**Do Emojis Increase How 'Well' Stress Can Be Measured? Applying An Emoji-Based**

**Stress Scale.**

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**Abstract**

Mental health at the workplace is a highly relevant topic with rising stress levels and burnout among the most relevant outcomes. Advancements in technology have enabled increasing digitalization of communication and work processes, such as assessing employees' stress levels via digital, text-based measures. However, lacking consideration of employees' experience of such stress, these can provide an invalid insight into employees' state depending on how stress is perceived. Recent applications of emojis within psychometric measures have shown good reliability in addressing limitations of commonly text-based measures. The present study examined if emojis can improve stress assessment by clarifying its affective components - in the form of employees' stress appraisals as challenging or threatening – utilizing the affective meaning of emojis. Two conditions were applied, asking employees to either respond to an emoji-based or a text-anchored stress scale, reporting their stress level. Additionally, their challenge or threat appraisals of stress were assessed. Results showed no significant difference in stress levels between the conditions. No correlation between stress and challenge appraisal was evident, whereas threat appraisal was significantly associated with stress in both conditions. The applied emoji scale thus did not show the expected results. Further analyses suggest that participants might generally hold a negative view of stress as threat. Possible factors explaining these results and future research on digital stress assessment are discussed.

*Keywords:* emojis, stress, appraisal, stress assessment, emoji-based measure

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**Stress Scale.**

Mental health issues at the workplace have received increasing attention during the last decades, especially their negative effects on employee satisfaction, productivity, and performance, and their relation to higher numbers of absenteeism, lower retention, and increased costs (Andersson et al., 2021). The financial costs for society are estimated at over EUR 600 billion per year, just in the EU (European Commission, 2023; Hassard et al., 2018). Work stress has been found to steadily increase since 1995 (Rigó et al., 2021) with burnout being highlighted as a result of chronic and work-related stress (Koutsimani et al., 2019). The psychological as well as economic consequences of negatively experienced stress are thus widely documented, making it increasingly relevant for organizations to measure and address stress within their workforce.

Most activities within human resources nowadays take place online, due to general advances in technology and increasing pace of processes in today's work (Johnson et al., 2020). These developments have also reduced the barriers and thus costs in applying organizational surveys. A popular technique are pulse surveys which are applied more frequently and faster compared to longer employee surveys and follow the goal of providing a quicker, 'real-time' insight into employees' current engagement, performance and overall state (Brown, 2022). These online surveys usually include text-based assessments of different constructs (CIPD, 2023; Huebner & Zacher, 2021). Due to the use of simplified statements however (Gallup, Inc., 2023), and despite occasionally assessing also risks for and causes of stress (Wood et al., 2019), they can provide an invalid insight into employees 'stress level as they can neglect clarifying the emotional experience of employees' stress (Epel et al., 2018).

Without further opportunity to express these experiences (Borg & Zuell, 2012), a review by Brown (2022) suggests that these measures do not provide adequate reliability and

thus limit which action could be taken based on these 'insights'. Especially for the assessment of affective components and subjective responses to stress (Carneiro et al., 2019; Epel et al., 2018), these digital measures can be problematic.

**The Concept of Stress**

Stress is often described as a negative consequence or refers to circumstances that affect an individual (Epel et al., 2018). It is also commonly used as a synonym of *distress* (Jamieson et al., 2018). *'Feeling stressed'* is frequently expressed to describe stress responses of increased anxiety or feelings of overwhelm and used interchangeably in colloquial language (Epel et al., 2018). This highlights already how diverse perceptions of stress in communication can be (Campbell & Ehlert, 2012).

Within the area of stress research, stress has been defined in different ways and linked to effects on mental and physical health (Campbell & Ehlert, 2012; McEwen & Akil, 2020). The psychological domain takes factors such as cognitive appraisal and coping and subsequent affective reactions based on the evaluation of a stressor into account. A difference has also been drawn between stress exposure (or stressor) (Surachman & Almeida, 2018; Epel et al., 2018) and stress responses (or strain). The individual's perception of the stressor or its evaluation play an important role, that is, stress appraisal affects how stress is actually experienced (Epel et al., 2018; Surachman & Almeida, 2018).

Based on Lazarus and Folkman's (1984) Theory of Psychological Stress and Coping, psychological stress is defined as "a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being" (Lazarus & Folkman, 1984, p. 19). The theory highlights the concepts of cognitive appraisal and coping, and states that the evaluation of the demands (or external event) and one's resources determine the stress experience. Cognitive appraisals hereby refer to the individual's evaluation of the perceived stressor (Surachman & Almeida,

2018) and includes primary and secondary appraisal. *Primary appraisal* focuses on the evaluation of the stressor in terms of its significance whereas *secondary appraisal* addresses the evaluation of the individuals' resources to manage the stressor (Gomes et al., 2013). The present study focuses on the two main types of cognitive appraisal of stress: perceiving it as threat or as challenge, and the affective components of stress. Whereas the threat perception is linked to negative emotions, e.g., fear and anxiety (Skinner & Brewer, 2002), the latter has been related to positive emotions, such as excitement (Skinner & Brewer, 2002) or confidence (Gomes et al., 2013). These processes highlight the importance of individual's evaluation of a stressor in terms of its *threat potential* and one's ability to cope with it regarding subsequent affective and behavioral responses (Devonport & Lane, 2006). Lazarus and Folkman's theory states that if the perceived demands exceed the perceived resources, the stressor has subsequent negative effects on the individual's wellbeing (Gomes et al., 2013). Assessing cognitive appraisal thus can help to get an insight into how differently individuals perceive stressors, more towards the challenging or rather towards the threatening side (Gomes et al., 2016) and thus how stress is experienced, rather positive or negative.

Linking this to the job demands-resources model (JD-R; Demerouti et al., 2001), it translates into perceiving a stressor as threat as an imbalance of resources and demands. Based on JD-R literature, the beneficial effect of 'challenges' for optimal performance (Hargrove et al., 2013) and growth (Lesener et al., 2018, Jamieson et al., 2016) has been established. The specific relationship between cognitive appraisal, stressors and strain (or stress) and subsequent outcomes such as burnout has also been confirmed in a number of studies (e.g., Gomes et al., 2013; 2016; Liu et al., 2019; Webster et al., 2011), such that stress appraisal can mediate the relationship between stress and burnout (or other work-related outcomes) and between stressor and strain, thus how positive or negative stress is

experienced (Hargrove et al., 2013). Appraisal therefore plays an important role within measuring the affective component of stress.

Assessing stress frequency as well as appraisal can therefore enable the organization to act on potential outcomes. In response, research has also shown the importance of mindset and reappraisal for potential interventions and improving performance (Jamieson et al., 2018).Within the organizational context, this again is highly relevant in measuring stress within the workforce to get insights not solely into employees' stress level but also if it exceeds their perceived (coping) resources and thus increase the risk of negative outcomes for their wellbeing as well as productivity and performance, as shown in Gomes and colleagues' (2016) study. It is the individual response to stressors and thus its evaluation that play a key role (Gomes et al., 2016; Koutsimani et al., 2019). Furthermore, Jamieson et al. (2018) suggest that common self-report scales might be rather constructed towards implying stress as solely negative, which again would provide an unreliable insight into employees' stress experience.

To summarize, stress is a complex concept which is differently understood by individuals, which can make measuring problematic without taking individuals' affective response to it into account. Especially with regards to digital, text-based assessment and use of simple statements, it can provide an invalid insight into employees 'stress level'. Stress can be perceived as more adaptive or maladaptive which is associated with different outcomes (Gomes et al., 2016). Simply measuring the level of stress without further clarification of respondent's perception thus neglects its affective component, whereby the role of cognitive appraisal plays an important role.

**Emojis**

This issue can be especially highlighted in online assessments since respondents do not have the option to communicate their perception of their stress level.  Whereas digital

stress assessment can provide a quick measurement of current states (Brown, 2022) and corresponds to todays' digital communication (Davies et al., 2022), these assessments however lack further information on subjective stress experience (Carneiro et al., 2019; Epel et al., 2018) and are arguable insufficient in identifying relevant differences among employees (Brown, 2022).

An emoji-based scale to measure stress would address the aforementioned limitations of common stress measures and the cognitive appraisal component. People increasingly use emojis in text-based online communication in order to add additional non-verbal information such as emotional expression (Kaye et al., 2016; 2017). Emojis have been defined as graphic symbols or graphical interfaces, not solely representing facial expressions, i.e., smileys but also, for example, depicting animals, activities or people (Erle et al., 2022; Liu, 2023). Referring to the Emotion as Social Information Model (EASI) by Van Kleef (2009), research has shown that emojis are effective in communicating emotionality and can be functionally related to properties of facial expressions of emotion during face-to-face communication (Erle et al., 2022). Research has shown that participants intend to use emojis to reduce potential ambiguity (Kaye et al., 2016; 2017) and thus provide greater clarity to what they are referring to. In order to avoid ambiguity in their messages or expressions, the choice of emoji aids the communication's intended meaning and can be linked to an improved understanding of their emotional state (Erle et al., 2022).

