

**Examining the Moderating Role of Conscientiousness Between Technological Self-Efficacy and Applicants Perceived Procedural Justice in a Game-Based Assessment**

**Context**

David Ulas

S4026322

Department of Psychology, University of Groningen

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Mentor group number: 22

Supervisor: (prof.) (dr(s).) Samantha Adams

Second evaluator: Teodora Heihal, MSc

In collaboration with: Clara Borstelmann, Wiert van der Schoor, Fardau van der Werff

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### **Abstract**

Game-based assessments (GBA) are a novel assessment tool used to select suitable candidates for job positions. Prior research indicates that applicants' reactions are important to determine how fair these novel selection procedures are perceived by applicants. This is important since using selection tools which are perceived as unfair by applicants can have negative outcomes for companies, such as decline in applications. This study examined how applicants' reactions in terms of procedural fairness perceptions of GBAs are connected to technology self-efficacy (TSE). Further we examined how this relationship is possibly moderated by conscientiousness, as prior research suggests that conscientiousness positively influences applicants fairness perceptions. The sample comprised 90 participants who were recruited through Whatsapp and from the Faculty of Economics and Business (FEB). In our study participants completed two GBAs as well as a survey, measuring their TSE, conscientiousness levels, and how fair they perceived the procedure. We conducted a multiple linear regression analysis, which indicated that there was no significant evidence for either of our hypotheses. A discussion of the results, limitations, along with implications and suggestions for future research is also presented.

*Keywords:* technology self-efficacy, conscientiousness, game-based assessments, procedural justice

## **Examining the Moderating Role of Conscientiousness Between Technological Self-Efficacy and Applicants Perceived Procedural Justice in a Game-Based Assessment**

### **Context**

The modern job market has had to find novel approaches to manage higher applicant numbers in a timely manner (Ellison *et al.*, 2020). Jobs in which technological knowledge is required experienced a vast increase over the last years, indicating that technological related knowledge by job applicants has become more important (McDonald & Siegall, 1992). Over the last decade selection procedures underwent a transition from traditional assessment methods such as paper-and-pen assessments to more novel assessment methods such as game-based assessments. These novel assessment methods (e.g., game-based assessments and gamified assessments) are reducing the time companies use for selection processes, by providing a faster and more efficient way of assessing an applicants suitability for employment (Ellison *et al.*, 2020). Game-based assessments (GBA) in particular, are being used to accelerate selection processes and enhance applicants' motivation towards selection procedures (Ellison *et al.*, 2020). Further, GBAs are proposed to increase the predictive validity in selection procedures, and by setting the selection procedure in a game environment they are proposed to reduce the pressure to perform, which applicants may feel during traditional assessments (Fetzer *et al.*, 2017).

In an effort to improve time efficiency in selection, Melchers and Basch (2021) have noted that the incorporation of game-based assessments in recruitment and selection procedures is developing progressively. Further, Fetzer *et al.* (2017), propose an increase in engagement from applicants towards the selection procedure, as fully engaging in a game-based environment will reduce applicants pressure to perform and therefore leads to a more accurate assessment of their abilities. This increased level of engagement is proposed to

enhance future work motivation from the applicants side, which results in potential benefits for companies, like employee knowledge retention and business growth (Fetzer *et al.*, 2017).

However, while time efficiency, reliability and validity are important, applicant reactions are equally important, as it offers insights into the users perception of the assessment method. This is crucial for improving GBAs, therefore recent avenues of research focus on improving GBAs user experience, by learning from feedback users provided (Buil *et al.*, 2020). Further, they emphasize the importance of obtaining applicants feedback towards GBAs, to improve assessment methods, particularly regarding applicants judgment of perceived procedural justice, as this is crucial for developing an assessment most applicants perceive as fair. Also, applicants technology self-efficacy (TSE) influences the procedure, as an advanced level of technological knowledge, and a higher confidence in applying it, is expected to lead to greater performance in GBAs (Bhatia, 2018). Additionally, Nikolaou *et al.* (2019), point out the importance of applicants conscientiousness levels in GBAs. As having a higher level of conscientiousness is proposed to lead to a greater performance in GBAs, therefore it is crucial to take personality characteristics into account when developing GBAs, as we need to account for potential influencing factors on applicants performance, to develop assessments which are perceived as fair and can be applied fairly to everyone.

In this research, we examine applicant reactions towards GBAs, specifically investigating how applicants TSE influences perceived procedural justice perceptions after administering applicants to GBAs. Further, we will examine how conscientiousness influences the relationship between applicants TSE and fairness perception towards GBA.

*Research Questions:*

1. To what degree does an applicants TSE influence their perceptions of procedural justice after completing a GBA?

2. To what extent does conscientiousness moderate applicants perceived procedural justice after completing a GBA?

### **Game-based assessments**

Game-based assessment (GBA) is a term used to classify assessments methods which are based on the implementation of game elements, to measure applicants abilities, on a cognitive, personality and job-related knowledge level (Bhatia, 2018). The aim of GBAs is to develop a user friendly, fun, and engaging assessment procedure for applicants. If a GBA is not providing a user-friendly experience, users can develop negative attitudes towards the assessment and judge the GBA as unsuitable (Landers & Sanchez, 2022). By implementing game-based approaches into selection processes, the modern job market is creating revolutionized selection procedures directed at assessing individuals abilities on a wider range than traditional assessment methods (e.g., multiple choice tests). Further, Ellison *et al.* (2020), indicate the accelerating incorporation of GBAs in companies, supporting the importance of GBAs in present day selection processes.

