

**A Comparative Study on Applicant Attitudes Towards Game-based vs Traditional  
Assessment: Investigating Age as a Moderator Between Perceived Fairness and  
Organizational Attractiveness**

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### **Abstract**

Game-based assessments are a type of assessment that utilizes a gamification strategy. In the context of personnel selection, this method of assessment is more efficient than traditional methods in terms of cost, effort and time. Research on selection processes show that applicants' attitudes influence intentions to pursue a position and accept a job offer. When a selection process is perceived as fair, one is more attracted to an organization. This is important as a test that is fair will increase the number of quality applicants. This comparative study investigated applicants' attitudes towards traditional versus game-based assessments. We examined the relationship between perceived fairness and organizational attractiveness. In addition, we studied if age weakened this relationship as a moderator. Participants were gathered via social media and Prolific with our sample containing 338 participants. Subjects were randomly assigned to either a gamified or a non-gamified assessment, completing a questionnaire afterwards measuring their perceived fairness and organizational attractiveness. Results were analyzed using multiple linear regression. In line with part of our first hypothesis, perceived fairness positively influenced organizational attractiveness. However, contrary to our expectations, this relationship was stronger for the non-gamified condition. Our second hypothesis suggesting that age would moderate this relationship for the gamified condition was not supported. We discuss our results, including limitations and suggestions for future research.

*Keywords:* game-based assessments, gamification, perceived fairness, organizational attractiveness.

## Introduction

The selection procedure has a significant impact on an organization's image and profitability (Woods et al., 2020). Selection assessments are designed to identify target knowledge, skills, abilities, and other characteristics relevant to a certain job position (Schmitt & Chan, 1998). A costly issue most organizations face is managing employee turnover rates. It is important to mitigate the loss of skilled employees (and hence, loss of productivity) by having a well-designed selection process that effectively measures applicant capabilities (Hossain et al., 2015). In regards to an organization's image, the selection procedure acts as a first impression of the company for many applicants. Aiman-Smith et al. (2001) state that in order for an applicant to further pursue a position, they must feel positively towards the company. Therefore, if the recruitment process is a negative experience for an applicant, they are less likely to accept a potential job offer or recommend it to others. Hence, it is understandable that many organizations pool substantial resources into recruitment.

With the rapid development of technology in recent decades, information and communication technologies (ICTs) are increasingly being incorporated into selection processes (Ramos-Villagrasa et al., 2022). The use of ICTs in recruitment helps organizations in terms of efficiency; saving effort, time and money compared to traditional methods. This comparative study was particularly interested in traditional assessment compared to the application of game-based assessment - a type of assessment that utilizes a gamification strategy for the assessments used in an organization's selection procedures. Gamification refers to the process of applying game elements such as progress bars, badges and avatars to non-game contexts (Deterding et al., 2011)

There are numerous studies proposing benefits of using GBAs during the selection process. For example, it has been found that GBAs possess significant predictive validity (the

ability of a test to predict a criterion) in the context of academic performance (Hommel et al., 2022; Nikolaou et al., 2019). Game-based assessments were also rated as enjoyable and fun by test-takers (Reed et al., 2019) This form of assessment is often reported as being fair, along with applicants having a positive view of the organization that utilizes gamification in assessments (Nikolaou, 2020). Interestingly, findings show that there are at least no additional adverse impacts or instances of faking associated with GBAs compared to traditional assessments - while some studies found less adverse impacts for GBAs (Ramos-Villagrasa et al., 2022).

Although there is much excitement surrounding GBAs in recruitment, it is important to note the gap between its practice and evidence base - which may be attributed to the rate at which digital selection procedures develop compared to their more traditional counterparts (Woods et al., 2020). Pyburn et al. (2008) stress the need for a selection test to be fair, valid and lack bias in order to be psychometrically sound and protect minorities. Some studies point to a potential for certain demographics to perform better in GBAs - namely young men. It is theorized that this may be linked to young men having more gaming experience than women and older people (Melchers & Basch, 2022). It is imperative that more research is done concerning the effects of GBA in recruitment and selection for different races, ethnicities, religions, genders and age groups to account for possible biases.

*Research question:* Does perceived fairness have a positive relationship with organizational attractiveness in a selection procedure that utilizes game-based assessments and does age moderate this relationship?

## **Theoretical Frameworks**

### ***Organizational Justice Framework***

Gilliland's (1993) model, based on organizational justice theories, states that applicants hold certain rules (procedural justice rules and distributive justice rules) in relation

to the personnel selection process. If these rules are met, perceived process fairness, leading to certain positive outcomes for both the applicant and the organization (e.g., increased organizational attractiveness). Procedural justice refers to the perceived fairness of the selection procedure itself. Gilliland divides the outcomes associated with high procedural justice into three categories; reactions during hiring, reactions after hiring, and self-perceptions. Reactions during hiring include factors such as job application, job acceptance and even test motivation - all which is relevant to the selection process. The outcomes associated with reactions after hiring also implies many benefits for organizations as it is suggested that high perceived fairness can lead to better performance in employees as well as increased organizational citizenship behavior and job satisfaction. Moreover, Gilliland's model offers insights into ways organizations can manage turnover rates and hence reduce cost by attracting quality applicants (Hossain et al., 2015). These are all promising reasons for companies to put resources towards creating selection assessments that are likely to be perceived as fair.

For the reasons above, it is important to consider whether game-based selection assessments are perceived as more fair than traditional selection assessments. Georgiou and Nikolaou (2020) investigated this, comparing a traditional assessment to a gamified Situational Judgement Test. They found that both perceived fairness and organizational attractiveness were higher for the gamified version. A review of game-related assessments by Ramos-Villagrasa et al. (2022) also notes consistent results showing positive applicant reactions to game-based assessment compared to traditional assessment (Georgiou, 2021; al-Qallawi & Raghaven, 2022; Georgiou & Lievens, 2022). A study by al-Qallawi and Raghaven (2022) proposed that the majority of negative reactions towards game-based assessments seem to be related to the technology surrounding the assessment.