This overall use and purpose of emojis has also been related to their application in psychometric measure. Using emojis within online assessment have been highlighted as support in simplifying the assessment process, especially in the mental health realm (Bai et al., 2019) and a way of self-monitoring (Van Dam et al., 2019). In comparison to common psychometric measures that are usually based on text or numerical anchors, e.g., 'low' or '1', emoji-based scales could increase the potential clarity of these by illustrating an emotion

(Kaye et al., 2017; Phan et al., 2017). Indeed, most emoji-based studies have looked at the comparison of traditional depression scales with new emoji-based scales (e.g., Depressive symptoms in young adults, Marengo et al., 2019; Depression in elderly, Tan et al., 2018 and Depression in Breast Cancer Patients, Kim et al., 2016) and have shown high validity in assessing depression. Further research on emoji-based assessment has been conducted with regards to other emotional reactions (e.g., food related emotions, Sick et al., 2022) or more complex wellbeing measures (e.g., current mood and experience scale, Davies et al., 2022). Anxiety has been mostly assessed as part of depression scales (e.g., Kim et al, 2016) or within specific contexts, such as dental anxiety in children (Setty et al., 2019; Padmanabh et al., 2022). These emoji-based scales offer the advantage of not being dependent on language mastery and potential biases can be reduced (Marengo et al., 2019). Additionally, emojis and generally image-based scales are arguable more straightforward in their interpretation compared to commonly used labels, e.g., low, moderate, high level (Marengo et al., 2019), thus reducing potential lack of clarity for respondents and further being independent on their level of literacy (Marengo et al., 2019). As highlighted, stress appraisal plays an important role in the experience of stress as something rather threatening or as challenging. Stress can be rated as overwhelming, e.g., 😖, however also as exciting, e.g., 😅 (Epel et al., 2018, Jaeger et al., 2019; Sick et al., 2022), which subsequently will provide a different interpretation of the respondent's stress experience and potential impacts on their performance (Jamieson et al., 2016), e.g., being in a flow or close to experiencing burnout.

An emoji-based stress assessment within organizations would thus, by utilizing the affective meaning of emojis, clarify the ambiguous meaning of stress, by presenting a specific emoji, e.g., threat: 😬, 😪 , 😖 (Jaeger et al., 2019; Krekhov et al., 2022) or challenge: 😅, 😎 (Sick et al., 2022). Thus, respondents would indicate their stress experience based on the emoji they feel like represents their experience the best. Based on the previously

described emotional properties of emojis and successful application within other psychometric measures, this could increase clarity of common numerical or text-based scale anchors with regards to stress assessment. Additionally, it would differentiate stress experiences based on individuals' appraisal of them. With the increasing use and preference of emojis in communication and daily life (Marengo et al., 2019) as well as within the professional context (Glikson et al., 2018), the adoption of emoji items in a measurement for stress is thus argued to be relevant due to the current gap within research. Specifically, with regards to the ambiguous concept of stress, emojis can offer greater clarification to the respondent and thus address the lack of thereof in simple employee surveys.

**Overview of the Present Research**

This research draws on the Theory of Psychological Stress and Coping to highlight the role of cognitive appraisal which is highly relevant for organizations that are interested in not only measuring stress frequency but also stress experience. Thus, it addressed the following aspects: (1) The lack of clarity of text-anchored or numerical scales for assessing stress, especially within increasingly text-based communication which includes the use of emojis. (2) The lack of appraisal inclusion when assessing stress in organizations, i.e., perceiving stress as threat or challenge and its links to outcomes.

It aimed to answer the research question: Do emojis increase how 'well' stress can be measured, that is, do emojis increase the validity of stress assessment compared to common text-anchored measures in the work-related context. To answer this question, an emoji-based scale was compared to a common (text-based) stress measure to assess stress perception within employees. In addition, cognitive appraisals of stress as either challenging or threatening were assessed. Thus, applying an emoji-based stress measure would contribute to the assessment of stress, by addressing the affective components of stress, that is, how

employees appraise and experience their stress level by utilizing the affective meaning of emojis.

The study therefore hypothesized that there would be a correlation between cognitive appraisal and stress when stress was measured with an emoji-based scale vs. a text-anchored scale. Specifically, based on the chosen emojis, a more positive emoji on the lower end of the stress scale indicates that stress is being appraised as challenging and was expected to correlate with challenge appraisal (negative correlation). Indicating a more negative emoji at the higher end of the stress scale, corresponding to appraising stress as threatening, was hypothesized to correlate with threat appraisal (positive correlation). The text-anchored stress scale does not clarify how participants experience their stress and applies numerical anchors; thus, no prediction was made about how participants' responses differed based on their stress appraisal and no correlation between stress and either appraisal was expected.

**H₁:** Stress will not correlate with challenge appraisal in the text condition.

**H₂:** Stress will not correlate with threat appraisal in the text condition.

**H₃:** Stress will be negatively correlated with challenge appraisal in the emoji condition.

**H₄:** Stress will be positively correlated with threat appraisal in the emoji condition.

Thus, the study hypothesized that there would be a difference in how challenge and threat appraisal would relate to stress, based on the applied stress scale.

**H₅:** The correlation between stress and challenge appraisal will differ between the emoji and text condition.

**H₆:** The correlation between stress and threat appraisal will differ between the emoji and text condition.

This study will provide insight into if emojis can contribute to an improved stress assessment by exploring its validity in assessing individuals' appraisal of their stress

experience. Additional measures were collected to assess participants' perceptions of the applied scales, namely to determine differences between the emoji-based and the text-anchored stress scale. Based on the discussed literature on emoji use in psychometric measures, it was expected that the scale anchors in emoji condition would be perceived clearer compared to the text condition and participants would feel more confident in their response.

**H₇:** Perceived clarity of the response options for the stress scale will be higher in the emoji condition compared to the text condition.

**H₈:** Confidence in responses for the stress scale will be higher in the emoji condition compared to the text condition.

## Method

### Participants

A power analysis was conducted using G\*Power Version 3.1.9.6 (Faul et al., 2009) to calculate the required a priori sample size. Assuming a power of .80 and a small effect size of .27 (based on Beevor et al., 2024; Gardner & Fletcher, 2009), in a one-tailed test, a sample of $N = 348$ was estimated. Participants had to give their consent to participate and data collection prior to participation by confirming they have read and do accept the stated information. This research received ethical approval from the ERB at the Tilburg School of Social and Behavioral Sciences (TSB) under the blanket application of the Social Psychology department (RP1173). Pre-registration of the study took place on aspredicted.org before data collection (#161629).

Participants were recruited on Prolific (https://www.prolific.com), pre-screening for employed participants for a study of 7-8 minutes length and received compensation of 1£ (8£/hour). In total, 355 participants ($N_{female} = 228$) between 19 and 77 years old ($M_{age} = 37.93$, $SD = 11.09$) completed this questionnaire. Participants were randomly assigned to one of the

two conditions (*n* = 177 in emoji condition). Participants had to be employed and over 18 years of age and had to answer all respective scale items in order for the data to be considered valid for the data analysis.

**Design**

The study applied a between-subjects design with two conditions. Each participant was asked to indicate their response to several scales measuring stress and cognitive appraisal. The dependent (outcome) variable was stress. As the independent variable of this study, the applied scale type was manipulated. Thus, one group answered an emoji-based scale to assess stress (emoji condition) whereas the other group answered a commonly applied text-anchored scale (control condition). Cognitive appraisal was assessed as an additional continuous predictor. Data collection took place in February 2024.

**Materials**

*Stress Appraisal*

Stress appraisal was measured using the Cognitive Appraisal Scale (CAS) by Skinner and Brewer (2002), which consists of 18 items assessing threat and challenge appraisal in regard to stressful situations (see Appendix A). The responses were measured on a 6-point Likert scale, assessing to what extent the respondent agrees with the statement, ranging from 1 = *Strongly Disagree* to 6 = *Strongly Agree*. Thus, a higher score indicated a stronger agreement with the item and with the respective threat or challenge scale. An example item for assessing threat appraisal is, "I worry that I will say or do the wrong things.", and for challenge appraisal is, "I believe that most stressful situations contain the potential for positive benefits.". The CAS has been utilized in research to assess appraisal within participants in work situations, such as to measure primary appraisal of a stressful event at work (Gardner & Fletcher, 2009; McGowan et al., 2006) or to explore the stressor appraisal process in regard to mindfulness at work (Jamieson et al., 2022). In the present study, both

subscales were found to be highly reliable with Cronbach coefficients of $\alpha = .81$ for challenge appraisal and $\alpha = .94$ for threat appraisal.

*Stress*

**Text-anchored Scale.** Despite the existence of several psychometric stress scales applied to measure stress within various research contexts, many organizations use simple questions to assess the level of stress employees are experiencing. Examples include assessing an employee's frequency or level of stress (Gallup, Inc., 2023; QuestionPro, 2019) or reporting likelihood of feeling stress (American Psychological Association, 2021). Exploring common work stress surveys and reports that highlight the rising stress levels within employees (Gallup, Inc., 2023), general questions on how stressed someone feels at their work are often stated, linking back to the issue with these online-based assessments. Based on this, it was concluded to apply a one-item question, to assess participants' stress, "How would you rate the level of your job stress?" (e.g., as in QuestionPro, 2019). The response was measured on a scale from 1 to 5 (See Appendix B).