### **Applicant reactions**

Previous selection research was focused on understanding selection procedures used by organizations, however, the attention has shifted to the applicants side (Ababneh *et al.*, 2014). Therefore, it is now more crucial to understand the attributions of applicants towards the selection procedure, such as underlying attitudes and motivation, as this is important to further improve and develop selection procedures. Additionally, understanding applicant reactions influences the entire perception applicants have towards an organization, as the use of a certain selection method can already send certain signs about the organization (Folger *et al.*, 2021). Therefore, positive reactions towards the selection method will lead towards a more positive evaluation of the organization. In this study we put the emphasis on fairness

perceptions of applicants regarding procedural justice, indicating how fair applicants view the GBA in terms of assessing their abilities.

### **Procedural Justice**

Procedural justice is useful for understanding candidate reactions and attitudes to the company, as applicants reactions arise from experiences throughout the selection procedure. Also, situation specific (e.g., test type) and personal factors (e.g., personal circumstances) can influence one's perception of procedural justice perceptions toward the assessment method (Gilliland, 1993). Fodchuk and Sidebotham (2005), emphasize the importance of applicants judgements on how fair selection procedures are being perceived, since the applicants performance on assessments influences their career pathways. If the selection procedure is perceived as unfair by the applicants, it can lead to negative evaluations of the procedure and in extreme case scenarios can cause legal disputes (Fodchuk & Sidebotham, 2005). By expanding the understanding of how fair game-based selection procedures are evaluated by applicants, it is possible to develop GBAs further into a direction, in which a more common perception of procedural justice is present. One theory that is often drawn on to explain procedural justice is Gillilands model of applicant reactions (Ellison *et al.*, 2020). In the present study, procedural justice is the outcome variable, as we want to assess how fair applicants perceive the given assessment.

#### ***Gillilands model of Applicants reactions***

Gilliland (1993) proposed a model, aimed at providing a vaster understanding of applicants reactions. The model is a framework for understanding how job applicants respond to the recruitment and selection process. It separates into two domains of perceived justice: distributive justice and procedural justice. In this model, situational and personal factors impact applicants experiences with the given assessment method, which influences their perception of procedural justice, and therefore determines if applicants rate the assessment as

a fair or unfair way of assessing suitable job candidates (Ellison *et al.*, 2020). The model proposes that both situational and personal factors can shape perceptions of procedural and distributive justice in a selection process, and that these perceptions can have consequences for individual and organizational outcomes (Gilliland, 1993). The model suggests that applicants go through a process of cognitive (thoughts about the selection process), affective (emotions during the selection process), and behavioral (responses to the selection process) reactions during the recruitment and selection process, and that these reactions can influence the outcomes of the process (Gilliland, 1993). This model has also been used in several studies examining applicants reactions in terms of fairness perception (Ababneh *et al.*, 2014; Ellison *et al.*, 2020; Fodchuk & Sidebotham, 2005). Therefore, the model informs this contemporary study, which places the focus on procedural justice, as we try to assess the applicants evaluation of the selection procedure. Further, we want to investigate how the other variables in our study, TSE and conscientiousness might influence applicants reactions in terms of fairness perception.

### **Technology self-efficacy**

Technology self-efficacy defines the competence individuals have regarding using and applying technological knowledge, furthermore, how confident people feel when using technology (Bhatia, 2018). This indicates the importance of sufficient knowledge and confidence in the use of technology, when completing GBAs. A study by McDonald and Siegall (1992) revealed that technicians with high TSE displayed more satisfaction and commitment to their organization. Further, Bhatia (2018), proposes that applicants high in TSE display more confidence in game-based selection procedures, due to an increased feeling of control. Therefore, applicants display a higher level of confidence leading them to feel more in control of the process and possibly performing better (Bhatia, 2018). Previous research by Ellison *et al.* (2020), found TSE significantly related to procedural justice

perceptions. Further, Wiechmann and Ryan (2003) found that individuals, scoring low in technology self-efficacy, tend to display more negative attitudes towards computerized tests which also influences fairness perceptions of the selection procedure. Therefore, applicants TSE serves as an individual difference in our study, assessing how differences in applicants TSE influences their perceptions of procedural justice after completing GBAs. In our study TSE is a predictor variable, predicting how fair applicants will perceive the GBAs.

*Hypothesis 1: Higher levels of TSE lead to a higher fairness perception of the applicants towards the assessment.*

### **Conscientiousness**

Conscientiousness is defined as “the quality of doing things carefully and correctly” (Oxford Advanced Learner's Dictionary, n.d.). Translating this to the workplace, Avery (2003) defines individuals high in conscientiousness, as reliable, focused, and committed to goal achievement. Further, Avery (2003) found conscientiousness to be a valid predictor for job performance. Therefore, conscientiousness and performance are linked, as individuals scoring high in conscientiousness are assumed to work with more motivation and attain higher goals compared to individuals scoring low on conscientiousness. Also, the high focus on achievement is proposed to lead applicants to a more precise and critical evaluation of the assessment method, as their prior knowledge of work experience and assessments is being tested (Dineen *et al.*, 2004). Additionally, Wang *et al.* (2020) support the claims that individuals scoring high in conscientiousness will display more critical attitudes towards perceived procedural justice of the assessment process. Accordingly, Dineen *et al.* (2004) stress the importance of perceived procedural fairness, especially regarding applicants scoring high in conscientiousness, as evaluations of perceived fairness of the selection procedure will impact their attitudes towards the company. In case of a negative evaluation, this could lead to a loss of potential high achieving applicants due to their negative impressions of the company.