### ***Signaling Theory***

It is proposed that merely phrasing an assessment as a “game” (game-framing) can lead to applicants making positive attributions towards the test itself and perhaps the company. This is described by signaling theory (Spence, 1973), wherein the applicant has limited knowledge on the assessment or the company, and the word “game” acts as a signal. Stiglitz (2002) calls this “information asymmetry” where each party knows different things (e.g., an organization is already aware of its values but the applicant may be unaware of these values). The organization has information (both positive and negative) and it will choose which information to display to an outsider who does not possess the same information (Connelly et al., 2011). In this context, the applicant will interpret the signal “game-based assessment” and may associate the organization as being fun or innovative, etc. Such attributions can enhance one’s enjoyment of the assessment or engagement with the material, as well as positively influencing how the company is viewed (Georgiou & Nikolaou, 2020), in turn increasing organizational attractiveness (Gkorezis et al., 2020).

Such signals, despite having the intention to be positively framed, can also lead to negative attributions being made about an assessment or organization depending on the individual and their attitudes surrounding the signal. For example, an individual may mistrust game-based assessments as a reliable measure (al-Qallawi & Raghaven, 2022) or perceive this form of assessment to be more difficult (e.g., scoring low on technology self-efficacy or system’s perceived ease of use). Then, game-framing would likely elicit a negative reaction from the applicant.

It is important to consider if certain demographics may have negative attitudes towards this signal. There is not much research on the effects age may have on perceptions of fairness surrounding game-based selection assessments. The studies that have been done on this show conflicting results. Fetzer et al. (2017, p. 298) highlighted concerns that younger males have an unfair advantage compared to older applicants. Hauk et al. (2018) found that

older applicants were less attracted to game-based assessments. Additionally, computer self-efficacy is reported as lower by older individuals, leading to more negative attitudes towards computers (Czaja & Sharit, 1998). In contrast, Ellison et al., (2020) found no significant relationship between perceived fairness and age. However, multiple studies state that older individuals have more negative attitudes towards technology than younger people (Czaja & Sharit, 1998; Hauk et al., 2018; Reed et al., 2005). This would then suggest that the signal “game” may lead to negative attitudes about the assessment and organization from older applicants. This needs to be further investigated before game-based assessments are widely implemented as a selection tool.

### **Perceived Fairness**

In the context of this study, perceived fairness (PF) refers to the applicant’s attitude towards the fairness of the selection process. This definition falls within Gilliland’s (1993) explanation of procedural justice. In line with his model, studies show that perceptions of fairness influences an individual’s view of the organization in question (i.e., organizational attractiveness). In turn, perceived fairness also influences an applicant’s likelihood to further pursue and accept a position (Elkins & Phillips, 2000). As mentioned above, many studies found game-based selection assessments to be more favorable amongst applicants than their traditional counterparts, thus we expect our study to replicate these findings (Georgiou, 2021; al-Qallawi & Raghaven, 2022; Georgiou & Lievens, 2022; Gkorezis et al., 2020). Perceived fairness is a promising area of focus when examining applicant reactions to game-based selection assessments.

### **Organizational Attractiveness**

Organizational attractiveness can be defined as the degree to which an applicant views the prospect of working within an organization appealing (de Waal, 2022; Highhouse et al., 2003). High organizational attractiveness can lead to an increase in intention to pursue and

accept a job position (Chapman et al., 2005). A company may be viewed as attractive through the recruitment process for a number of reasons such as perceived fairness of the assessment and enjoyability of the procedure. Candidates also determine a position's attractiveness based on factors that are important to them as an individual, such as work culture, or whether an organization's values line up with their personal values. Considering this, along with the subjective nature of attitudes, it posits that there are individual differences in what an applicant may deem attractive about an organization (de Waal, 2022). For example, through Spence's (1973) signaling theory we see how applicant attitudes towards a signal such as "game" will lead to them making either positive or negative attributions towards the assessment and the company. Though, attitudes are generally more positive in response to signals surrounding gamification, leading to increased organizational attractiveness (Gkorezis et al., 2020). In line with Gilliland's (1993) organizational justice framework model, multiple studies find perceived fairness to positively influence organizational attractiveness (Georgiou & Nikolaou, 2020; Ramos-Villagrasa et al., 2022). This leads us to our first hypothesis.

*Hypothesis 1: a) There is a significant positive relationship between perceived fairness and organizational attractiveness b) with the effects being stronger for the gamified condition.*

## **Age**

Population aging describes an increase in the percentage of older people along with a decrease in the percentage of younger people in a population (Ismail et al., 2021). The main reasons for this phenomenon are increased life expectancy, higher education levels and improved birth control. In developed countries, 24% of the population comprises older adults with estimates of this increasing to approximately 33% by 2050 (Klimova & Poulouva). This suggests further increase in older workers in the future. The aging population may challenge norms surrounding fairness, career entry and management in organizations - encouraging



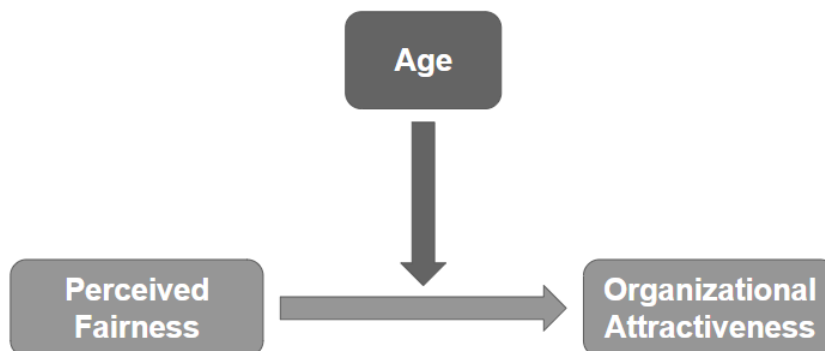
change in approaches towards attracting and maintaining an aging workforce (Kulik et al. 2014). For these reasons, it is important to consider age in regards to the introduction of game-based assessments to the selection procedure.

