Evaluating Applicant Reactions to a Gamified Assessment of Personal Values: Developing and Testing a Theoretical Model

By

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Declaration

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Abstract

To address the limitations of traditional rating-scale assessment methods of psychological constructs in human resource management, game-based assessments and the gamification of existing pre-employment assessments have recently emerged as promising directions for applied measurement. Gamification, the process of applying gaming principles to non-game contexts, is being used increasingly in personnel selection and pre-employment assessments. However, scientific research is limited on the important questions of how job applicants react to these assessments and how these reactions develop. The present study developed and tested a theory of applicant reactions to a gamified pre-employment assessment of personal values. Given the novelty of gamified assessments, the elements of gamified assessments were first deconstructed using a modular framework of assessment types—a process that explained how these assessments differ from traditional inventory-based assessments. Next, drawing on theories of work gamification and applicant perceptions, a theoretical model of applicant reactions (composite of the subscales anxiety and perceived fairness) in the gamification context incorporating applicants' enjoyment, cognitive processing and perceived organisational attractiveness was developed. To test the model, an experimental design was used. Subjects (N = 159) were asked to complete either a gamified values assessment (n = 78) or a traditional values assessment (n = 81) followed by a measure of applicant reactions. Results of the data analysis showed that the use of a gamified assessment led to more favourable perceptions of the organisation than the traditional assessment. Moreover, levels of engagement and enjoyment were significantly more favourable when using a gamified assessment than a traditional assessment. Enhanced applicant reactions were found to elicit more favourable perceptions of the organisation, higher enjoyment and higher engagement. However, overall applicant reactions

(low anxiety and favourable perceived fairness combined) across different test types (gamified versus traditional) elicited a non-significant relationship. Results suggested that gamified assessments are likely to heighten perceived organisational attractiveness through being a more enjoyable and engaging experience, but further research is needed to support the present study outcomes. The present study results can aid organisations in making more informed decisions about the use of gamified pre-employment assessments and provide empirical evidence regarding the applicant reactions and subsequent behavioural outcomes for both a traditional and a gamified values assessment. Furthermore, results contribute to gamification theory by developing a model from identified differences between modern tests and traditional tests that can be used to investigate applicant reactions and subsequent behavioural outcomes.

Keywords: Applicant reactions, gamification, personnel selection, traditional assessments, values

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Finally, to my daughter, Madison, and my sons, Jake and Martin: Your educational journey has still to begin. I hope that you will find passion in learning and fall in love with the opportunities that it brings. I have no doubt that one day you will find success in whatever field you follow.

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Chapter 1: Introduction

Background and Context of the Research

Global business practices are continuously being adapted, modified, and improved to ensure company survival in an ever-increasing competitive market (Cuthbertson et al., 2015). Advancements in technology, generational changes and characteristics, demand for efficiency, globalisation, and scarce skills are examples of aspects that are shaping how and why businesses are evolving and revolutionising (Shute, 2011). Within the field of Industrial/Organisational (I/O) psychology, there is almost no area untouched by technological change (Morelli et al., 2017). More specifically, rapid, and continuous technology-based innovations have massively influenced how businesses source, motivate, and retain human capital, leading to personnel selection processes being at the forefront of this evolution (Georgiou et al., 2019). This is manifested in the fact that within the United States, it is estimated that since 2006, there has been a 50% to 80% growth in the selection of applicants from technology-based and computer-focused platforms (Nikolaou et al., 2019).

One of the most significant technological advances infiltrating personnel selection processes is the increased use of computers and the internet (Ellison et al., 2020; Ployhart et al., 2017). Computerised shifts have made processes faster and better suited to the current generations (Holm, 2012; Singh & Finn, 2003). Furthermore, more prominent human-computer use has replaced paper-and-pencil formats that require manual scoring thus reducing administration demands (Bruk-Lee et al., 2013).