Hence, it should be of great importance for companies to apply GBAs which are perceived as fair by the applicants. Building on previous findings by Wang *et al.* (2020), who found that conscientiousness positively influences procedural justice perceptions, we propose that conscientiousness will moderate the relationship between TSE and procedural justice. Therefore, conscientiousness is a moderator variable in the present study.

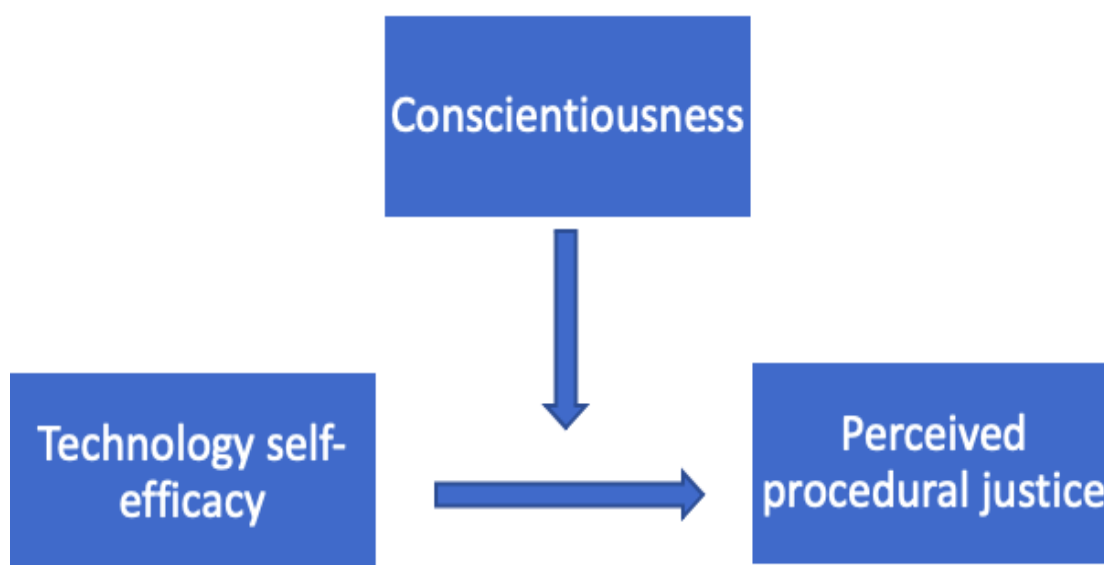
*Hypothesis 2: Conscientiousness moderates the relationship between applicants' TSE and perceived procedural justice.*

### **Contemporary Study**

In this study we want to further examine, to what extent applicants TSE influences perceptions of procedural justice after GBAs. Additionally, we want to assess to what extent applicants perceptions of procedural justice are moderated by contrasting levels of conscientiousness after completing a GBA. The research model is presented in Figure 1.

### **Figure 1.**

*Research model of the contemporary study.*



*Note.* In this model, technology self-efficacy is the independent variable and perceived procedural justice is the dependent variable with conscientiousness as the moderating variable for this relationship.

## Methods

### Participants

Out of an initial sample ( $N = 119$ ) participants, 29 were excluded from the study prior to our analyses, due to abandoning the survey, too little time spent on the survey, incomplete responses, and/or no completion of the GBAs. The final sample ( $N = 90$ ) consisted of 41% females and 59% males. Ages ranged between 18 and  $>60$  of age ( $M = 2.07$ ,  $SD = 0.596$ ), indicating most of our participants were between 18-25 years old (2 equaled the response choice "18-25"). Participants reported their native language from a total of 17 different countries. Additionally, they were asked to indicate their highest educational level, English proficiency level, if they had previous experience with recruitment and if they had any experience with GBAs prior to the current study. 67.8% of our participants reported a high school diploma as their highest educational level. In terms of English proficiency, 75.6% reported fluency in English. Additionally, 52.2% of participants had previous experience with recruitment, and only 13.3% had prior experience with GBAs. An *a priori* power analysis conducted with *G\*Power*, based on a linear multiple regression, indicated that 89 participants were required to achieve a medium effect size ( $f^2 = .15$ ) and power .95%.

### Research Design and Procedure

This study was approved by the Ethics Committee of the Faculty of Social and Behavioral Sciences of the University of Groningen, and is part of the bachelor thesis for the Bachelor of Psychology. The convenience sample for this study was gathered by distributing an online survey using Qualtrics. This survey was distributed on WhatsApp and in the research lab of the Faculty of Economics and Business (FEB), in which only students from the FEB filled out the survey. After answering a couple questions, participants had to complete two game-based assessments. For our study we used two game-based assessments

(GBA) from the company *Equaltura*. Before starting the GBAs, participants were asked to answer questions regarding their preferences of employment such as dream company and job, in order to create a more realistic selection procedure scenario (Appendix B). The GBAs used in this study were two demo versions which assess different skills and abilities. The first game “The Ferry” assessed applicants problem-solving ability and problem-solving style. Additionally, the second game “Bird spotting” assessed applicants processing speed and accuracy. Participation was voluntary and participants provided informed consent before completing the survey. No compensation was offered for their participation, however, a one-euro donation to UNICEF for each participant was offered, up to hundred-fifty euro. The students from the FEB received SONA credits for their participation in the study.