**Emoji-based Scale.** Five emojis were chosen to display the affective components of stress, and thus, to represent a stress experience, more specifically, negative, as threat or positive, as challenge. Based on research relating threat and challenge stress appraisal to specific negative and positive emotions, that is fear and anxiety or excitement and confidence (Gomes et al., 2013), key words such as exciting, confident, challenging, worrying, stressed (commonly framed as distressed, Jamieson et al., 2018) were respectively applied to search for appropriate emojis. The choice of specific emojis was mainly based on qualitative research into emoji meaning within adults by Jaeger et al. (2019), which showed that there was a high similarity between the semantic meanings and meaning described on Emoji websites, like Emojipedia (https://emojipedia.org). To present the stress scale, a choice of five different emojis was displayed in the form of a Likert scale, similar to the 5-point text-

anchored stress measure (See Appendix B). This scale presentation also corresponded to materials used in previous emoji-based studies, where participants were presented with a range of different emojis and asked to choose the emoji that they associate most with the respective construct the study intended to measure, for example, mood (Tan et al. 2018) or anxiety (Setty et al., 2019). The applied emojis in the emoji-based scale were the following:

The Smiling face with sunglasses emoji '😎' has been linked to *Confident* and *at ease* in Sick et al. (2022) and thus represented the lowest level on the stress scale.

The Grinning face with sweat emoji '😅' is described as expressing discomfort but in a sense of releasing tension (Emojipedia, 2023b) and utilized when handling a potentially stressful moment well (Emojimeanings.net, 2021). This emoji represented the second lowest level on the emoji scale.

The Grimacing face emoji '😬' has been linked to *Nervous/anxious/worried* and *stressed* in Jaeger et al. (2019). Regarding the assigned meaning on Emojipedia (2023a), it is described as linked to emotions like tense and nervousness. However, a previous study by Jaeger et al. (2018) also suggests that meanings/interpretations for this emoji might be broader. This emoji represented the third emoji within the emoji scale.

The Downcast face with sweat emoji '😓', has been labelled with *Stress* in Krekhov et al. (2022) and *Stressed* and *Nervous/Anxious/Worried* in Jaeger et al. (2019), thus indicating a strong agreement in participants on a similar meaning. This emoji represented the second highest point on the emoji scale.

The Confounded face emoji '😖' has been respectively linked with *Stressed* in Jaeger et al. (2019) and was be the highest point on the emoji scale.

The newest emojis versions at the time of the study (January, 2024) were used as scale anchors in Qualtrics and applied in their current Unicode Version 15.0 (Emojipedia, 2023c), available at Emojipedia (https://emojipedia.org) (See Appendix C for Emoji

Unicodes). Participants were therefore presented with the emojis that agreed with their device's operating system when assessing the study online.

### *Other Measures*

During the study, data on demographic information (i.e., age, gender, employment status) was collected. In purpose of additional research projects, measures of job satisfaction, turnover intention and diversity were also collected and assessed using the Turnover Intentions Scale (TIS- 6) (Bothma & Roodt, 2013), the Brief Index of Affective Job Satisfaction (BIAJS) (Thompson & Phua, 2012), the Job Satisfaction Survey (JSS) (Spector, 1985) and emoji-based diversity scales, respectively.

Manipulation checks were assessed after the stress scale in each condition to assess participants' agreement with the clarity of the scale response options and their confidence in their response (i.e., 1 = *Strongly Disagree* to 5 = *Strongly Agree*). To divert participants from questioning the purpose of these questions, further questions on the clarity of the question and their level of comfort answering the questionnaire were included (see Appendix D for question set).

### Procedure

The study was conducted online, using Qualtrics (https://www.qualtrics.com) to present a questionnaire to participants and took approximately 7-8 minutes to complete. The study was presented as a study exploring various questionnaires applied in the work and organizational context regarding a number of work-related constructs. Each participant received standardized instructions. Participants were asked to give their consent to participation in order to participate in the study. The first questionnaire part included questions on demographic information. If a participant did not adhere to the criteria of being an employee despite pre-screening, they did not proceed with the subsequent questionnaires. Participants were randomly assigned to one condition within the survey flow and asked to

respond to either the text-anchored stress scale or the emoji-based stress scale. This was followed by a set of manipulation check questions. After completing the questionnaires, participants were presented with a debrief stating the main objective of the study, exploring the application of emoji as opposed to text or numerical anchors in online assessments of work-related constructs. A check for careless responders was included within the questionnaire by applying an instructed response item (Meade & Craig, 2012), i.e., participants were asked to "please select agree" (see Appendix E). Identified careless responders were excluded from the data set.

**Statistical analysis**

The data set was exported from Qualtrics into an Excel File and analyzed using the statistical software SPSS (IBM SPSS Statistics Version 29). A correlation analysis was applied to the dataset. The assumptions for linearity, normality and homoscedasticity were tested by applying visual inspections of scatterplots, histograms, and residual plots of the observed and predicted values. To test the study's hypotheses Pearson correlations were employed. Correlation coefficients were tested for significance of respective relationship between appraisal and stress in each condition. Independent *t*-tests were applied to assess the applied manipulation checks. The significance value for all statistical tests was $p = .05$.

## Results

### Preliminary Analyses

In total 360 participants completed the study on Prolific (https://www.prolific.com). Data from 5 participants were removed as careless responders as they failed to correctly answer the instructed response item. The final data set included 355 participants ($n = 178$ in text condition). Preliminary analyses were conducted to assess whether the assumptions for applying parametric statistical tests, i.e., scale level of measurement, normal distribution, no

outliers or extreme values, homogeneity of variances and homoscedasticity were met. A relatively normal distribution of the data was assumed as histograms for stress level scores were symmetrical (see Figure F1-3) and values for skewness and kurtosis were near zero (see Table F1). Normal Q-Q plots (see Figure F4) also suggested a normal distribution of values with values being close to the diagonal line. Visual inspections of scatterplots, see Figure 1 and 2, did not show a relationship between appraisal and level of stress. To check for homoscedasticity, a standardized residual plot was computed, which showed a random pattern (see Figure F5-6). Boxplots indicated some participants had relatively low scores for challenge appraisal, however since responses were within the range of the 6-point Likert scale, the data were not considered as outliers. Additionally, Levene's Test for Equality of Variances was non-significant for stress level scores, $F(353) = 1.51$, $p = .221$, thus these results suggested no violation of the homoscedasticity assumption. Thus, parametric tests were applied to explore the relationship between variables.
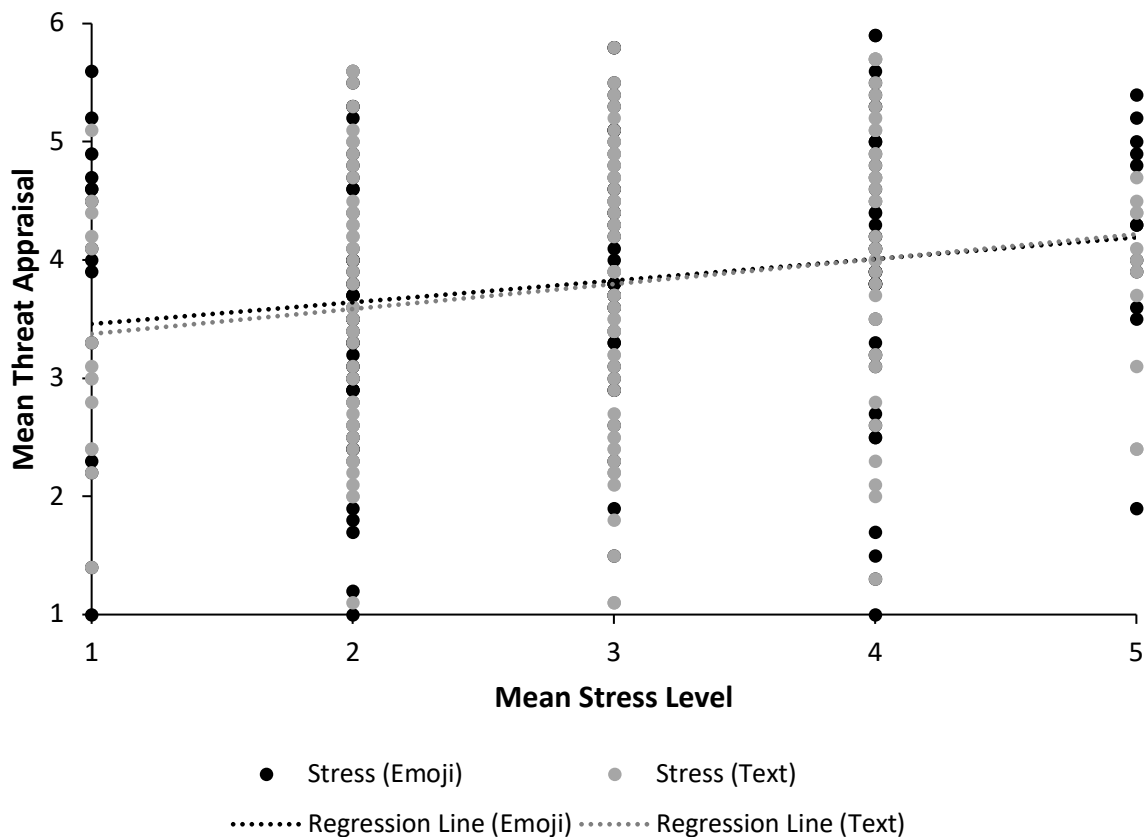
**Figure 1**