Historically, when selecting relevant personnel selection tools, *face validity* (the degree of effectiveness that the tool appears to have) of personnel selection practices and tools was

deemed sufficiently appropriate; the applicant viewpoint was rarely considered (Truxillo et al., 2018). The large-scale technology-inspired changes to personnel selection processes are now driving significant behavioural outcomes for job applicants (Armstrong, Landers et al., 2016). As a result, greater attention has been paid to applicant reactions within selection processes. In the personnel selection space, applicant reactions are now considered standard criteria for ensuring the use of a good test (Farr & Tippins, 2017); focus is no longer on efficiency and accuracy alone. Applicant reactions are defined as attitudes, emotions, or cognitions that individuals may have regarding a personnel selection process (McCarthy, Bauer, Truxillo, Anderson et al., 2017). Research into applicant reactions is considered highly productive, with applicant reactions being a mainstream research topic since the 1980s (Nikolaou et al., 2019).

Research Problem

Based on the context provided, the research problem is presented below. The remainder or this chapter will focus on introducing key concepts and providing theoretical context relating to the research problem, which is presented below:

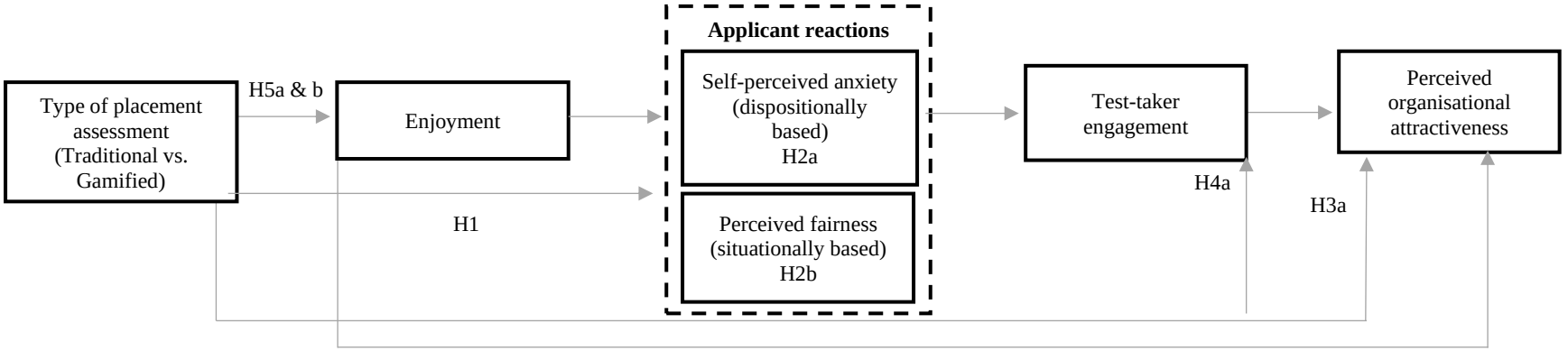
1. *What are the differences in levels of applicant reactions between a gamified and a traditional assessment of personal values? Relatedly, do applicant reactions potentially explain the relationship between assessment type and perceived organisational attractiveness?*

The Introduction Chapter will also expand on this research problem by exploring why applicant reactions are being considered and the relevance for considering applicant reactions towards a new technological advancement in the personnel selection space known as gamified assessments.

The present study's conceptual framework can be found in Figure 1 below. This model will be explained in more detail in Chapter 3 but is presented here for ease of reference. A summary of all hypotheses can be found in Appendix G.

Figure 1

Assessment Framework for Measuring Applicant Reactions across Different Personnel Selection-Related Assessments



Why Applicant Reactions are Important

In the past, organisations held power and candidates competed for positions, however, in recent times this power has shifted with organisations now competing for the best talent in a scarce market. As such, how organisations and human resource (HR) practitioners manage personnel selection processes has become more user focused (Bruk-Lee et al., 2013), thus fuelling the significance of applicant reaction research (Chamorro-Premuzic et al., 2016).