## **Materials**

### ***Technology self-efficacy***

Applicants technology self-efficacy was assessed on a scale consisting of three items, which was developed by McDonald and Siegall (1992). Participants had to indicate on a 5-Point Likert scale (1 = “strongly agree” to 5 = “strongly disagree”) how much they agree with the given statements. The first item assessed applicants confidence in using technology (“*When I have to learn a new task that is high in tech, my first reaction is that I’m sure I can do it.*”). The second statement asked applicants how they rate their own technology self-efficacy in comparison to others (“*In terms of my ability to learn new tasks that are high in tech, I would describe myself as one of the best in my peer group.*”). The wording of this item was changed slightly to align with the target group of this study (i.e., students), by replacing the word “work-group” with “peer group”. The third item assessed participants previous experience in using and applying technological knowledge (“*In the past I have had a great amount of experience (either on or off the job) working on high-tech tasks.*”). The reliability analysis indicated moderate internal consistency ( $\alpha = .793$ ).

### ***Conscientiousness***

Conscientiousness was measured by using a ten-item bipolar scale (e.g., *organized-disorganized*), which was developed by Goldberg (1992). Participants indicated on a scale from 1 = “extremely” (attribute 1) through 5 = “neither” (attribute 1) “nor” (attribute 2) to 7 = “extremely” (attribute 2) to what extent they rate themselves on the given items (Goldberg, 1992). For the purpose of our study and to enhance user experience, we reduced the number of answer options from nine to seven, by taking out the answer option “quite”. Goldberg (1992) reported moderate internal consistency for the ten-item bipolar scale ( $a = .74$ ). Our own reliability analysis supported Goldberg’s findings ( $a = .81$ ). A full list of the items can be found in the Appendix A.

### ***Perceived Procedural Justice***

Perceived procedural justice was measured by using a three-item scale of perceived fairness. The items for this scale were created from two scales of perceived fairness (Goldberg, 1992; Kluger & Rothstein, 1993). The participants indicated their agreement with each given statement on a 5-Point Likert scale (1 = “very fair”, 5 = “not fair at all”). The first item asked participants how fair they felt the test (GBA) is (“*I think this test is fair.*”). The second item assessed applicants’ perception on how most applicants would rate the GBA (“*Most people would say this test is fair.*”). The third item asked participants to indicate how they would rate the given assessment in terms of determining suitable candidates (“*I believe this test can predict whether I will be a successful employee.*”). The reliability analysis for the three-item scale indicated moderate internal consistency ( $a = .78$ ).

## Results

We hypothesized that higher levels of TSE lead to a higher fairness perception towards the assessment. Additionally, we hypothesized that conscientiousness will significantly moderate the relationship between technology-self efficacy and perceived procedural justice. To analyze our data we used the statistical software SPSS.

### Descriptive Statistics

Of our initial sample ( $N = 119$ ), we excluded 29 participants prior to the analyses. 13 participants were excluded due to abandoning the survey after a few minutes, as determined by their responses and the length of time spent on the survey (less than 8-10 minutes). Another 13 participants were excluded due to not completing the GBA. Additionally, 3 participants were excluded due to incomplete responses on items measuring conscientiousness. Therefore, our final sample comprised 90 individuals. Participants reported their first language from 17 different countries (Table 1), predominantly Dutch (40%) and German (22.2%).

**Table 1.**

*Reported first language of the participant.s*

	N	%
No entry	1	1.1%
Bahasa Indonesia	2	2.2%
Bulgarian	1	1.1%
Chinese	1	1.1%
Croatian	1	1.1%
Dutch	36	40.0%
English	5	5.6%
Finnish	1	1.1%
French	1	1.1%
German	20	22.2%
Greek	3	3.3%

Hungarian	5	5.6%
Italian	3	3.3%
Norwegian	1	1.1%
Polish	5	5.6%
Romanian	2	2.2%
Slovak	2	2.2%

*Note.* Frequency table.

### Assumptions

Prior to our main analyses we checked if the necessary assumptions were met, in order to conduct a multiple linear regression analysis. To check the normality assumption, indicating that our data for all our three variables is normally distributed, we used the Shapiro-Wilk test (Table 2). The Shapiro-Wilk test did not show significant evidence that conscientiousness ( $W = 0.975, p = .075$ ) was non-normally distributed. But there was evidence that TSE ( $W = 0.957, p \leq .05$ ) as well as Procedural Justice ( $W = 0.972, p \leq .05$ ) were non-normally distributed.

**Table 2.**

*Shapiro-Wilk test to test for normality.*

Variable	$W$	$df$	$p$
Conscientiousness	.975	90	.075
TSE	.957	90	.005
ProceduralJustice	.972	90	.047

*Note.* Significant results ( $p \leq 0.05$ ) suggest a deviation from normality.

Therefore, we looked at the Kurtosis and Skewness of our data (Table 3) and found that our data was in the acceptable range (-1 to +1), which indicated that our data does not deviate too much from normality.

**Table 3.**

*Descriptive statistics for Conscientiousness, TSE and ProceduralJustice.*

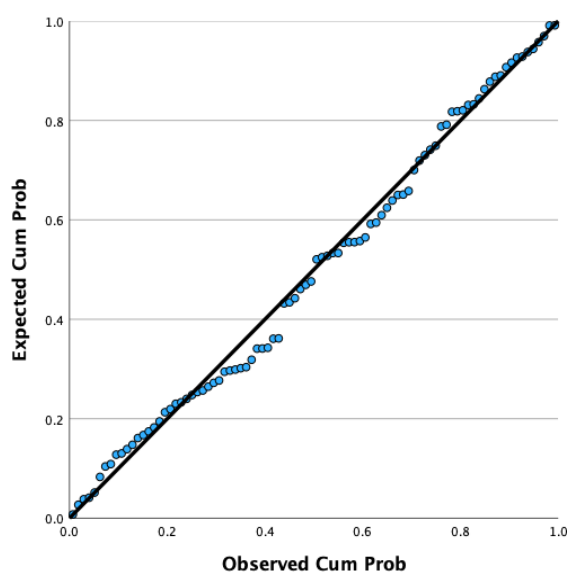
Variable	<i>M</i>	<i>SD</i>	Skewness	Kurtosis
Conscientiousness	3.002	.828	.475	.813
TSE	3.222	.920	-.447	-.530
ProceduralJustice	.851	.851	.099	-.483

*Note.* Skewness and Kurtosis in the acceptable range (-1 to +1) indicate no concern for violation of normality.

