current study.

Table 20. Supplementary Path Analysis Results: Model Two (Controls Included)

Path	**Estimate**	***SE***	**z-value**	***p***
Frustration ~				
Goal Blockage	**0.26**	**0.09**	**3.00**	**.003**
Effort	**-0.22**	**0.08**	**-2.72**	**.006**
Certainty	0.12	0.08	1.52	.129
Control	-0.06	0.10	-0.62	.536
Responsibility	-0.03	0.03	-1.11	.268
Fairness	0.05	0.10	0.53	.594
Attention	0.02	0.05	0.32	.750
VGSE	-0.06	0.06	-1.04	.299
SIG	**0.12**	**0.04**	**2.93**	**.003**
Goal Blockage*Condition 1	-0.05	0.04	-1.26	.209
Goal Blockage*Condition 2	**-0.11**	**0.04**	**-2.63**	**.009**
Goal Blockage*Condition 3	-0.10	0.05	-1.90	.057
Effort*Condition 1	0.06	0.04	1.69	.091
Effort*Condition 2	**0.12**	**0.04**	**3.17**	**.002**
Effort*Condition 3	0.00	0.05	0.07	.943
Certainty*Condition 1	0.04	0.04	1.05	.292
Certainty*Condition 2	0.10	0.04	2.31	.021
Certainty*Condition 3	-0.12	0.07	-1.55	.121
Control*Condition 1	-0.03	0.05	-0.50	.615
Control*Condition 2	-0.01	0.05	-0.29	.770
Control*Condition 3	-0.01	0.07	-0.14	.885
Responsibility*Condition 1	0.01	0.02	0.73	.464
Responsibility*Condition 2	0.02	0.02	1.53	.126
Responsibility*Condition 3	0.03	0.02	1.67	.094
Fairness*Condition 1	0.01	0.05	0.27	.786

Fairness*Condition 2	-0.01	0.05	-0.10	.925
Fairness*Condition 3	0.17	0.08	2.01	.045
Attention*Condition 1	0.00	0.03	0.09	.931
Attention*Condition 2	-0.05	0.03	-1.81	.071
Attention*Condition 3	0.07	0.04	1.67	.095
Frustrative Non-Reward*Goal Blockage	**-0.07**	**0.03**	**-2.20**	**.028**
Frustrative Non-Reward*Effort	**0.08**	**0.03**	**2.53**	**.011**
Frustrative Non-Reward*Certainty	-0.05	0.03	-1.55	.122
Frustrative Non-Reward*Control	0.03	0.04	0.78	.437
Frustrative Non-Reward*Responsibility	0.00	0.01	0.32	.746
Frustrative Non-Reward*Fairness	-0.01	0.04	-0.22	.825
Frustrative Non-Reward*Attention	0.01	0.02	0.46	.643
Attentiveness ~				
Frustration	**0.37**	**0.12**	**3.17**	**.002**
Hostility ~				
Frustration	**0.45**	**0.10**	**4.56**	**.000**
Guilt ~				
Frustration	**0.45**	**0.09**	**4.97**	**.000**

Note. Bolded values indicate significance.

Table 21. Supplementary Path Analysis Results: Model Two (Controls Removed)

Path	**Estimate**	***SE***	**z-value**	***p***
Frustration ~				
Goal Blockage	**0.33**	**0.08**	**3.97**	**.000**
Effort	**-0.24**	**0.08**	**-2.92**	**.004**
Certainty	0.09	0.08	1.19	.235
Control	-0.12	0.10	-1.22	.223
Responsibility	-0.03	0.03	-0.81	.416
Fairness	0.09	0.10	0.93	.354
Attention	0.02	0.05	0.34	.738
Goal Blockage*Condition 1	-0.07	0.04	-1.65	.099
Goal Blockage*Condition 2	**-0.13**	**0.04**	**-3.10**	**.002**
Goal Blockage*Condition 3	**-0.12**	**0.05**	**-2.37**	**.018**
Effort*Condition 1	0.07	0.04	1.93	.054
Effort*Condition 2	**0.14**	**0.04**	**3.56**	**.000**
Effort*Condition 3	0.00	0.05	0.04	.967
Certainty*Condition 1	0.05	0.04	1.33	.182
Certainty*Condition 2	**0.11**	**0.04**	**2.58**	**.010**
Certainty*Condition 3	-0.08	0.07	-1.02	.310
Control*Condition 1	-0.02	0.05	-0.44	.658
Control*Condition 2	0.01	0.05	0.27	.791
Control*Condition 3	0.01	0.07	0.15	.884
Responsibility*Condition 1	0.01	0.02	0.74	.457
Responsibility*Condition 2	0.02	0.02	1.42	.156
Responsibility*Condition 3	0.03	0.02	1.37	.170