Consideration of the user is done to enhance applicant reactions to the personnel selection process, which in turn, enhances perceptions of the organisation (McCarthy, Bauer, Truxillo, Anderson et al., 2017). According to Chamorro-Premuzic et al. (2016), a war for talent exists which has initiated a considerable amount of interest in the development, validation, and use of technology-inspired measures of human constructs. Drawing on technology, such as the inclusive of videos and animation (Bruk-Lee et al., 2013) allows organisations to create more user-centric approaches (Nikolaou et al., 2019),

How applicants react to selection processes and internalise the activities undertaken cumulates into positive or negative emotions towards the organisation (Chamorro-Premuzic et al., 2016; Georgiou et al., 2019; McCarthy, Bauer, Truxillo, Anderson et al., 2017). More favourable organisation perception are outcomes from positive applicant reactions and thus organisations are increasingly more aware of the behavioural outcomes associated with their activities (McCarthy, Bauer, Truxillo, Anderson et al., 2017). Being positively perceived by applicants increases applicant’s willingness to work at the organisation or recommending employment in the same organisation to others (Chamorro-Premuzic et al., 2016; McCarthy, Bauer, Truxillo, Anderson et al., 2017).

The increasing divergence from traditional personnel selection methods to more technologically inspired tools has, however, created a significant gap between practice and research (Landers, 2019b; Woods et al., 2020). The rapid rate of technology within the I/O Psychology field has led to researchers calling for an increase in theory development, hypotheses testing, and publication of empirical research to understand the implications of these developments (Morelli et al., 2017). Applicant reaction research remains popular (McCarthy, Bauer, Truxillo, Anderson et al., 2017), however, there is a significant lack of research that considers applicant reactions towards technologically altered I/O Psychology practices (Gkorezis et al., 2020; Woods et al., 2020). Thus, an abundance of research opportunities are available to close the growing gap that has been created by fast-paced technological development and applicant reactions.

Defining Applicant Reactions

Applicant reactions are a broad construct, inclusive of many measurement aspects and are defined as attitudes, emotions, or cognitions that individuals may have regarding a personnel selection process (McCarthy, Bauer, Truxillo, Anderson et al., 2017). For the purpose of the present study, applicant reactions are specified as situationally based and dispositionally based (McCarthy, Bauer, Truxillo, Anderson et al., 2017).

Situationally based applicant reactions refer to the external circumstances in which the activity is being used (McCarthy, Bauer, Truxillo, Anderson et al., 2017). Perceived fairness is a situationally based applicant reaction and research into perceived fairness is broad and extensive. Perceived fairness is often considered procedural or distributive in nature (Ellison et al., 2020). Thus, perceived fairness refers to either the procedure followed, or the validity of the decision made. Perceived fairness is a broad construct with a particularly important area of focus relating

to the perceptions of an activity's relevance to the context in which it is used or the face validity of an activity (Smither et al., 1993). Should applicants perceive a selection process as unfair, they would be less likely to accept a position with the company or recommend it to others (Konradt et al., 2017). Applicants are also less likely to have positive perceptions of the company if they feel that the assessment is not relevant to the position for which they are applying. Technology is revolutionising how assessments are developed and administered (Nikolaou et al., 2019), which is likely to affect aspects of perceived fairness significantly. Thus, giving importance to the consideration of perceived fairness research where technology has affected change to assessments.

Dispositionally based applicant reactions refer to characteristics related to the individual who is completing the activity (McCarthy et al., 2013). Anxiety is a dispositionally based applicant reaction. Anxiety is defined as the emotional state of an individual when completing an assessment for which there may be a negative consequence of failure such as not being offered a job (Bonaccio & Reeve, 2010). Standard international testing guidelines regulate that assessments should aim to reduce anxiety (International Test Commission, 2001). With technology-based changes to personnel selection tools, the impact on applicant characteristics such as anxiety is theorised to be beneficial; however, there is a call for scientific research in this area (McCarthy et al., 2013).

Understanding applicant reactions towards new technology would help in bridging the gap between novel trends and research. For the purpose of the present research, applicant reactions have been defined as the combination of user anxiety and perceptions of fairness. The following section outlines applicant reactions towards technology-based changes to

assessments—specifically, what is already known and the gap that the present research addresses. In addition, gamification is introduced and discussed in further detail.