In the next step we examined if our variables met the linearity requirements, which requires a linear relationship between our independent variables ('TSE'), 'Conscientiousness') and outcome variable ('ProceduralJustice'). The PP-Plot (Figure 2) indicated that the linearity assumption for our variables was not violated, as the points follow approximately a linear pattern.

### Figure 2.

*PP-Plot displaying the linearity assumption.*

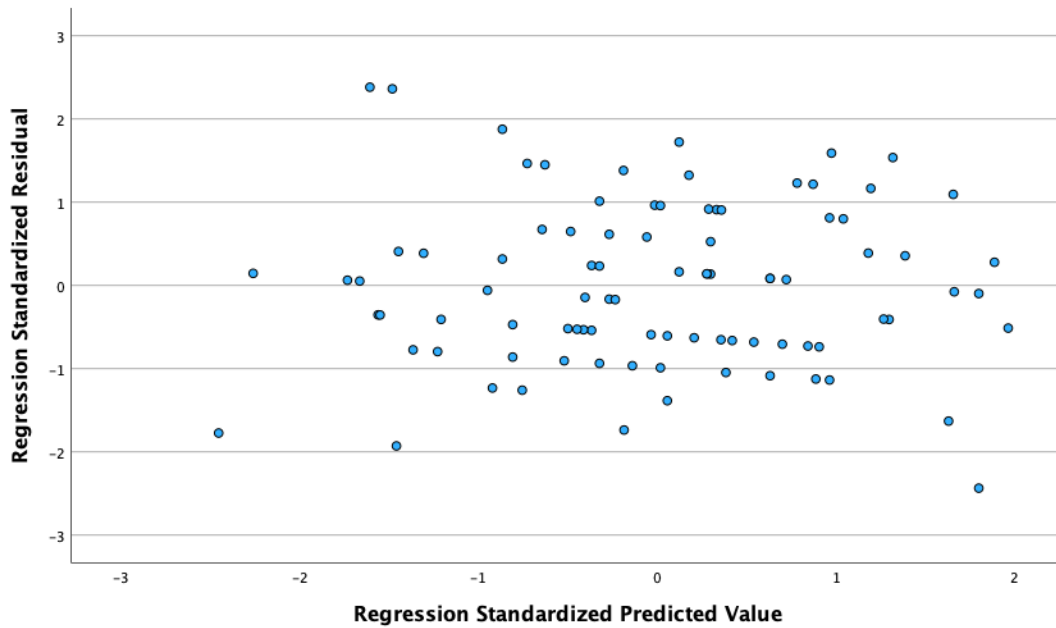


*Note.* Dependent variable: procedural Justice.

To test that the residuals had constant variance we examined a scatterplot (Figure 3). The scatterplot revealed that there was no clear pattern in distribution in the data, therefore the assumption of equality of variances was met.

**Figure 3.**

*Scatterplot for testing homogeneity of variances.*



To test if there is a violation to the multicollinearity assumption, we first looked at the Pearson correlations coefficients between our variables (Table 4).

**Table 4.**

*Correlations.*

		Conscientiousness	TSE	ProceduralJustice
Conscientiousness	<i>r</i>	1	.279**	-.015
	<i>p</i> (2-tailed)		.008	.885
	N	90	90	90
TSE	<i>r</i>	.279**	1	.140
	<i>p</i> (2-tailed)	.008		.187
	N	90	90	90
ProceduralJustice	<i>r</i>	-.015	.140	1
	<i>p</i> (2-tailed)	.885	.187	



	N	90	90	90
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Note. \*\*. Correlation is significant at the 0.01 level (2-tailed).

Since TSE and conscientiousness were significantly correlated ( $r(90) = 0.279, p < .01$ ), we looked at the variance inflation factor (VIF). The VIF was calculated for each predictor variable in the multiple regression model, the values are shown in Table 5. All the VIF values were less than 10, indicating that multicollinearity was not a concern in the model.

**Table 5.**

*Coefficients table.*

	Model	<i>B</i>	<i>SE</i>	<i>Beta</i>	<i>t</i>	<i>p</i>	<i>VIF</i>
1	(Constant)	2.560	.412		6.213	<.001	
	TSE	.145	.102	.157	1.421	.159	1.084
	Conscientiousness	-.061	.113	-.059	-.536	.593	1.084
2	(Constant)	2.579	.417		6.181	<.001	
	TSE	.146	.103	.158	1.423	.158	1.085
	Conscientiousness	-.066	.115	-.064	-.575	.567	1.101
	INT	-.025	.066	-.040	-.376	.708	1.015

Note. VIF <10 indicates no concern for multicollinearity.

### Main Analysis

The relationship between TSE levels and procedural fairness perception was examined to test the hypothesis (H1) that higher levels of TSE ( $M = 3.2, SD = 0.92$ ) lead to a higher fairness procedural perception ( $M = 2.8, SD = 0.85$ ). A simple linear regression was performed to analyze the effect of TSE on perceived procedural justice (Table 6). It was found that TSE had no significant effect on procedural justice  $\beta = .130, t(89) = 1.329, p = .187, 95\% CI = [-.064, .324]$ . However, since zero was included in the confidence interval and the p-value indicated no significant effect, we found no supportive evidence for H1, leading us to reject the hypotheses.