*Scatterplot showing Relationship between Challenge Appraisal and Stress Level*
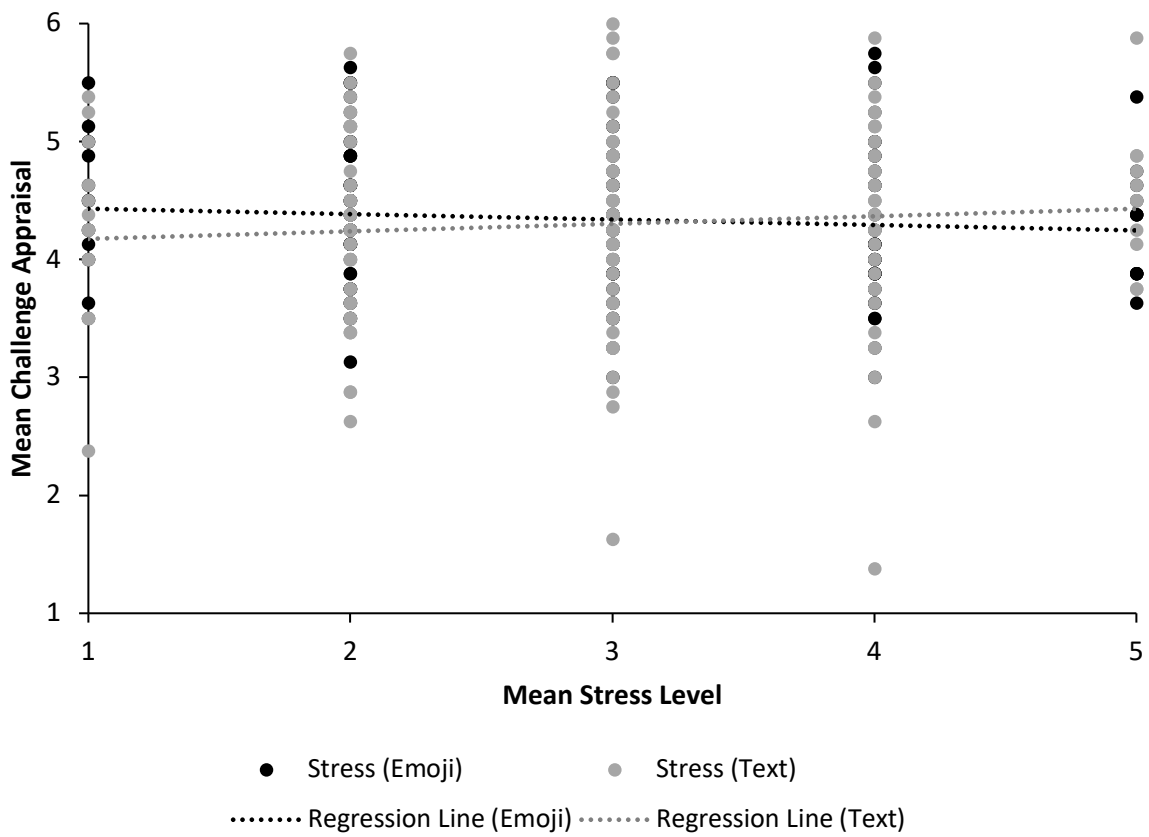


*Note.* Regression lines are shown for stress levels in the emoji and text condition

**Figure 2**

*Scatterplot showing Relationship between Threat Appraisal and Stress Level*



*Note.* Regression lines are shown for stress levels in the emoji and text condition

**Main Analyses**

*Descriptive Statistics*

Participants reported overall a medium level of stress ($N = 355$, $M = 2.92$, $SD = 1.06$) on a scale from 1 to 5. This value was similar in the text condition ($n = 178$, $M = 2.93$, $SD = 1.03$) and the emoji condition ($n = 177$, $M = 2.91$, $SD = 1.08$), hereby the mean corresponded to the following emoji '😁' (i.e., value 3) (see Table 1). For stress appraisal, participants overall reported a high level of challenge appraisal ($M = 4.31$, $SD = 0.70$) and a medium-high level of threat appraisal ($M = 3.80$, $SD = 1.12$) which is in line with Skinner & Brewer (2002).

**Table 1**

*Descriptive Statistics and Correlations for all Variables*

| Variable | *M (SD)* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| 1. Challenge Appraisal | 4.31 (0.70) | — | | | | | | | |
| 2. Threat Appraisal | 3.80 (1.12) | -.12* | — | | | | | | |
| 3. Stress (Emoji)[a] | 2.91 (1.08) | -.08 | .18** | — | | | | | |
| 4. Stress (Text)[b] | 2.93 (1.03) | .09 | .19* | — | — | | | | |
| 5. Stress (overall)[c] | 2.92 (1.06) | .01 | .19** | — | — | — | | | |
| 6. Age | 37.93 (11.09) | -.17** | -.18** | .12 | .09 | .11* | — | | |
| 7. Gender[d] | 1.67 (0.5) | .06 | .11* | -.03 | .10 | .04 | -.03 | — | |
| 8. Scale Clarity | 3.96 (1.3) | .05 | .02 | .06 | .15* | .10 | -.08 | -.12* | — |
| 9. Response Confidence | 4.2 (1.04) | .05 | -.00 | .00 | .11 | .05 | -.05 | -.05 | .87** |

*Note.* Total $N = 355$. [a] $n = 177$. [b] $n = 178$. [c] Mean of emoji and text condition stress level. [d] 1 = male, 2 = female, 3 = other, 4 = prefer not to say. *$p < .05$. **$p < .01$.

### *Hypotheses Testing*

To analyze the relationships between appraisal and stress, Pearson correlations were calculated (see Table 1).

**Hypotheses 1 and 2**. Results showed that there was no significant correlation between stress and challenge appraisal for the text condition, $r(176) = .09$, $p = .260$, two-

tailed, $r^2 = .01$. However, a significant positive weak correlation between stress and threat appraisal for the text condition, $r$ (176) = .19, $p = .010$, two-tailed, $r^2 = .04$, was present. These results thus only provided support for Hypothesis 1.

**Hypotheses 3 and 4.** For the emoji condition, there was no significant correlation between stress and challenge appraisal, $r$ (175) = -.08, $p = .134$, one-tailed, $r^2 = .01$. However, results showed a significant positive weak correlation between stress and threat appraisal, $r$ (175) = .18, $p = .009$, one-tailed, $r^2 = .03$. Thus, threat appraisal was associated with a higher score on the emoji-based stress scale, providing support for Hypothesis 4, whereas Hypothesis 3 was not supported.

**Hypotheses 5 and 6.** A Fisher's $z$ transformation calculation demonstrated that the correlations between challenge appraisal and stress did not differ significantly, $z = -1.58$, $p = .114$, two-tailed, however, results showed a negative correlation in the emoji condition ($r = -.08$, 95% CI [-1.00,0.04], one-tailed) compared to a positive correlation in the text condition ($r = .09$, 95% CI [-0.06,0.23], one-tailed). Comparing the correlations between threat appraisal and stress in the respective conditions, showed no significant difference, $z = -0.13$, $p = 0.897$, two-tailed, with similar correlations in the emoji condition ($r = .18$, 95% CI [0.06,1.00], one-tailed) compared to the text condition ($r = .19$, 95% CI [0.05,0.33], one-tailed). Thus, both Hypotheses 5 and 6 were not supported.

**Hypotheses 7 and 8.** Participants reported high clarity ($M = 3.96$, $SD = 1.30$) and confidence ($M = 4.2$, $SD = 1.04$). This was higher in the text condition compared to the emoji condition, respectively for clarity of response options ($M_{diff} = 0.43$) and confidence in their response ($M_{diff} = 0.35$) (see Figure 3) . There was a significant difference between the emoji and the text condition for clarity, $t(353) = 3.14$, $p = < .001$, one-tailed. Participants rated perceived clarity lower in the emoji condition compared to the text condition ($M_{diff} = 0.43$, 95% CI [0.16,0.70], Cohen's $d = 0.33$). For confidence rating, there was a significant

difference between the emoji and the text condition, $t(352) = 3.17$, $p = < .001$, one-tailed.

Again, participants rated their confidence in their response lower in the emoji condition

compared to the text condition ($M_{diff} = 0.35$, 95% CI [0.13,0.56], Cohen's $d = 0.34$). These

results were thus the opposite of what was expected under Hypotheses 7 and 8.

**Figure 3**

*Diagram showing Perceived Scale Clarity and Response Confidence by Condition*
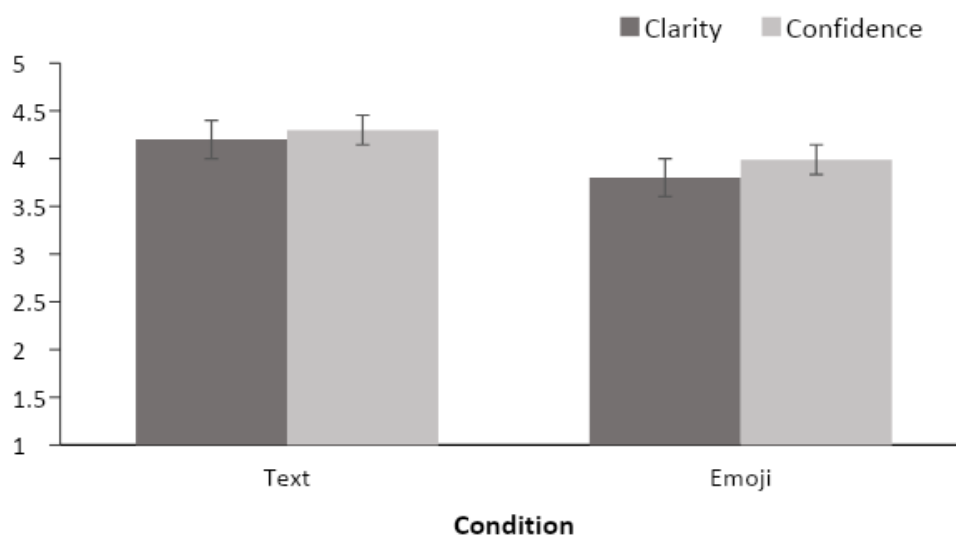


*Note.* $n = 178$ in text condition, $n = 177$ in emoji condition. Scores for clarity and confidence

are shown for each condition (error bars show standard error).