Fetzer et al. (2017, p. 298) highlighted that in relation to selection methods, older individuals are often associated with encountering potential issues surrounding the use of game-based assessments. In general, technology self-efficacy has been found to decrease with age (Reed et al., 2005), along with perceived ease of use of gamified tools (Koivisto & Hamari, 2014). It is also suggested that individuals have more negative perceptions of technology, scoring lower on technology acceptance (Czaja & Sharit, 1998). In light of these findings, we expect age to negatively influence applicant attitudes towards game-based assessments in line with signaling theory and Gilliland's (1993) model. With the following hypothesis, we hope to contribute towards closing this research gap.

*Hypothesis 2: a)* Under the gamified condition age acts as a moderator, weakening the relationship between perceived fairness and organizational attractiveness as it increases compared to *b)* the non-gamified condition in which age does not affect the relationship between perceived fairness and organizational attractiveness.

### Figure 1

#### *Overview of Research Model*



*Note.* Organizational attractiveness is the dependent variable, with perceived fairness as the independent variable and age as the moderating variable.

## Methods

### Participants

After data cleaning,  $n = 338$  cases remained from both the non-gamified and gamified conditions. The demographics collected for participants were gender, age, country of residence and highest education level. Both the survey and the assessment were conducted in German, so the options for highest education level were in accordance with the German education system.

### *Non-Gamified Condition*

For the non-gamified condition,  $n = 183$  and for the gamified condition,  $n = 155$ . The most commonly chosen education level was “Master’s Degree” with  $n = 63$  (34.4%), closely followed by “Bachelor’s Degree” with  $n = 62$  (33.9%). For gender, 47.5% of participants identified as women, 50.8% as men, and 0.5% as non-binary. The youngest participant was 18 years old, with the eldest being 65 years old (see Appendix B). The average age of participants was 30.91 years ( $SD = 10.40$ ).

### *Gamified Condition*

For the gamified condition,  $n = 155$ . The most commonly selected education level was “Bachelor’s Degree” with  $n = 55$  (35.5%), closely followed by “Master’s Degree” with  $n = 46$  (29.7%). For gender, 54.2% of participants identified as women, 44.5% as men, and 1.3% as non-binary. The youngest participant was 18 years old, with the eldest being 71 years old (see Appendix B). The average age of participants was 32.08 years ( $SD = 11.43$ ).

*A priori* power analysis was conducted using G\*Power to determine the minimum sample size required to test the study hypothesis. Results indicated the required sample size to achieve 95% power for detecting a medium effect ( $f^2 = 0.15$ ), at a significance criterion of  $\alpha = .05$ , was  $N = 107$  for a multiple linear regression. Both conditions exceed this required sample size.

## **Procedure**

This paper is based on a larger study that was approved by the Ethics committee of the Faculty of Social and Behavioral Sciences of the University of Groningen. Participants were approached via social media or gathered through Prolific. They received a link that led them to the study on Qualtrics. First, subjects read an information form detailing the aims of the study, with contact details for the Ethics Committee and the Data Protection Officer of the University of Groningen in case of queries or concerns. After answering some questions concerning demographic information, subjects were asked to imagine a scenario in which they are applying for a Marketing Director position at a company and have been invited to participate in a selection assessment.

Participants were then directed to the main study where they were randomly assigned to one of two conditions. The first condition required subjects to complete a digital version of Grant and Berg's (1993) Wisconsin Card Sorting Test (WCST) - a cognitive flexibility test where participants must sort cards without instructions on how to do so, only receiving feedback on whether they were sorted correctly (Stoet, 2017). The second condition involved an adapted, gamified version of the WCST - Hommel et. al.'s (2022) Gamified Set Shifting Task (GSST). For the GSST, instead of matching cards, participants had to match items to five target groups. After a short introduction to the task by a fictive marketing manager, the five target groups were shown - each group represented by different avatars. The market items were displayed one at a time. Afterwards, participants received a virtual budget of \$10,000 and were told to increase the organization's profit by correctly allocating the items to the five avatars. Correct allocations are awarded with an increase in budget of \$500, while wrong decisions decrease the account balance by -\$500. In the study, game elements such as performance graphs and account balances were shown to indicate candidates' progress.

Subjects took part in the study voluntarily and provided consent beforehand. Participants recruited through Prolific received €7.28 per hour. The remaining participants were not compensated. After the fictive selection assessment, participants completed a questionnaire. Once the questionnaire was completed, the participants were debriefed about the aim (comparing the answers based on the assessment that was taken) and the settings of the two research conditions. Lastly, participants were asked if they still consent to the use of their responses.

### ***Materials and Apparatus***

**Organizational Attractiveness.** Organizational attractiveness was measured on a 5-point Likert scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. The scale had 5 items e.g. *For me, this company is a good place to work* (see Appendix A). The scale we used to measure organizational attractiveness was taken from a previous study's "general attractiveness scale" with internal consistency ( $\alpha = .88$ ) and 5 items (Highhouse et al., 2003). In our study, the internal consistency was higher than in the original study; the non-gamified condition had Cronbach's alpha ( $\alpha = .92$ ), and the non-gamified condition had Cronbach's alpha ( $\alpha = .91$ ). For the internal consistency of each item, see Appendix B.

**Perceived Fairness.** Perceived fairness was measured on a 5-point Likert scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. The scale had 4 items with one example item phrased as *Most people would say that this test is fair* (see Appendix A). Kluger and Rothstein (1993) developed this fairness scale ( $\alpha = .65$ ). Cronbach's alpha was higher for the perceived fairness scale in our study for both the non-gamified ( $\alpha = .71$ ), and the gamified condition ( $\alpha = .74$ ). For the internal consistency of each item, see Appendix B.

## **Results**

### ***Assumptions***

In order to validate the use of linear regression, assumptions were checked regarding normality, linearity, homoscedasticity and multicollinearity. First, the normality of each variable was investigated using a Shapiro Wilk test (Table 1 & 2). The results showed statistical significance for non-normal distributions. Hence, Skewness and Kurtosis was examined to further describe the distribution. The values of Skewness and Kurtosis ranged from -1 to 1, indicating an acceptable amount of deviation from normality for both conditions.

**Table 1**

*Non-Gamified Condition: Shapiro-Wilk Test of Normality*

	Statistic	df	Sig.
Organizational Attractiveness	.956	183	<.001
Perceived Fairness	.983	183	.027
Age	.847	183	<.001

*Note.* With normal distribution of data at significance level  $p \geq 0.05$ .