**Table 6.**

*Coefficients table to examine the effect of TSE on procedural justice.*

Predictor	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	95% CI	
					<i>UL</i>	<i>LL</i>
Constant	2.426	.327	7.417	<.001	1.776	3.076
TSE	.130	.098	1.329	.187	-.064	.324

*Note.* Dependent Variable: procedural justice. CI = confidence interval; *UL* = upper limit, *LL* = lower limit.

By further examining how much variance TSE explains on the outcome variable we found  $R^2 = .02$ ,  $F(1, 88) = 1.767$ ,  $p = .187$  (Table 7). Indicating that the amount of variance in our model explained by TSE is 2%.

**Table 7.**

*Model summary.*

Model	$R^2$	Adj. $R^2$	<i>SE</i>	<i>F</i>	<i>df1</i>	<i>df2</i>	<i>p</i>
1	.020	.009	.847	1.767	1	88	0.187*

*Note.* \* $p < .05$  indicates significant F-change.

Our results suggest that higher levels of TSE seem to be associated with higher fairness perceptions, however, the relationship was not very strong, and the results were not statistically significant. Therefore, this confirmed the lack of supportive evidence for H1.

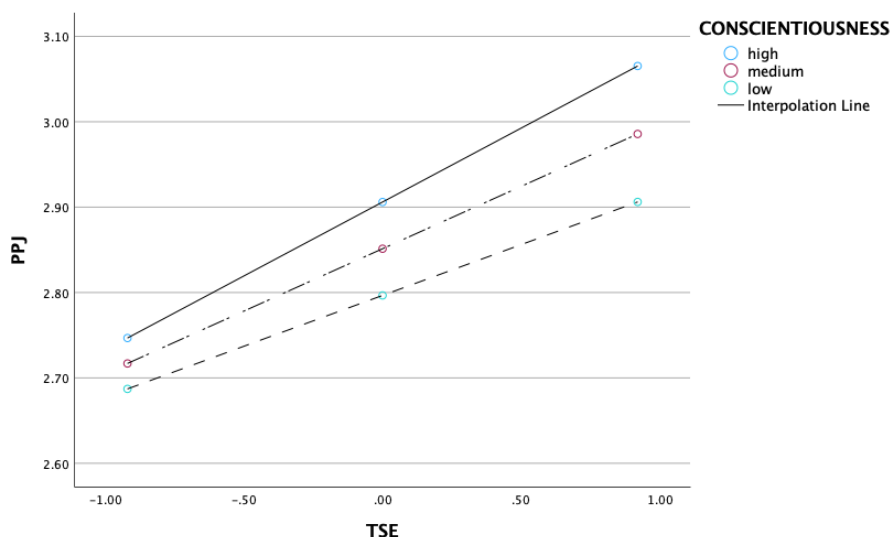
For H2 we tested if conscientiousness ( $M = 3$ ,  $SD = .83$ ) moderates the relationship between TSE and procedural justice. To test the moderator effect of conscientiousness the PROCESS macro (model 1) by Hayes (2013) was applied. Conscientiousness did not moderate the effect of technology self-efficacy on perceived procedural justice  $\beta = -.0327$ ,  $t(89) = -.375$ ,  $p = .708$ , 95%  $CI = [-.205, .140]$ . Since the CI is included zero, we determined that there was no significant moderating effect of conscientiousness. Moreover, we found that the moderation has a negative slope, which is not significant, but suggests that the effect of

the moderator has rather decreasing effects on the relationship between TSE and perceived procedural justice. Further, we found  $R^2 = .0245$ ,  $F(1, 88) = .72$ ,  $p = .542$ , this indicates that our model, including the moderator, explains 2.45% of the variance in our outcome variable. By adding the moderator, we had an increase of 0.45% in explained variance in our model. This increase is small and was found to be statistically insignificant. Therefore, we found no supportive evidence for H2, leading us to reject the hypothesis.

To further investigate the difference between the different levels of conscientiousness (high, medium, low) a graph with moderation regression slopes was utilized (Figure 5). The lines of the slopes follow a parallel direction, which further supports our findings, as there seems to be no interaction effect. Indicating that between the different levels of conscientiousness there seems to be no statistically significant difference. Hence, the moderating influence of conscientiousness was further supported to be non-significant.

**Figure 5.**

*Moderation regression slopes.*



*Note.* PPJ = perceived procedural justice, TSE = technology self-efficacy, the slopes are indicating the differences in conscientiousness. (The graph was created by using the syntax from the SPSS PROCESS output.)

To sum up, we found no significant statistical evidence for the effects of the independent variables (TSE, conscientiousness), indicating a non-significant influence on the dependent variable (procedural justice). Additionally, there was also no corroborating evidence for a significant effect of the interaction of the predictors on the dependent variable.

### Discussion

The aim of this study was to examine participants reactions to game-based assessments in terms of procedural justice. We investigated how applicants TSE influences perceived procedural justice after completing a GBA, while hypothesizing that higher TSE will lead to higher fairness perceptions of the procedure. Additionally, we examined to what extent conscientiousness moderates the relationship between applicants TSE and perceived procedural justice, hypothesizing that conscientiousness moderates the relationship. Since, we found no significant results, there was no supportive evidence for both of our hypotheses.