**Exploratory Analyses**

***Manipulation Checks***

Further analyses showed a strong correlation between the two applied manipulation

checks, that is between the clarity of response options and participants' confidence in their

response, $r$ (354) = .87, $p$ <.001, two-tailed. This was also the case within each condition, in the emoji condition, $r$ (175) = .88, $p$ < .001, two-tailed, and in the text condition, $r$ (176) = .85, $p$ < .001, two-tailed.

To clarify the properties of the perceived clarity and confidence of participants regarding the stress scales, a regression model addressing these variables was calculated. The regression model was not significant, $R^2$ = .01, $F$(2,351) = 2.96, $p$ = .053. Clarity of response option was however a significant predictor, ($\beta$ = .24, $t$ = 2.22, $p$ = .027) for stress as a dependent variable.

### Stress Appraisal

Regression analyses were applied to explore further how appraisal scores differ in the two conditions to predict stress. The overall regression model was significant, $R^2$ = .02, $F$(7,347) = 2.23, $p$ = .032, showing that stress level could be predicted by several predictor variables, namely condition, challenge appraisal, threat appraisal and their interaction terms (see Table 2). More specifically, threat appraisal statistically predicted stress *($\beta$ = .20, $t$ =* 2.68, $p$ = .008) whereas the individual effects of condition or challenge appraisal on stress were not significant. This suggested that a higher stress level can be partly explained by a higher threat appraisal score in the present study.

**Table 2**

*Unstandardized and Standardized Coefficients for Predictor Variables*

| Predictor | B | SE | β | 95% CI | | p |
|---|---|---|---|---|---|---|
| | | | | LL | UL | |
| Condition[a] | - .03 | .11 | -.12 | -0.25 | 0.19 | .778 |
| Challenge Appraisal | .11 | .07 | .10 | -0.04 | 0.24 | .141 |
| Threat Appraisal | .21** | .08 | .20 | 0.06 | 0.36 | .008 |
| Condition x Challenge | -.19 | .12 | -.11 | -0.42 | 0.04 | .103 |
| Condition x Threat | -.02 | .11 | -.01 | -0.24 | 0.20 | .851 |
| Challenge x Threat | .02 | .06 | .02 | -0.09 | 0.13 | .719 |
| Condition x Challenge x Threat | -.02 | .10 | -.01 | -0.22 | 0.18 | .844 |
| Constant | 2.94** | .08 | - | 2.79 | 3.10 | < .001 |

*Note.* Total $N = 355$. CI = confidence interval for B; *LL* = lower limit; *UL* = upper limit. [a]0 = text condition, 1 = emoji condition. *p < .05. **p < .01.

Exploring the interaction between condition and appraisal, both challenge and threat, were insignificant, indicating that their relationship, that is between condition and challenge, and condition and threat did not significantly predict the stress level. However, as Figure 4 illustrates, albeit, this combined effect of condition and challenge appraisal did not reach statistical significance *(β = -.11, t = -1.64, p = .103)*, the regression plot illustrated that the effect of challenge appraisal on stress may have differed between the two conditions, with a positive effect on the reported stress level in the text condition, whereas a negative effect on stress in the emoji condition. Figure 5 illustrates the effect of threat appraisal on stress within

each condition, indicating that the relationship between threat appraisal and stress level was similar across the two conditions (i.e., the applied scale types).

**Figure 4**

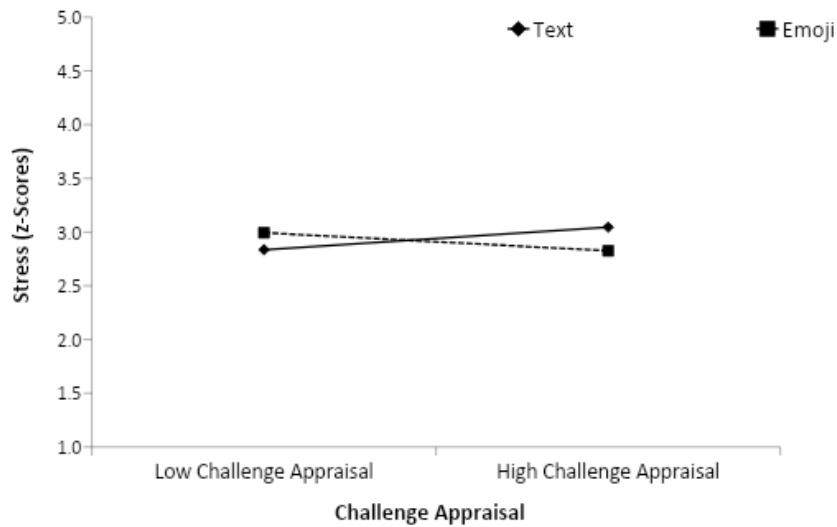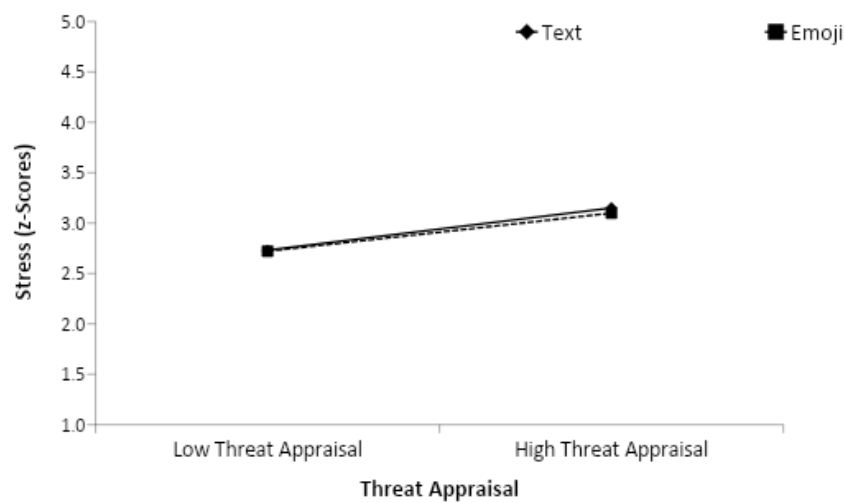*Regression Plot Showing Interaction Between Challenge Appraisal And Condition on Stress*



**Figure 5**

*Regression Plot Showing Interaction Between Threat Appraisal And Condition on Stress*

**Discussion**

Simply asking employees about their levels of stress neglects the affective component of how they appraise their stress. This component that was addressed by utilizing the affective meaning of emojis when assessing stress. While previous studies have investigated the application of emojis within psychometric measures of depression or anxiety, stress, as an affective and complex construct, has not been explored. This study addressed this gap by applying an emoji-based stress scale and relating it with stress appraisal to illustrate the role of challenge or threat appraisal and how this could be assessed by use of emoji anchors.

The results overall show that while threat appraisal was significantly associated with stress in both conditions, this was not the case for challenge appraisal in either condition. Whereas participants reported higher clarity and confidence for the text-anchored scale, stress levels did not significantly differ between the conditions. These findings suggest that the type of scale, namely emoji-based or text-anchored, did not make a difference for stress levels or its relationship to appraisal. Since the present emoji scale was newly applied in this research context, no direct comparisons to previous research can be made. Based on the research aim of applying emojis to improve stress assessment, findings are related to previous research on emoji and stress appraisal.

*Stress Appraisal and Stress*

There was a positive relationship between threat appraisal and stress level in both conditions, suggesting that a higher stress level is associated with appraising stress as threatening. For the emoji scale, the positive relationship between threat appraisal and stress, referring to the emojis: '😓' (= value 4) and '😖' (= value 5), indicates support for the affective meaning of emojis in this context of appraising stress as threatening (Skinner & Brewer, 2002) as it was intended. This finding also corresponds to the discussed

meaning/interpretation of these emojis as 'stressed' as in the study by Jaeger et al. (2019), referring to the generally negative perception of stress (Epel et al., 2018). Previous research has indicated a positive link between threat appraisal and perceived stress (e.g., Gomes et al., 2016; Hoffmann & Geisler, 2020; Kilby & Sherman, 2016), as Jamieson et al. (2018) highlights, scales on perceived stress are often implying stress as negative. In light of the present study, an explanation of the finding could thus also include that participants perceive stress generally as negative, when being asked about their stress level. Threat appraisal as a significant predictor of self-reported stress level also supports this common evaluation and corresponds to previous studies on perceived stress (Beevor et al., 2024, Hoffmann & Geisler, 2020).