**Table 2**

*Gamified Condition: Shapiro-Wilk Test of Normality*

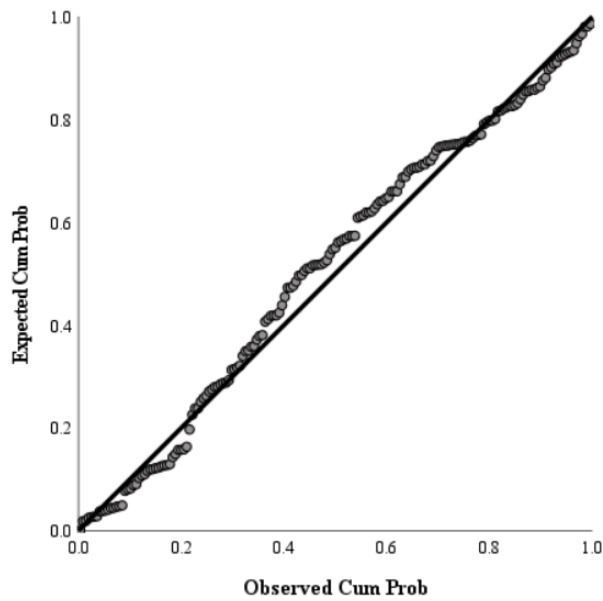
	Statistic	df	Sig.
Organizational Attractiveness	.972	155	.003
Perceived Fairness	.962	155	<.001
Age	.832	155	<.001

*Note.* With normal distribution of data at significance level  $p \geq 0.05$ .

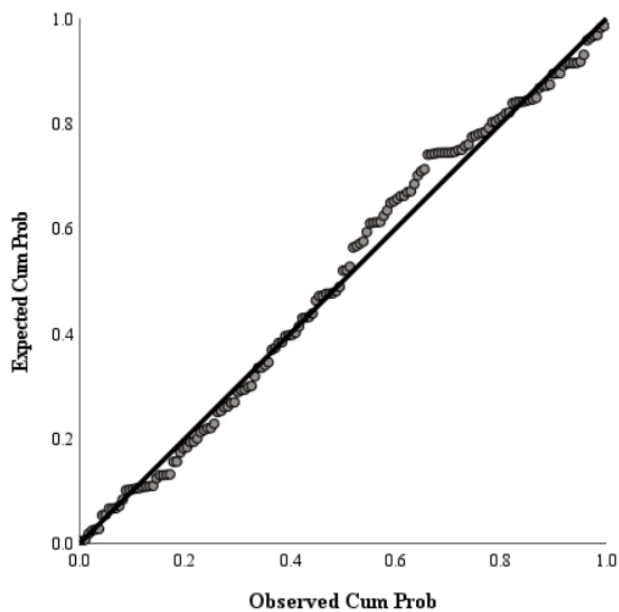
Additionally, normality of residuals was inspected by means of a normal P-P plot (Figure 2 & 3). The plots suggest that the regression residuals are normally distributed under both conditions.

**Figure 2**

*Non-Gamified Condition: Normal P-P Plot of Regression Standardized Residual*

**Figure 3**

*Gamified Condition: Normal P-P Plot of Regression Standardized Residual*



The next assumptions checked were homoscedasticity of residuals, and linearity between the independent variables and the dependent variable. These assumptions were

investigated with a residual plot (Figure 4 & 5). It was found that there was no significant pattern in the plots, indicating that neither assumption was violated. This held true for both the non-gamified and gamified conditions.

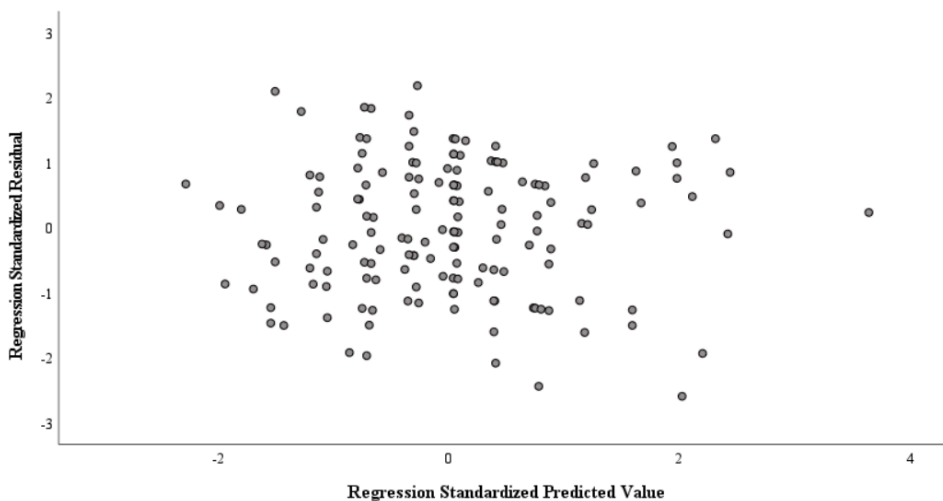
#### Figure 4

*Residual Plot for Non-Gamified Condition*



#### Figure 5

*Residual Plot for Gamified Condition*



Before establishing the presence of multicollinearity, a bivariate Pearson's correlation was calculated for our variables. Under the non-gamified condition, a significant correlation

between Organizational Attractiveness and Perceived Fairness was found ,  $r = .423, p < .001$  (Table 3).

**Table 3**

*Correlations for Non-gamified Condition*

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	1	2	3
1. Organizational attractiveness	183	3.23	.85	—		
2. Perceived fairness	183	3	.75	.423**	—	
3. Age	183	30.9	10.4	-.083	-.021	—

*Note.* \*\*  $p < .01$

The gamified condition also found a significant correlation between Organizational Attractiveness and Perceived Fairness,  $r = .423, p < .001$  (Table 4).