Interestingly, we found a small positive relationship between participants TSE and procedural justice, but it was non-significant. In comparison to findings from other research (e.g., Bhatia, 2018; Ellison *et al.*, 2020) supportive evidence for the positive relation between TSE and fairness perceptions was found. Furthermore, the slope for the moderation was negative which is interesting, as this would indicate rather decreasing effects of the moderator on the relationship between TSE and procedural fairness, but also for this finding we had no significant evidence. On the one hand, this is contrary to the findings of Wang *et al.* (2020), who found conscientiousness positively correlated to procedural justice perceptions. On the other hand it is in line with the assumption that highly conscientious individuals are more likely to display more critical attitudes towards perceived procedural justice of selection procedures (Avery, 2003; Dineen *et al.*, 2004). Furthermore, the positive correlation between TSE and conscientiousness supports the latter assumption, as the slope of the moderation was negative, indicating that the interaction of both variables leads to a rather critical fairness evaluation of the procedure.

Regarding technological development, there are a number of different GBAs in the market, and we used two GBAs of many, which should also be researched to determine if they have an influence on applicant reactions, as each GBA might measure similar constructs

but is perceived differently by the applicants. This is supported by Landers and Sanchez (2022), who stress the importance of a carefully designed GBA, to ensure they meet the needs of the organization and are well-received by candidates. Especially in the case of our study we used the demo-version of two GBAs, of which each was estimated to take two to five minutes. Furthermore, the selection procedure scenario provided (Appendix B), did not create a real life application setting, as the GBA did not determine if they are accepted to a job or not. This combined with the demo-versions of the GBAs might decrease participants engagement in the study. This connects to the study of Landers and Sanchez (2022) who emphasize the importance of a well constructed GBA for optimal engagement in the procedure. As we try to enhance novel selection procedures, it is important to account for possible influencing factors to create a procedure which is generally perceived as a fair procedure (Landers & Sanchez, 2022). This is supported by Gillilands model of applicants reactions, which highlights the importance of creating a positive candidate experience in selection processes to attract and retain suitable job applicants (Gilliland, 1993). This stresses the importance for researchers, developers, and organizations to enhance the fairness perception of the selection method which applicants are administered to. By accounting for different factors which might influence applicants fairness perceptions of GBAs, we can over time estimate the influence more, and point out possible confounding factors for the justice perceptions of applicants, which can be used to improve and develop GBAs.

Additionally, technology has experienced a tremendous development over the last few decades, leaving a lot of open space for research, especially in the field of game-based selection methods (Ellison *et al.*, 2020). Therefore, examining how age relates to TSE and how this influences procedural fairness perceptions provides more information about the influence of age in this relationship, as prior research suggests that age is negatively correlated to TSE (Ellison *et al.*, 2020). To investigate this we would have required a larger

sample size and more variation in age, as most of our participants indicated an age of 18 to 25 years. Also, investigating the influence of cultural backgrounds on fairness perceptions would have been interesting, but our sample was not diverse enough, as the majority of participants were either Dutch or German.

### **Practical Implications**

This study proposes that procedural fairness is a very important factor to take into consideration when administering GBAs, as applicants' perceptions of the fairness of the procedure can have crucial effects on how the company is perceived by future applicants (Gilliland, 1993). Therefore, it is important to implement carefully designed GBAs, so that applicants have a good user experience and rate it as a fair selection tool (Folger et al., 2021).

We examined how TSE influences the fairness rating of a GBA, as previous research (Bhatia, 2018; Ellison *et al.*, 2020) indicated a relationship between these two variables. Our study only found a small correlation but no significant evidence for this relationship, nonetheless TSE should be considered in future research. The job applicants in the technological field are increasing (McDonald & Siegall, 1992) and companies need to account for differences in applicants' TSE. Especially when applying novel selection tools like GBAs, as prior research suggests that applicants with lower technological knowledge display rather negative reactions towards computerized tests (Wiechmann & Ryan, 2003), which influences their fairness perception of assessment tools.

Further, the moderating influence of conscientiousness on the relationship between TSE and procedural fairness was examined. No significant evidence for the moderating effects of conscientiousness was found. However, our study design, especially sample size and the intervention method used, should be taken into consideration when evaluating the results. Hence, future research should consider personality traits when conducting research on procedural fairness perceptions of applicants towards GBAs. As previous research suggests

that conscientiousness is positively influencing procedural justice perceptions (Wang *et al.*, 2020).

### **Limitations**

One limitation of this study was the intervention method used. Specifically, since the demo version of two GBAs was used in the study, which were estimated to take two to five minutes to complete. This may not create the same experience as a full version of a GBA. We attempted to simulate and personalize the selection process by asking participants to indicate the ideal company and job position they would like to apply to (Appendix B). This may have reduced the seriousness of the process from the perspective of the participants, who may experienced difficulties imagining their ideal company using the demo version of a GBA to assess their suitability for their dream job. To address this limitation and increase the realism of the study, it would have been beneficial to use an established and full version of a GBA, like in the study of Ellison *et al.* (2020). This would have allowed us to provide performance data to the participants and test their fairness perceptions of the procedure before and after providing them with feedback and performance results. This may also have helped to identify any differences in fairness perceptions between low- and high-scoring candidates. Furthermore, providing explanations of the tasks and feedback on performance leads to more positive reactions towards the selection procedure (Ellison *et al.*, 2020). Overall, using a full version of a GBA may have resulted in more accurate evaluations of fairness perceptions and improved the overall validity of the study.