Interestingly, a different pattern emerged for challenge appraisal. As hypothesized, no correlation was evident between challenge appraisal and stress in the text condition. Since a simple stress level assessment does not address *how* stress is appraised or experienced, this findings corresponds to research illustrating how stress appraisal affects stress experience (Jamieson et al., 2016; 2018) which was not assessed by the stress measure in the text condition. However, appraising stress as challenging did not correlate with stress in the emoji-condition. This raises questions on validity of the applied scale to address appraisal within this emoji measure. Previous research has illustrated that emojis can be successfully applied to measure for instance depression by relating emoji-based scales with common psychometric assessment of such constructs (e.g., Marengo et al., 2019), this was however not the case in the present study. Despite the lack of significant associations, it is of relevance that the direction of the correlation differed, that is, negative for the emoji condition, whereas positive for the text condition. Regarding this study's aim of addressing employees' appraisal of stress to improve stress assessment, it is important to explore this further. Based on the applied emojis, it suggests that the emoji anchors, i.e., '😎' (value = 1) and '😅' (value = 2),

as illustrated on the lower end of the applied emoji scale, seem to correspond to the concept of challenging stress (Gomes et al., 2013; Hargrove et al., 2013). Although these correlations were very small and not significant, the regression plot corresponds to this notion by illustrating how the relationship between stress level and challenge appraisal differed based on the applied stress scale.

### *Challenge Appraisal*

The study illustrates the different patterns that emerged based on appraisal and stress (Jamieson et al., 2013) which is relevant for stress assessment and its implications. Whereas higher threat appraisal and higher stress level could be related, on both stress scales, challenge appraisal was somehow unrelated to both applied measures. This finding corresponds to the overall notion of stress as negative, as for instance, highlighted in workplace reports or media (Crum et al., 2013). Additionally, challenge appraisal has been shown to be beneficial, especially appraising stress as such is linked to positive outcomes (Searle & Auton, 2014), coping with stressors (Beevor et al., 2024; Gomes et al., 2013; McLoughlin et al., 2023) and performance (Jamieson et al., 2018). A study by Lin et al. (2014) also indicates that higher challenge appraisal of stressors is linked to more positive affect at work. Stressors, in the form of increased demands at work, are actually beneficial for creative performance outcomes if these are perceived as challenging (Ohly & Fritz, 2009). This highlights that measuring stress also in its challenging form is indeed relevant to organizations since it can inform further actions and outcomes. Of note, participants also reported higher levels of challenge appraisal than threat appraisal across both samples, which is consistent with previous research (Skinner & Brewer, 2002; Jamieson et al., 2022; Kilby & Sherman, 2016, Williams & Cumming, 2012). Thus, these findings indicate that measuring this stress experience from the perspective of appraising stress challenging vs. threatening is meaningful to organizations since it is linked to different outcomes.

*Manipulation Checks*

Perceived clarity and confidence ratings differed significantly between the two conditions with lower scores in the emoji condition. Whereas the study applied emojis corresponding to participants' device system, with a higher chance of familiarity with these, research has highlighted several factors that could have influenced participants' interpretation of emojis and perceived clarity/confidence. The present study included participants from a wide age range of 19-77 years old. Whereas some research has suggested age differences (Gallud et al., 2018), this could not be shown in other studies (Brants et al., 2019; for a review see Krekhov et al., 2022). In the present study, age did not correlate with clarity or confidence, thus other factors might have influenced these findings. Cultural differences are also often discussed (for a review see Bai et al., 2019), however, the present study applied facial emojis, Krekhov and colleagues (2022) concluded in their study that applicability across cultures of such emojis was generally adequate. The influence of other possible variables should be thus addressed, which will be discussed in the following.

**Limitations**

Several limitations should be considered within this study. As discussed, correlations were weak between threat appraisal and stress level, or not evident in case of challenge appraisal. Thus, the findings are limited in their generalizability. The present study applied a one-item measure, asking participants about their stress level, to draw comparisons to commonly used simple statements on stress level among employees. Since this measure however did not correlate with challenge appraisal, it limits its validity in assessing the affective components of stress, since it was unrelated to challenge appraisal. The directions of the correlation suggest that the applied emoji might indicate the intended 'challenging' or 'threatening' meaning (i.e., lower and higher end of the emoji scale), however, as described, the emojis were based on their (sentiment) meaning and their association to emotions

commonly linked to challenge and threat appraisal, (i.e., fear and anxiety or excitement and confidence, Gomes et al., 2013). Thus, it cannot be excluded that these emojis did not represent appraisal adequately. Further research on emojis could thus explore which emojis do specifically correspond to experiencing stress as threatening or as challenging, e.g., as previously done with other concepts in Tan et al. (2018) (mood) or in Setty et al. (2019) (anxiety). This could explore whether the relationship of the applied emoji scale with appraisal would increase and thus whether it would correspond to the assessment of these affective components of stress.

A second limitation of the study's findings is that clarity and confidence was lower in the emoji condition, against what was expected based on applying emojis as anchors. As discussed, several factors might play a role in how clear emojis were perceived in the present study, however previous findings regarding this are mixed. Future research could explore applying different measures of participant's perception to assess whether the applied scale could reduce ambiguity of common text-based anchors. Additionally, the reduced clarity of the emoji scale could relate to what it was compared to, that is, numerical labels which might have been generally just well understood by participants. To explore this hypothesis, future research could include text labels, corresponding to the meaning of the applied emojis, to explore whether there would be difference between emoji anchors and these text anchors. Additionally, further manipulation checks could be included, e.g., a statement on 'I have used the presented emoji in daily interactions', to explore possible differences despite participants reporting high clarity of response options (i.e., the emojis) to explore participants' familiarity with specific emojis (Liu, 2023; Weiß et al. 2022). The phrasing of the manipulation question set could be improved since they were positively phrased ("The response items were clear to me", Strongly Disagree – Strongly Agree), by asking participants *how* clear response items were to them.

Since the broader aim is to apply these scales within the work environment, their application in a described work-related assessment might have had an influence on these results. It might be the case that participants were uncertain about the presentation of emojis within the study's framed context. Glikson et al. (2018) have shown in their study that the context can have effects on competence perceptions and Kaye et al. (2016) and Liu (2023) have indicated that social acceptance and appropriateness also affected the use of emoticons/emojis. Additionally, it cannot be excluded that responding to an emoji scale (vs. the common numerical or text-based ratings) was generally unexpected for participants. Thus, participants' perception should be as well explored further since they could have relevant effects on the findings discussed in this study.

Despite these limitations, these results suggest several theoretical and practical implications. The present study represents a first attempt to address the affective components of appraisal by applying emojis in a common stress scale. Further research examining the impact of addressing stress appraisal may provide insight into an improved way of assessing employees' stress.

**Theoretical Implications**

Valid and accurate assessment of depression by using emojis has been documented (e.g., in Marengo et al., 2019) and its successful application of emojis within psychometric measures has received support. Stress however is generally an ambiguous and complex concept by nature (Koolhaas et al., 2011) that in the present study has been initially explored by applying a one-item emoji-anchored stress scale. Thus, further exploration of emojis with regards to assessing affective concepts and stress is needed. Relationships with both challenge and threat appraisal highlight the relevance of assessing this component in stress measures, especially with regards to the potential of challenge appraisal and its link to

positive emotions (Gomes et al., 2013). These findings further suggest that assessing both aspects is of relevance to understand stress in a more nuanced way. Since previous studies on emoji anchors have explored constructs such as depression which is usually assessed as an unidirectional concept (Bianchi et al., 2022), stress on the other hand, regarding its individual evaluation and linked to negative or positive stress experiences, is rather complex. The present research applied both positive and negative emojis by means of a one-item stress measure. However, if participants perceive stress as generally negative and threatening, future research could consider applying a bidimensional stress scale, exploring how challenging and threatening respondents' perceive their stress level, e.g., by applying the following emojis for challenge: 🤭 - 😌 - 🙂 - 😅 - 😎 (5-point Likert Scale, low - high) or threat: 😐 - 😬 - 😰 - 😥 - 😖 (low - high) (emojis based on research by Jaeger et al., 2019 and Sick et al., 2022). Possible differences could further inform whether emojis can actually be applied to measure stress in a more effective way.

Based on the discussed limitations, individual and cultural differences could be assessed further. Application across employees from an actual organization might for instance yield different results while collecting further data on age, culture and familiarity. By further exploring potential differences in emojis that might affect interpretation and thus reported stress levels, future research would benefit from continue exploring emojis in different samples. This would contribute to continuous development of a set of emojis that can be utilized in research and practice on emotion research and psychometric measures (Kaye et al., 2017). Research on stress and appraisal has additionally expanded towards beliefs about stress and mindset (e.g., stress beliefs in Kilby et al., 2020, associations with stress in Rudland et al., 2019) which could be explored further with regards to associations with self-reported stress.

**Practical Implications**

This study's findings generally correspond to the common notion of negative stress within organizations (Crum et al., 2013; Epel et al., 2018). As discussed, a different pattern emerged for challenge appraisal with respect to the different conditions. In terms of challenge appraisal and its positive effects, e.g., to proactive coping (Beevor et al., 2024), being able to assess stress in its 'challenging' form is relevant. For instance, if employees actually evaluate stress as something challenging and exciting, which they are indeed able to handle, it should be visible when applying a stress scale. There is a need to address this aspect of appraisal in stress assessment in practice. Further research on the applicability of emoji could contribute to a measure that could capture these components. This could provide employers with a more valid understanding of their employees' stress experience and inform further processes within the company.