**Table 4**

*Correlations for Gamified Condition*

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	1	2	3
1. Organizational attractiveness	155	2.84	.87	—		
2. Perceived fairness	155	2.44	.72	.291**	—	
3. Age	155	32.08	11.4	-.004	-.083	—

*Note.* \*\*  $p < .01$

In relation to multicollinearity, the Variance Inflation Factor for each predictor in the regression model was examined. A  $VIF > 4$  indicates potential multicollinearity. After



centering the predictors, all VIF values calculated were approximately 1, indicating no significant correlation between predictors (see Table 5 & 6).

**Table 5**

*Non-Gamified Condition: Coefficients Table.*

Model		B	SE	Beta	t	Sig.	VIF
1	(Constant)	3.231	.057		56.525	<.001	
	PF	.477	.076	.422	6.268	<.001	1.00
	Age	-.006	.006	-.074	-1.098	.274	1.00
2	(Constant)	3.232	.057		56.564	<.001	
	PF	.462	.077	.409	5.979	<.001	1.03
	Age	-.006	.006	-.072	-1.075	.284	1.00
	Interaction	.007	.006	.074	1.086	.279	1.03

**Table 6**

*Gamified Condition: Coefficients Table.*

Model		B	SE	Beta	t	Sig.	VIF
1	(Constant)	2.84	.067		42.13	<.001	
	PF	.35	.094	.293	3.76	<.001	1.01
	Age	.002	.006	.021	.266	.791	1.01
2	(Constant)	2.83	.068		41.88	<.001	
	PF	.34	.094	.283	3.62	<.001	1.02
	Age	.001	.006	.012	.149	.882	1.02
	Interaction	-.01	.009	-.084	-1.08	.284	1.02

Lastly, Cook's distance and the range of standardized residuals were investigated to check for outliers or influential observations and none were found.

### Analysis

The design of this study was comparative. Linear regressions were conducted to test each hypothesis and assumptions for this statistical method were not violated.

### ***Perceived Fairness and Organizational Attractiveness***

*Hypothesis 1* stated that *a)* there is a significant positive relationship between perceived fairness and organizational attractiveness *b)* with the effects being stronger for the gamified condition. This hypothesis was tested with a simple linear regression for each condition. Assumptions were met for this method. The dependent variable was organizational attractiveness, with the independent variable being perceived fairness.

**Non-Gamified Condition.** For the non-gamified condition, perceived fairness ( $SD = .75$ ) predicted organizational attractiveness ( $SD = .85$ ),  $R^2 = .179$ ,  $F(1, 181) = 39.554$ ,  $p < .001$ . Perceived fairness explains 17.9% of variance in organizational attractiveness (Table 7). These results are statistically significant.

**Table 7**

*Non-Gamified Condition: Coefficients Table for PF on Organizational Attractiveness*

	B	SE	t	Sig.	95% CI for B	
					LB	UB
(Constant)	3.231	.057	56.494	<.001	3.118	3.343
PF	.479	.076	6.289	<.001	.329	.629

*Note.* Dependent variable: organizational attractiveness; PF = perceived fairness; SE = standard error; CI = confidence interval; LB = lower bound; UB = upper bound.

**Table 8**

*Non-Gamified Condition: Model Summary*

Model	$R^2$	SE of estimate	F	df1	df2	Sig.
1	.179	.774	39.554	1	181	<.001*

**Gamified Condition.** For the gamified condition, Perceived Fairness ( $SD = .72$ ) predicted Organizational Attractiveness ( $SD = .87$ ),  $R^2 = .085$ ,  $F(1, 153) = 14.151$ ,  $p < .001$ . Namely, Perceived Fairness explains 8.5% of variance in Organizational Attractiveness with results being statistically significant.

**Table 9**

*Gamified Condition: Coefficients Table for PF on Organizational Attractiveness*

	B	SE	t	Sig.	95% CI for B	
					LB	UB
(Constant)	2.839	.067	42.262	<.001	2.706	2.971
PF	.351	.093	3.762	<.001	.167	.535

*Note.* Dependent variable: organizational attractiveness; PF = perceived fairness; SE = standard error; CI = confidence interval; LB = lower bound; UB = upper bound.

**Table 10**

*Gamified Condition: Model Summary*

Model	$R^2$	SE of estimate	F	df1	df2	Sig.
1	.085	.836	14.151	1	153	<.001*

Overall, these findings show a significant positive relationship between perceived fairness and organizational attractiveness for both conditions. Thus *Hypothesis 1 a)* is supported. Meaning that when perceived fairness increases so does organizational attractiveness. This holds true for both conditions.

We expected that the relationship between perceived fairness and organizational attractiveness would be stronger for the gamified condition - as highlighted in *Hypothesis 1 b)*. Contrary to our beliefs, the effect was stronger for the non-gamified condition. This is evident by comparing the slopes of each condition: The non-gamified condition,  $B = .479$ ,  $p$

= <.001, 95% CI = [.329, .629] and the gamified condition,  $B = .351$ ,  $p = <.001$ , 95% CI = [.167, .535]. Additionally, the percentage of variance in organizational attractiveness explained by perceived fairness was 17.9% for the non-gamified condition compared to 8.5% for the gamified condition. This does not support *Hypothesis 1 b*).