Applicant Reactions and Behavioural Outcomes from User-Focused Technology-Based Advancements in Personnel Selection

Capitalising on *media types*, such as animation, to enhance behavioural outcomes has spurred the growth of new market trends within the personnel selection domain (Chamorro-Premuzic & Steinmetz, 2013). These trends include innovations such as digital interviews and serious games (Nikolaou et al., 2019). All these trends have become viable methods for achieving business objectives (Fetzer et al., 2017).

Technological advancements like digital interviews draw on video-based media types to allow candidates to remotely record their interviews (Nikolaou et al., 2019). Digital interviews are being used by organisations more frequently to screen applicants since they are more cost-effective and are perceived as less disruptive by candidates, reducing in-person interview mechanics (Morelli & Illingworth, 2019). Furthermore, the creation of more favourable reactions by creating a process that is more applicant focused is likely to create better perceptions of the organisation (McCarthy, Bauer, Truxillo, Anderson et al., 2017). However, studies are finding that the digital interview process is disorientating for applicants and that applicant reactions towards such interviews are negative (Morelli & Illingworth, 2019) due to the less personal nature of the process and elicited privacy concerns (Langer et al., 2017). Digital interviews are, therefore, an example of where technology offers a more convenient screening process but the reactions towards the process require further investigation.

Personnel selection assessments comprise another area that has experienced significant technology-based change in recent times, with minimal research showcasing the significance of

the changes (Tippins, 2015). With technology, assessments have changed in simple ways such as paper-and-pencil versions to online versions and in more dynamic ways such as the incorporation of game elements into assessments (Wood et al., 2020). An example of a more dynamic change is *serious games*.

A serious game has been defined as a type of game used for purposes other than entertainment (Petridis et al., 2014; Susi et al., 2007). Serious games are built from the game components and are designed for a particular or 'real' purpose (Kasurinen & Knutas, 2018) such as teaching a skill or understanding the process to assemble a vehicle or even learning how to fly an aircraft through simulation (Farr & Tippins, 2017). These games allow organisations to gauge the skill levels or competence of individuals. Serious games often capitalise on animation or videos and attempt to immerse candidates in the experience with this design feature (Fetzer et al., 2017). Serious games are often discussed alongside the concept of *gamification*. Gamified assessments within personnel selection and the applicant reactions elicited from the use of gamified assessments are a focus of the present study. The following section will discuss the concept gamification, provide examples of gamification and outline some of what is known about gamification. Differing user characteristics associated with gamification and context for using gamification will also be provided in Chapter 2.

Gamification

Gamification refers to the inclusion of game design elements (varying from a single gaming element such as animation to multiple gaming elements such as animation and a leaderboard) into nongaming contexts (Akoodie, 2020; Deterding et al., 2011). For example, gamification at work can take the form of a gamified situational judgement test (SJT) used for screening applicants. A SJT refers to an assessment of decision-making whereby candidates are

presented with options and need to make the more preferred decision based on a situation provided (Ployhart et al., 2017). Traditional SJTs are commonly text-based but are now being converted to multimedia assessments, using game features, like avatars, to assess an applicant's judgement to a work situation. Gamification can comprise of applicants assuming avatars and moving through a game platform which could mean facing challenges to advance to the next level or stage of the selection process (Akoodie, 2020).

Modern business demand for efficiency and technological advances has cultivated the market for gamification (Armstrong, Ferrell, & Collmus, 2016; Landers, 2019b). Gamification is a process which gathers attention for enhancing candidate experience, creating a more enjoyable process that can in turn, increase job applicants and thus act as a marketing benefit (Bersin & Chamorro-Premuzic, 2019). There are estimates that the market for gamification will grow from $6.33 billion in 2019 to over $10 billion by 2022 (Stratistics MRC, 2015). The market size in 2019 and predictions associated with gamification indicate that it is not a passing fad as are many trends (Dale, 2014). The main driver of gamification market growth seems to be that rather than stimulating action through rewards, gamification is generating action through enjoyment (Angelovska, 2019).