Despite the longstanding existence on concepts like distress and eustress (Rudland et al., 2019) and research highlighting the importance of a certain level of demand for employees engagement (Hargrove et al., 2013), results showed a prototypically negative understanding of stress. This perception might generally be relevant to employers and employees. Based on research available on reappraisal and the positive aspect of stress (e.g., Jamieson et al., 2018; Rudland et al., 2019), this is another factor that organizations and practitioners should keep in mind. Future research could explore the link between how challenge appraisal could be increased and a reduction of threat appraisal which has been shown in previous research (Jamieson et al., 2018). Within a broader scope, regarding behavior and cognitions that can result from appraisal, challenge is highly relevant for motivation, whereas threat is associated with avoidance behavior (Jamieson et al., 2018). Both threat and challenge appraisal have also been linked to cognitive resources depletion, however threat additionally to emotional exhaustion (Palmwood & McBride, 2017). In

practice, this highlights the relevance of addressing a potential lack/need in the employee community, and could inform possible interventions, e.g., targeting stress reappraisal and social support or alternatively coping techniques, e.g. mindfulness (Palmwood & McBride, 2017) that would need to be improved from an organizational level perspective.

**Conclusion**

The present study explored stress and appraisal within emoji research and addressed research efforts in developing questionnaires based on the emotion properties of emojis and changes in communication. Whereas results did not provide support for the applied emoji scale, it highlights the role of challenge and threat appraisal in assessing employees' stress. Further research on how to assess this more effectively and whether the applicability of an emoji-base scale is beneficial, is needed.

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**Appendix A**

**The Cognitive Appraisal Scale (CAS; Skinner & Brewer, 2002)**

Please read each statement and indicate how much you agree or disagree with that statement on a scale from 1 ("strongly disagree") to 6 ("strongly agree").

1. I tend to focus on the positive aspects of any situation. (C)

2. I worry that I will say or do the wrong things. (T)

3. I often think about what it would be like if I do very well. (C)

4. I believe that most stressful situations contain the potential for positive benefits. (C)

5. I worry about the kind of impression I make. (T)

6. I am concerned that others will find fault with me. (T)

7. Overall, I expect that I will achieve success rather than experience failure. (C)

8. In general, I look forward to the rewards and benefits of success. (C)

9. Sometimes I think that I am too concerned with what other people think of me. (T)

10. I feel that difficulties are piling up so that I cannot overcome them. (T)

11. I lack self-confidence. (T)

12. A challenging situation motivates me to increase my efforts. (C)

13. In general, I anticipate being successful at my chosen pursuits, rather than expecting to fail. (C)

14. I worry what other people will think of me even when I know that it doesn't make any difference. (T)

15. I am concerned that others will not approve of me. (T)

16. I look forward to opportunities to fully test the limits of my skills and abilities. (C)

17. I worry about what other people may be thinking about me. (T)

18. I feel like a failure. (T)

**Appendix B**

**Stress Scale**

**Figure B1**

*Stress Scale Text Condition*

Please indicate your response.

How would you rate the level of your job stress?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

**Figure B2**

*Stress Scale Emoji Condition*

Please indicate your response.

How would you rate the level of your job stress?

😎          😅          😬          😓          😖

**Appendix C**

**Emoji Choice**

**Table 1**

*Information on Applied Emojis*

| Emoji Name | Emoji | Unicode | Meaning |
|---|---|---|---|
| Confounded face | 😖 | 1F616 | *Stressed (*Jaeger et al., 2019) |
| Downcast face with sweat emoji | 😓 | 1F613 | *Stress* (Krekhov et al., 2022); *Stressed* and *Nervous/Anxious/Worried (*Jaeger et al., 2019). |
| Grimacing face emoji | 😬 | 1F62C | *Nervous/anxious/worried* and *stressed* (Jaeger et al., 2019); *awkward* and *cringe (*Krekhov, et al., 2022). |
| Grinning face with sweat | 😅 | 1F605 | Relief, tension (Emojipedia, 2023b) 'Handling a stressful situation' well (Emojimeanings.net, 2015) |
| Smiling face with sunglasses emoji | 😎 | 1F60E | *Confident* and *at ease (*Sick et al., 2022) |

**Appendix D**

**Manipulation Check**

**Figure 1**

*Presentation of the Manipulation Check within the Emoji Condition*

Please choose the option that best describes your response to the statement.

😎     😅     😬     😓     😖

How would you rate the level of your job stress?   ○ ○ ○ ○ ○

Please answer the following questions about the scale you just completed.

| | Strongly Disagree | Disagree | Undecided | Agree | Strongly Agree |
|---|---|---|---|---|---|
| The statements/questions were clear to me | ○ | ○ | ○ | ○ | ○ |
| The response options were clear to me | ○ | ○ | ○ | ○ | ○ |
| I am confident in my responses | ○ | ○ | ○ | ○ | ○ |
| I felt comfortable answering the questionnaire | ○ | ○ | ○ | ○ | ○ |

**Appendix E**

**Careless Responder Check**

**Figure 1**

*Instructed Response Item placed within the CAS*

| | Strongly Disagree | Moderately Disagree | Slightly Disagree | Slightly Agree | Moderately Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| In general, I look forward to the rewards and benefits of success | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| Sometimes I think that I am too concerned with what other people think of me. | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| I feel that difficulties are piling up so that I cannot overcome them | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |
| If you are reading this please choose 'Strongly agree' | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |

**Appendix F**

**Data Screening**

**Figure F1**

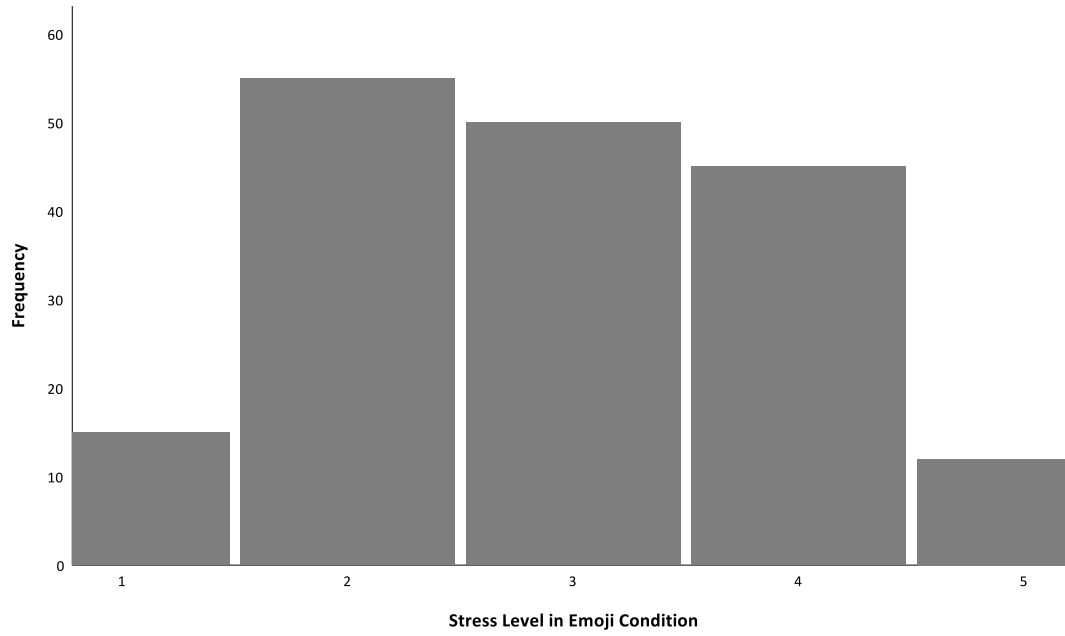*Histogram for Stress in Emoji Condition*