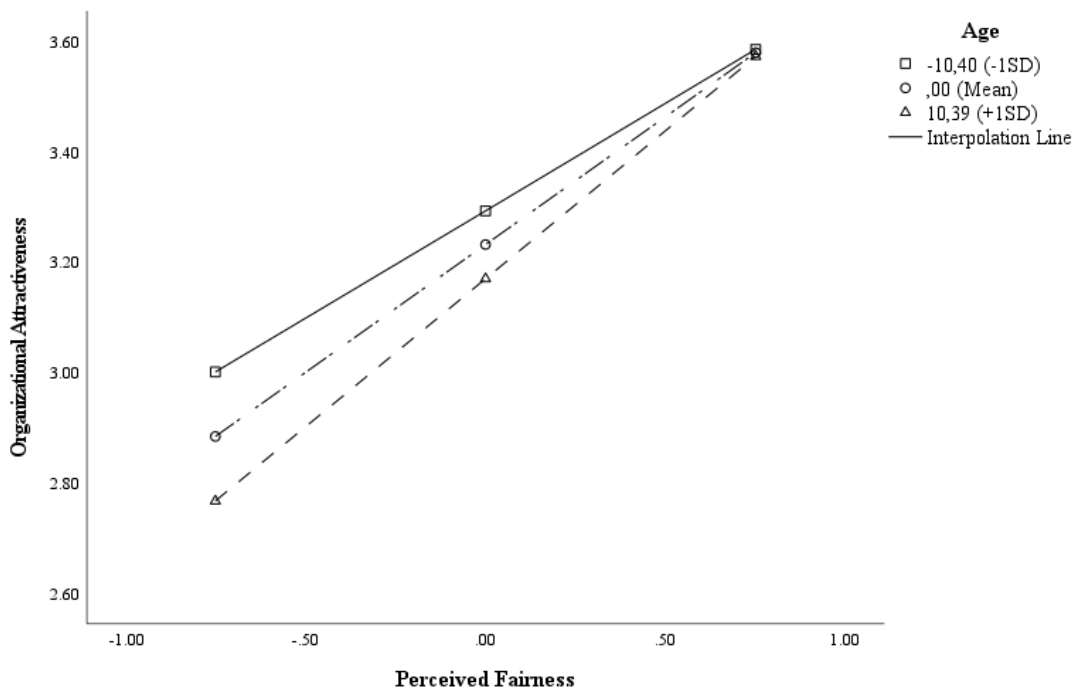
### *Age as a Moderator*

A simple moderator analysis was performed using PROCESS to test *Hypothesis 2: a*) Under the gamified condition age acts as a moderator, weakening the relationship between perceived fairness and organizational attractiveness as it increases. compared to *b*) the non-gamified condition in which age does not affect the relationship between perceived fairness and organizational attractiveness. The outcome variable for analysis was organizational attractiveness. The predictor variable for the analysis was perceived fairness. The moderator variable evaluated for the analysis was age.

**Non-Gamified Condition.** Under this condition we tested *Hypothesis 2 b*), expecting age to have a non-significant effect on the relationship between perceived fairness and organizational attractiveness for the non-gamified assessment. The interaction between perceived fairness and age was found to be non-significant [ $B = .007$ , 95% CI (-.006, .020),  $p = .279$ ]. The conditional effect of perceived fairness on organizational attractiveness showed the following: At low moderation perceived fairness = -.753, the conditional effect = .389, 95% CI (.169, .609),  $p < .05$ . At middle moderation perceived fairness = 0, the conditional effect = .462, 95% CI (.31, .615),  $p < .05$ . At high moderation perceived fairness = .753, the conditional effect = .536, 95% CI (.352, .72),  $p < .05$ ). Interestingly, Figure 6 shows a steeper slope for perceived fairness on organizational Attractiveness for higher age scores. Overall, our results showed that age was not a moderator on the relationship between perceived fairness and organizational attractiveness under the non-gamified condition. This supports *Hypothesis 2 b*).

**Figure 6**

*Non-Gamified Condition: Simple Slopes Analysis for Moderation Regression*



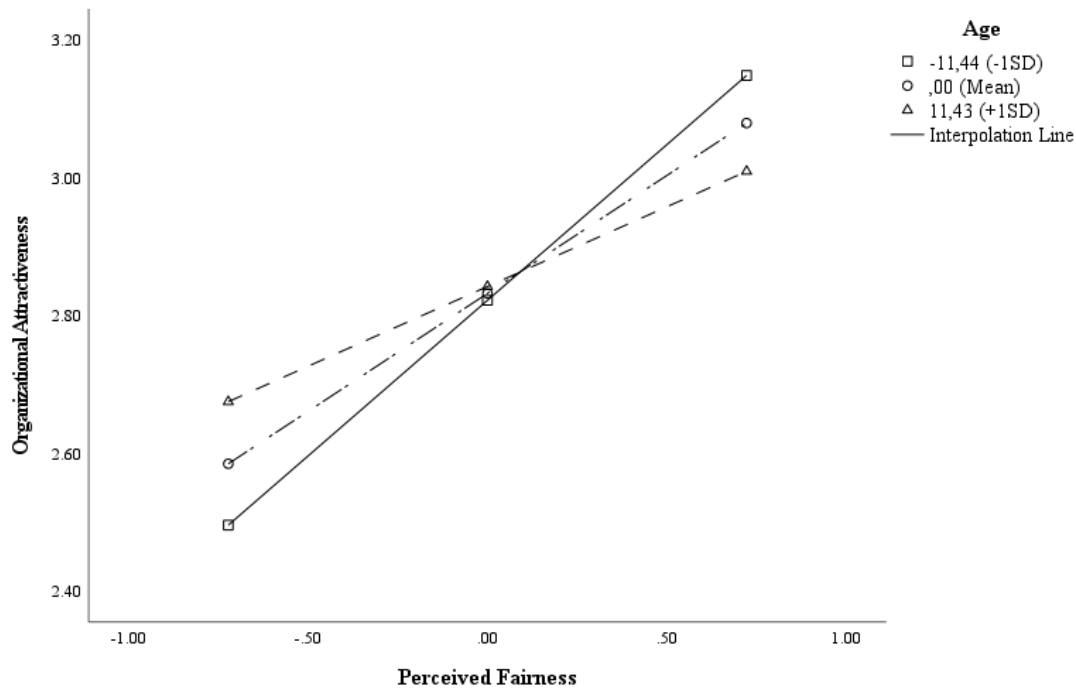
*Note.* Each slope indicates either a high (+1SD), medium (Mean) or low (-1SD) level of Age (This graph was created using the PROCESS macro for SPSS).

**Gamified Condition.** Under this condition we tested *Hypothesis 2 a)*, stating that age would act as a moderator, buffering the positive relationship between perceived fairness and organizational attractiveness for the gamified assessment. The interaction between perceived fairness and age was found to be non-significant [ $B = -.010$ , 95% CI (-.027, .008),  $p = .284$ ]. The conditional effect of perceived fairness on organizational attractiveness showed the following: At low moderation perceived fairness = -.722, the conditional effect = .452, 95% CI (.192, .712),  $p < .05$ . At middle moderation perceived fairness = 0, the conditional effect = .341, 95% CI (.155, .528),  $p < .05$ . At high moderation perceived fairness = .722, the conditional effect = .231, 95% CI (-.06, .522),  $p = .119$ . Figure 7 shows a steeper slope for perceived fairness on organizational attractiveness for lower age scores. Here we see that the positive relationship between perceived fairness and organizational attractiveness is

dampened by higher levels of age. Overall these results were non-significant, age was therefore not a moderator of the relationship between perceived fairness and organizational attractiveness under the gamified condition. This does not support *Hypothesis 2 a*).