Fairness*Condition 1	0.01	0.05	0.29	.775
Fairness*Condition 2	-0.02	0.05	-0.46	.643
Fairness*Condition 3	0.15	0.08	1.70	.089
Attention*Condition 1	0.00	0.03	0.00	.999
Attention*Condition 2	**-0.06**	**0.03**	**-2.01**	**.045**
Attention*Condition 3	0.07	0.04	1.75	.080
Frustrative Non-Reward*Goal Blockage	**-0.09**	**0.03**	**-2.77**	**.006**
Frustrative Non-Reward*Effort	**0.10**	**0.03**	**2.90**	**.004**
Frustrative Non-Reward*Certainty	-0.05	0.03	-1.46	.145
Frustrative Non-Reward*Control	0.05	0.04	1.32	.187
Frustrative Non-Reward*Responsibility	0.00	0.01	0.12	.905
Frustrative Non-Reward*Fairness	-0.02	0.04	-0.63	.532
Frustrative Non-Reward*Attention	0.01	0.02	0.50	.619
Attentiveness ~				
Frustration	**0.37**	**0.12**	**3.17**	**.002**
Hostility ~				
Frustration	**0.45**	**0.10**	**4.56**	**.000**
Guilt ~				
Frustration	**0.45**	**0.09**	**4.97**	**.000**

Note. Bolded values indicate significance.

Appendix F - Indirect Effects Tests

Additional supplementary analyses were conducted to determine the indirect effect of frustration on affective states for both models one and two. Results are presented in Tables 22 and 23, demonstrating the mediating effect of frustration. The mediating effect of frustration was examined by adding indirect effects to models one and two. Model specification for each remained the same, with the inclusion of goal blockage and effort indirectly affecting attentiveness, hostility, and guilt via frustration.

Results of path analyses including these indirect effects indicated that for model one (see Table 22), frustration significantly mediated the relationship between goal blockage and hostility (B = 0.10, p = .012), as well as the relationship between goal blockage and guilt (B = 0.16, p = .004). It also significantly mediated the relationship between effort and hostility (B = -0.08, p = .024) and effort and guilt (B = -0.08, p = .012).

Table 22. Supplementary Results: Model One (Indirect Effects)

Path	**Indirect Effect of Frustration**	**SE**	**z-value**	***p***
Goal Blockage ~Attentiveness	0.05	0.04	1.17	0.243
Goal Blockage ~ Hostility	**0.10**	**0.04**	**2.50**	**0.012**
Goal Blockage ~ Guilt	**0.12**	**0.04**	**2.88**	**0.004**
Effort ~ Attentiveness	-0.04	0.03	-1.14	0.254
Effort ~ Hostility	**-0.08**	**0.03**	**-2.25**	**0.024**
Effort ~ Guilt	**-0.09**	**0.03**	**-2.51**	**0.012**

Note. Bolded values indicate significance.

Results of path analyses including these indirect effects indicated that for model two (see Table 23), frustration again significantly mediated the relationship between goal blockage and hostility (B = 0.10, p = .022), as well as the relationship between goal blockage and guilt (B = 0.09, p = .019). It also significantly mediated the relationship between effort and guilt (B = -0.07, p = .039), and the mediating effect was marginally significant for effort and guilt (B = -0.07, p = .050).

Table 23. Supplementary Results: Model Two (Indirect Effects)

Path	**Indirect Effect of Frustration**	**SE**	**z-value**	***p***
Attention ~ Hostility	0.01	0.02	0.33	.740
Attention ~ Attentiveness	-0.00	0.00	-0.16	.880
Attention ~ Guilt	0.01	0.02	0.33	.740
Certainty ~ Hostility	0.03	0.03	1.09	.281
Certainty ~ Attentiveness	-0.00	0.01	-0.17	.860
Certainty ~ Guilt	0.03	0.02	1.10	.274
Control ~ Hostility	-0.04	0.03	-1.12	.262
Control ~ Attentiveness	0.00	0.01	0.17	.860
Control ~ Guilt	-0.03	0.03	-1.13	.261
Effort ~ Hostility	**-0.07**	**0.04**	**-2.01**	**.050**
Effort ~ Attentiveness	0.01	0.03	0.18	.860
Effort ~ Guilt	**-0.07**	**0.03**	**-2.06**	**.039**
Goal_Blockage ~ Hostility	**0.10**	**0.04**	**2.27**	**.022**
Goal_Blockage ~ Attentiveness	-0.01	0.04	-0.18	.860
Goal_Blockage ~ Guilt	**0.09**	**0.04**	**2.35**	**.019**
Legitimacy ~ Hostility	0.03	0.03	0.88	.379
Legitimacy ~ Attentiveness	-0.00	0.01	-0.17	.860
Legitimacy ~ Guilt	0.03	0.03	0.88	.377
Responsibility ~ Hostility	-0.01	0.01	-0.78	.435
Responsibility ~ Attentiveness	0.00	0.00	0.17	.860
Responsibility ~ Guilt	-0.01	0.01	-0.78	.433
Attention ~ Hostility	0.01	0.02	0.33	.740