**Figure F2**

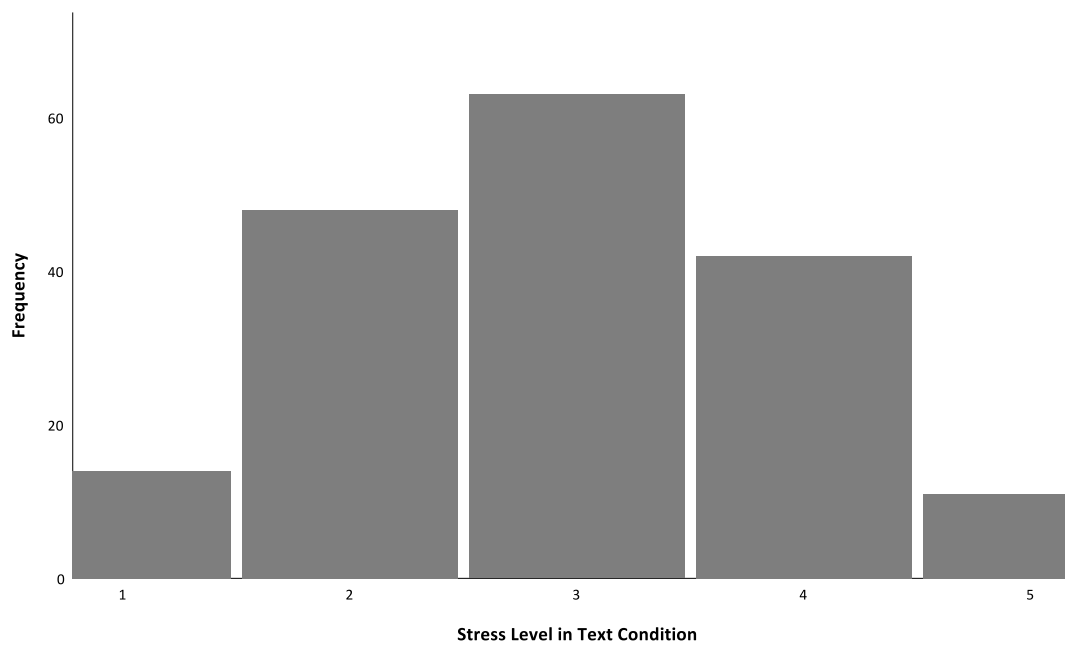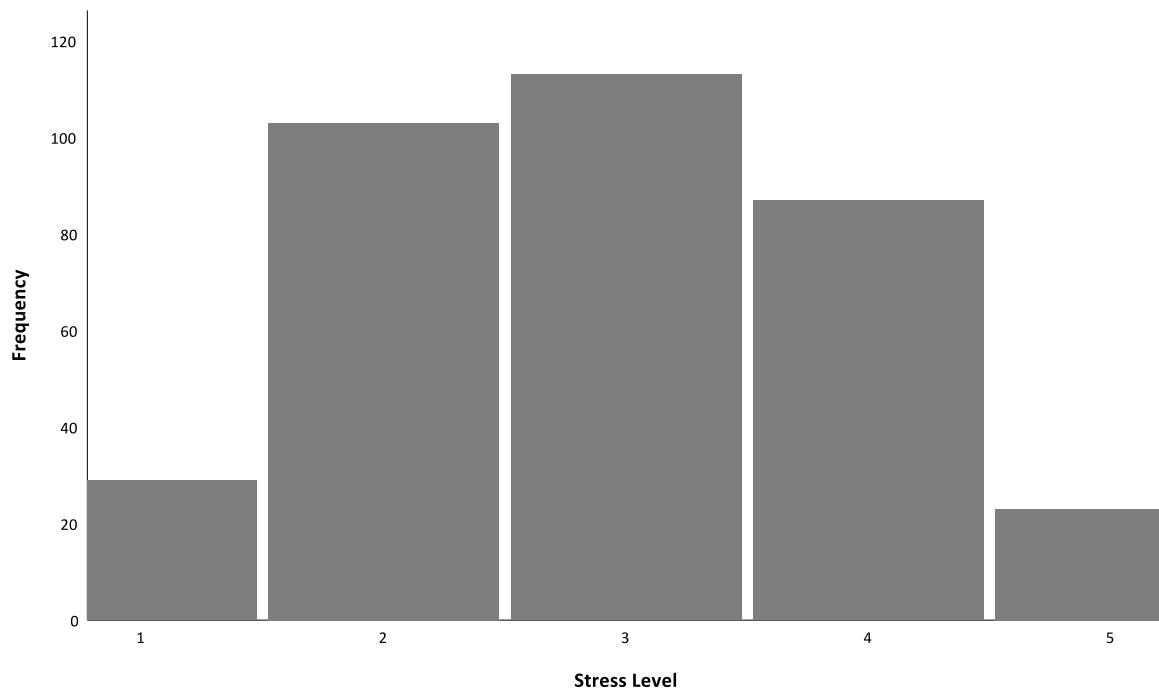*Histogram for Stress in Text Condition*

**Figure F3**

*Histogram for Stress (overall) in both Conditions*



**Table F1**

*Descriptive Statistics for Main Variables*

|  | N | Range | Minimum | Maximum | Mean | SD | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|---|
| Age | 355 | 58 | 19 | 77 | 37.93 | 11.09 | 0.79 | 0.23 |
| Stress (Emoji) | 177 | 4 | 1 | 5 | 2.91 | 1.08 | 0.10 | -0.80 |
| Stress (Text) | 178 | 4 | 1 | 5 | 2.93 | 1.03 | 0.04 | -0.56 |
| Stress (overall) | 355 | 4.00 | 1 | 5 | 2.92 | 1.06 | 0.07 | -0.69 |
| Challenge Appraisal | 355 | 4.63 | 1.38 | 6 | 4.32 | 0.69 | -0.31 | 0.95 |
| Threat Appraisal | 355 | 4.90 | 1 | 5.90 | 3.80 | 1.12 | -0.35 | -0.49 |
| Scale Clarity | 355 | 4.00 | 1 | 5 | 3.96 | 1.30 | -1.01 | -0.32 |
| Response Confidence | 354 | 4.00 | 1 | 5 | 4.17 | 1.04 | -1.12 | 0.29 |

**Figure F4**

*Normal Q-Q Plot for Stress*
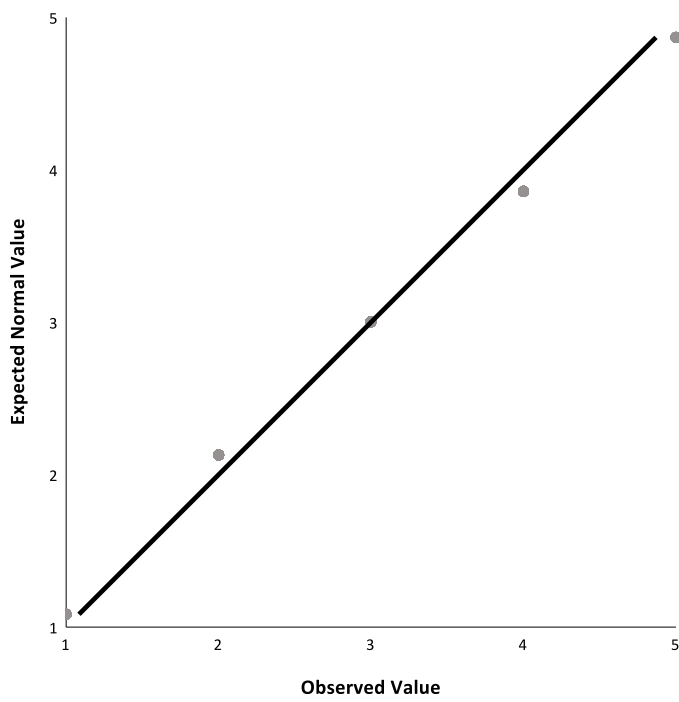


**Figure F5**

*Residuals Plot for Challenge Appraisal and Stress (Emoji)*
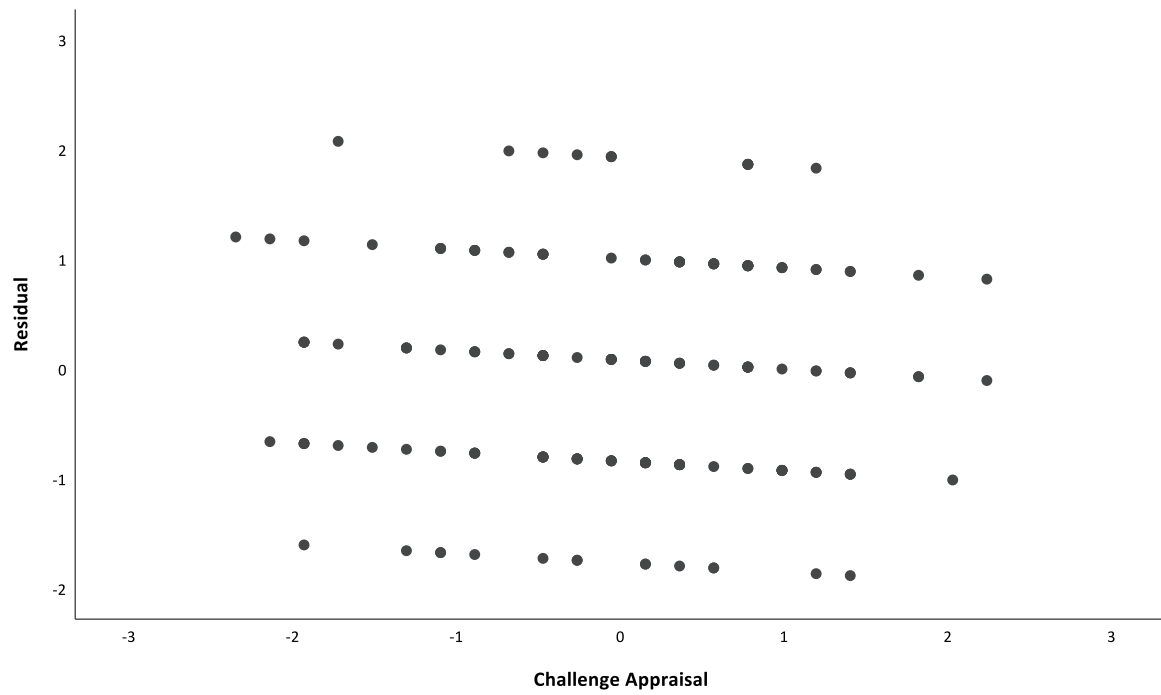
**Figure F6**

*Residuals Plot for Threat Appraisal and Stress (Emoji)*