### Figure 7

*Gamified Condition: Simple Slopes Analysis for Moderation Regression*



*Note.* Each slope indicates either a high (+1SD), medium (Mean) or low (-1SD) level of Age (This graph was created using the PROCESS macro for SPSS).

In summation, we found that under both conditions there is a significant positive relationship between perceived fairness and organizational attractiveness (supporting *Hypothesis 1 a*). However, this relationship is stronger for the non-gamified assessment (this does not support *Hypothesis 1 b*). Finally, age was found to not moderate the relationship between perceived fairness and organizational attractiveness - which we expected for the non-gamified assessment (supporting *Hypothesis 2 b*) but we did not expect for the gamified assessment (not supporting *Hypothesis 2 a*).

## Discussion

The aim of this study was to investigate applicant attitudes towards game-based assessment compared to traditional assessment methods. Our research question was: Does perceived fairness have a positive relationship with organizational attractiveness in a selection procedure that utilizes game-based assessments and does age moderate this relationship? We drew upon Gilliland's (1993) model stemming from organizational justice theories. In relation to this model, we focused on procedural justice - namely perceived fairness. We first hypothesized that higher perceived fairness would lead to higher organizational attractiveness. Meaning that applicants who found the assessment to be fair, were more inclined to positive perceptions of the corresponding organization. We found a significant moderate positive relationship for the hypothesized relationships under both the gamified and non-gamified conditions, supporting *Hypothesis 1 a*). This is not surprising as many studies on the utilization of gamification in recruitment processes find perceived fairness of selection assessments to positively influence organizational attractiveness (Georgiou & Nikolaou, 2020; Gkorezis et al., 2020; Ramos-Villagrasa, 2022).

Extending on this, we investigated under which condition this relationship was stronger. In line with previous studies, we expected to see a stronger relationship for the gamified assessment (Georgiou, 2021; al-Qallawi & Raghaven, 2022; Georgiou & Lievens, 2022). However, our results found the opposite, meaning that *Hypothesis 1 b*) was not supported. In our study, applicants seemed more in favor of the traditional assessment method. This may be due to a number of factors such as the explanation of the assessment not being clear enough to applicants (Georgiou, 2021) perhaps due to phrasing or because German may not have been their first language. Another possible factor could be that a cognitive ability test was not seen as being related to the proposed job position. Further research must be done to explain such differences in results.

Additionally, age was examined as a potential moderator on the relationship between perceived fairness and organizational attractiveness. Our second hypothesis proposed that *a)* Under the gamified condition age acts as a moderator, weakening the relationship between perceived fairness and organizational attractiveness as it increases compared to *b)* the non-gamified condition in which age does not affect the relationship between perceived fairness and organizational attractiveness. There was no moderating effect of age on the relationship between PF and OA for the non-gamified condition. The slope of the interaction effect was negative, however the value was negligible and also non-significant. This supports *Hypothesis 2 b)*. However, *Hypothesis 2 a)* was not supported, as age did not act as a moderator between perceived fairness and organizational attractiveness under the gamified condition either. These findings suggest that age does not affect applicants' perceived fairness of game-based assessment in the context of personnel selection. There is conflicting research on the effects age has on perceived fairness in regards to game-based assessment. A study by Ellison et al. (2020) was in line with these results, that found no significant relationships between age and perceived procedural justice. These results were, however, unexpected as many studies highlight that older individuals have more negative attitudes towards gamification. Hauk et al. (2018) found a significant negative association between age and technology acceptance, and that older applicants found game-based assessments less attractive. Age is also often found to be negatively associated with technology self-efficacy (Chung et al., 2010; Reed et al., 2005). Signaling theory (Spence, 1973) would then point towards negative attitudes amongst older applicants when receiving a signal about game-based assessments.

Our *Hypothesis 2 a)* may not be supported for a number of reasons. Firstly, there may have been a shift in attitudes towards game-based assessments amongst older individuals in recent years as the number of adults aged 65 and above that use the internet and social media



is increasing (Leist, 2013). In addition, participants were volunteers who may have decided to take part in the study out of interest in the topic itself, such as game-based assessment. This would indeed influence perceptions surrounding this form of selection. Lastly, the gamified condition introduced a made up scenario with a fictitious company meaning the assessment had low stakes. Perceptions of perceived process fairness would likely differ in a real-life selection assessment.

### **Practical Implications**

This study highlights the importance of considering applicants' perceived fairness during the design of game-based assessments. This is suggested through the effects that perceived fairness has on an organization's image (Elkins & Phillips, 2000; Georgiou, & Nikolaou, 2020; Gilliland, 1993). A company's image has important implications for their quality of applicants, offering a valuable path to manage turnover costs and the loss of experienced employees (Hossain et al., 2015).

Age was examined as a potential moderator between perceived fairness and organizational attractiveness for GBAs. Although there were no significant results, the relationship between age and procedural justice should be further investigated in future studies. This is important as in order for an assessment to be ethical in application, it must be psychometrically sound and not bias the test takers from particular groups (Bina et al., 2021; Pyburn et al., 2008). There is a notable research gap in relation to this. The fact that age and technology self-efficacy are negatively associated should be enough to prompt further research into the implications that game-based assessments have on older people as a protected group (Chung et al., 2010; Reed et al., 2005).

### **Limitations**

As previously mentioned, the way in which most participants could access this study is one limitation. This is mainly due to the study being online and voluntary - meaning that

participants were likely drawn to the study out of personal interest in the topic and were at least familiar with internet use, and possibly technology in general. Moreover, Prolific participants were paid for participating which may have been an influencing factor in their decision to partake in the study. This could have a negative impact as perhaps this was the main reason they participated and then may not have answered questions properly. This also could have a positive impact as it likely encouraged a more diverse sample to participate rather than only people who are inherently interested in the topic.