Another significant limitation of this study is its generalizability, or the extent to which the results can be applied or generalized to a wider population beyond the sample examined. This is because the sample for the study was obtained through the distribution of a link on social media platforms, such as WhatsApp, and in the research lab of the Faculty of Economics and Business (FEB). While this method allowed us to gather a diverse and larger



sample, it may not be representative of the wider population and could potentially affect the generalizability of the results. Additionally, the participants on WhatsApp were not incentivized in the same way as the business students, who received SONA credits for completing the study. This difference in incentives may have influenced the responses and ratings provided by participants, potentially impacting the validity and reliability of the findings. To address this limitation and increase the generalizability of the results, a homogenous sample would have been beneficial, such as a sample consisting only of students from the business faculty. This would have allowed us to apply the results to a smaller and more specific subgroup, rather than attempting to generalize to a broader population. A good example is the study conducted by McDonald and Siegall (1992) who examined how TSE influences technicians job attitudes, such as commitment to the company and job satisfaction. While this would have resulted in a smaller sample size in our study, it may have allowed for a more focused and targeted analysis of the procedure being evaluated, potentially increasing the validity and reliability of the findings.

### **Future Research**

Despite the current findings on implementing GBAs in the selection process for job applicants, it is essential for future research to continue examining the reactions of job applicants towards GBAs. This is due to the increasing demand for qualified individuals, especially in the technological field (McDonald & Siegall, 1992). To effectively meet this demand, organizations must find efficient and effective ways to review a larger number of applicants in a timely manner (Ellison *et al.*, 2020). One potential solution is the use of GBAs as part of the selection process. However, to determine the appropriateness and effectiveness of this approach, it is necessary to conduct further research on the reactions of job applicants to GBAs. By ensuring optimal user-experience, ideal candidates will have a good experience and form positive impressions of the organization.

Additionally, it is important for future research to examine the relationship between applicants TSE and their perception of procedural fairness in GBAs, as several studies have provided evidence of a connection between TSE and perceived procedural fairness (Bhatia, 2018; Ellison *et al.*, 2020). To increase the realism and validity of future studies on this topic, it would also be beneficial to use more established versions of GBAs and to provide participants with feedback. Completing a demo-version of a GBA without feedback may not elicit the same level of engagement from participants as if they knew their performance in the procedure is being evaluated. Feedback could include offering performance feedback after participants have provided feedback on perceived fairness of the GBA. This is supported by previous research (Buil *et al.*, 2020; Ellison *et al.*, 2020; Gilliland, 1993) stressing the importance of feedback and by Landers and Sanchez (2022), who highlight the value of carefully designed GBAs to ensure optimal user-experience.

Moreover, future research should continue to explore the link between conscientiousness and fairness perceptions, since conscientiousness is a predictor for job performance (Avery, 2003). Not considering this personality trait could lead to the loss of high achieving candidates, which can have a wider impact on organizational outcomes, such as a decline in companies' performance (Fetzer *et al.*, 2017).

## **Conclusion**

We examined the relationship between TSE and procedural justice perceptions of participants in GBAs, and further examined how the relationship between the two variables is moderated by conscientiousness. In the study participants had to complete questions on a questionnaire assessing their levels of TSE and conscientiousness. We hypothesized that higher levels of TSE will lead to a higher fairness perception of the procedure and that conscientiousness moderates the relationship between TSE and procedural justice. In the following step participants had to complete two GBAs and afterwards had to indicate how fair

they perceived the fairness of the selection method. We found no significant effects and therefore no supportive evidence for our hypotheses. Concluding, future research should continue to further examine possible factors which influence applicant reactions towards fairness perceptions of GBAs, as organizations need to implement selection procedures that are generally perceived as fair and do not lead to negative reactions towards the assessment method.

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## Appendix A

### Questionnaire items for measurement scales

#### **Technology self-efficacy** (Adopted from McDonald and Siegall, 1992)

Answer choices (1 = “strongly agree” to 5 = “strongly disagree”)

Question: Please indicate how much you agree with the given statements.

1. When I have to learn a new task that is high in tech, my first reaction is that I’m sure I can do it.
2. In terms of my ability to learn new tasks that are high in tech, I would describe myself as one of the best in my peer group.
3. In the past I have had a great amount of experience (either on or off the job) working on high-tech tasks

#### **Conscientiousness** (Adopted from Goldberg, 1992)

Answer choices (1 = “extremely” (attribute 1) to 7 = “extremely” (attribute 2))

Question: Please indicate the most suitable answer option that describes you the most.

1. organized-disorganized
2. dependable-undependable
3. conscientious-unconscientious
4. practical-impractical
5. thorough-careless
6. thrifty-extravagant
7. cautious-rush
8. serious-frivolous
9. economical-wasteful
10. reliable-unreliable

**Procedural justice** (Goldberg, 1992; Kluger & Rothstein, 1993)

Answer choices (1 = “very fair”, 5 = “not fair at all”)

Question: Please indicate how much you agree with the given statements.

1. I think this test is fair
2. Most people would say this test is fair
3. I believe this test can predict whether I will be a successful employee.



## Appendix B

### Selection procedure scenario

Imagine you have applied for a position for your ideal job. You are now part of the selection process.

Please indicate the name of the organization you have in mind: (answer format: text field)

Please indicate the ideal job you have applied for: (answer format: text field)

In the following step, you will perform 2 game-based assessments provided by your ideal company that offers your ideal job. These games will test your logical reasoning (problem-solving ability) as well as your speed/accuracy, to determine your suitability for the role.

To start the assessment you have to click on the links provided below.

[Game 1: "The Ferry"](#) (3-5 min)

[Game 2: "Bird Spotting"](#) (2-3 min)

Please continue with the questionnaire when you have finished the assessments.