Secondly, the study required participants to imagine a fictitious hiring process wherein the job and the organization were not real, meaning that the assessment had low stakes. If subjects were applying for a real job that they wanted, their opinions surrounding process fairness would likely be stronger as fairness would matter more in this scenario. If this is the case, organizational attractiveness would also be affected by such perceptions.

Third, the study was conducted in German with most participants being German-speaking. In cases where participants did not know German, they may have been subjected to unreliable translations via the internet which may lead to misinterpretation of questions. Perhaps the study conducted in English could have included a more diverse sample as it is a widely spoken language.

Lastly, there was no opportunity for a direct comparison of results in our study as each participant was only assigned to one condition - either completing the gamified or the non-gamified assessment. Making this a direct comparison would likely offer new insights into the study.

### **Future Research**

Suggestions for future research include conducting a study in-person so that the traditional assessment is completed as a pencil-and-paper assessment compared to the game-based assessment which would be completed on a computer or mobile device. This

may differentiate both assessments more, especially if the study was conducted so that each participant would complete both assessments for a direct comparison.

Secondly, creating a study in multiple languages will help to diversify participants. Beginning with replicating the study in English would be an effective way to reach a wider audience. It would be interesting to replicate the study across cultures that are different in terms of technological advancement and work culture, to investigate how this may influence applicant perceptions.

Lastly, manipulating factors such as study design, variables and measures will help identify additional potential factors and relationships that may not have come to light in this area of research. Game-based assessment is still developing and gamification is extremely broad. There are many ways in which different game elements can be combined that may contribute significantly towards good versus bad test design.

## **Conclusion**

Our findings on the relationship between perceived fairness and organizational attractiveness are supported by most literature on game-based assessments in personnel selection. However, there are many conflicting findings in relation to procedural justice and age, with our findings showing no significant relationship. There is much more research to be done on game-based assessments before it is advised to be implemented in real-life recruitment processes. Moreover, if the benefits of game-based assessments do not outweigh those of traditional assessments, there is not much justification to replace the traditional format. Nonetheless, there is a lot of excitement surrounding gamification in the context of recruitment with many interesting findings and opportunities to further develop and test this novel approach to assessment. As technology improves and applicant reactions and attitudes towards organizations change so too will the selection assessments that are used to select

them. We therefore need to continue to replicate past studies in this area as well as explore new research questions and grow alongside the ever-changing field of technology.

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## Appendix A

### Questionnaire Items for Each Scale

**Organizational Attractiveness** (Highhouse et al., 2003).

Answer options were on a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*).

#### *Questions*

1. For me, this company would be a good place to work.
2. I would not be interested in this company except as a last resort.
3. This company is attractive to me as a place for employment.
4. I am interested in learning more about this company.
5. A job at this company is very appealing to me.

**Perceived Fairness** (Kluger & Rothstein, 1993).

Answer options were on a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*).

#### *Questions*

1. I think this test is fair.
2. Most people would say that this test is fair.
3. I believe that this test can predict whether I will be a successful employee.
4. I can see the connection between this test and performance on the job.

**Appendix B****Tables****Table 1B***Frequencies for Age*

Non-Gamified Condition			Gamified Condition		
Age	N	%	Age	N	%
18	2	1.1	18	1	0.6
19	5	2.7	19	2	1.3
20	3	1.6	20	3	1.9
21	6	3.3	21	5	3.2
22	11	6.0	22	7	4.5
23	13	7.1	23	7	4.5
24	14	7.7	24	15	9.7
25	22	12.0	25	18	11.6
26	14	7.7	26	10	6.5
27	7	3.8	27	7	4.5
28	11	6.0	28	10	6.5
29	4	2.2	29	8	5.2
30	8	4.4	30	4	2.6
31	3	1.6	31	4	2.6
32	4	2.2	32	4	2.6
33	4	2.2	33	6	3.9
34	4	2.2	34	1	0.6
35	3	1.6	35	3	1.9
36	4	2.2	36	1	0.6
37	3	1.6	37	4	2.6
38	2	1.1	39	2	1.3
39	1	0.5	40	1	0.6
40	1	0.5	41	1	0.6
41	2	1.1	42	2	1.3
42	1	0.5	43	3	1.9
43	4	2.2	44	3	1.9

44	3	1.6	47	2	1.3
45	2	1.1	48	2	1.3
46	2	1.1	49	1	0.6
47	2	1.1	50	3	1.9
49	2	1.1	52	2	1.3
50	1	0.5	53	1	0.6
51	2	1.1	54	2	1.3
52	1	0.5	55	1	0.6
53	2	1.1	58	2	1.3
54	2	1.1	59	1	0.6
56	1	0.5	60	1	0.6
57	3	1.6	61	1	0.6
59	1	0.5	62	1	0.6
60	2	1.1	63	1	0.6
65	1	0.5	67	1	0.6
			71	1	0.6

**Table 2B***Non-Gamified Condition: Cronbach's Alpha for Perceived Fairness Scale*

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 1	8.32	5.514	.540	.626
Item 2	8.43	6.005	.444	.682
Item 3	9.84	5.292	.595	.592
Item 4	9.51	5.537	.433	.696

**Table 3B***Gamified Condition Cronbach's Alpha for Perceived Fairness Scale*

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
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Item 1	7.02	5.175	.560	.658
Item 2	7.07	5.430	.503	.689
Item 3	7.81	4.945	.578	.645
Item 4	7.40	4.891	.478	.710

**Table 4B**

*Non-Gamified Condition: Cronbach's Alpha for Organizational Attractiveness Scale*

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 1	13.08	11.823	.842	.891
Item 2	12.83	11.559	.779	.904
Item 3	13.01	11.879	.837	.892
Item 4	12.63	12.235	.665	.927
Item 5	13.06	11.694	.855	.889

**Table 5B**

*Gamified Condition: Cronbach's Alpha for Organizational Attractiveness Scale*

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 1	11.49	12.641	.791	.884
Item 2	11.27	13.069	.675	.907
Item 3	11.41	11.931	.846	.872
Item 4	11.08	12.150	.712	.903
Item 5	11.53	12.316	.841	.874