Gamification uses human-centric design to shift processes from a mechanical approach towards being more engaging and enjoyable (Dale, 2014; Ellison et al., 2020). Common features of gamification include points and levels. For example, users needing to accumulate points by exhibiting certain behaviours or needing to advance to new levels by answering question correctly. These game-based features are being incorporated into previously non-gaming activities across various business areas, including learning and development, marketing, and HR functions such as personnel selection assessments, performance management, and employee

referral schemes (Armstrong, Ferrell, & Collmus, 2016; Huotari & Hamari, 2012). The application of game design is often undertaken to elicit more positive user behaviours such as increased participation, performance, engagement and loyalty. For example, gamification of a performance systems offers employees points and places on a leaderboard if they display a desired behaviour (Cardadoret al., 2017; Huotari & Hamari, 2012). Position on the leaderboard could then guide which employees are ready for a promotion or other forms of recognition such as a monetary bonus. Within personnel selection, gamification has been used to make application processes more appealing to applicants.

Defining Gamification

Gamification, an increasingly recognisable business term, involves the use of gaming principles such as interactive problem solving, sensory stimuli, and adaptive gameplay in a non-game context (Akoodie, 2020; Fetzer et al., 2017; Landers, 2019a; Tippins & Adler, 2011). Gamification, more simply, can be the replacement of text-based scenarios with fantasy inspired images and storylines to assessment candidate suitability in the workplace (Akoodie, 2020). While gamification has been used interchangeably with the concept of serious games (Fetzer et al., 2017) and game-based assessments (Landers & Sanchez, 2020), there are key differentials between the terms.

Unlike gamification, serious games are developed for a specific or ‘real’ purpose (Kasurinen & Knutas, 2018). For example, serious games have been developed to teach users the process for assembling a vehicle and for users to learn how to fly an aircraft through simulation (Farr & Tippins, 2017). Gamification is fundamentally a technique or a collection of techniques that is applied to activities that were not originally associated with games (Farr & Tippins, 2017). For example, in a personnel selection context, a pre-existing selection tool is modified through

colourful graphics and avatars that guide you through a virtual office to immerse applicants in the organisation's culture (Landers, 2019b). Modification of business practices through mechanics such as gamification has been increasing steadily since the inception of this concept in 2008 (Deterding et al., 2011).

Conversely, a game-based solution is defined as a completely formed tool, thus a complex development process, whereby a game is played (Landers & Sanchez, 2020). On the contrary, a gamified solution is primarily the modification of an existing non-game assessment (Landers & Sanchez, 2020). For the purpose of the present study, the focus is on gamified assessments in the personnel selection context.

Examples of Gamified Personnel Selection Assessments. Gamification involves infusing digital game mechanics into traditional talent assessments by adapting their design and use (Armstrong, Landers et al., 2016; Tippins & Adler, 2011). One example of a gamified assessment uses an elevator-themed design. Users' complete tasks that move them up levels in the elevator. Each level reached by the user measures a different psychological construct (Weidner & Short, 2019). One of the levels, for example, measures emotional intelligence by asking users to teach a computer to recognise emotions in tower guests. While this is one example of a construct measure, the application of gamification is versatile and has been used to measure a range of constructs including cognitive ability, personality, risk aversion, and emotional intelligence (Weidner & Short, 2019).

A further example of gamification is the gamification of SJTs. For example, to assess constructs such as resilience and adaptability Georgiou and Nikolaou (2019) describe a gamified SJT: applicants begin by selecting an avatar and then face choices and challenges across four

islands. The SJT draws on character backstories, narratives, and fantasy to elicit emotional advantages such as engagement.

Another example of gamification being used to measure a construct involves applicants being presented with a grid containing a ball and several objects (Ellison et al., 2020). Applicants are then challenged to move the objects to have the ball freed from the grid in as few moves as possible. This assessment uses gaming elements to measure complex planning capability.

Current Research Trends in Gamification

On the 2020 trends list of the American Society of Industrial and Organizational Psychology (SIOP), gamification is placed seventh (Society for Industrial and Organizational Psychology [SIOP], 2020). Gamification was mentioned as a consideration on the SIOP trends list under the review on applicant reactions. Furthermore, gamification being novel and popular in the market there is currently a call for research into the field of gamified assessments. This call is requesting further research on gamified assessments and the outputs from the use of these assessments since gamification is at the frontier of psychometric advances (Landers & Sanchez, 2020). Gamification is considered an innovative initiative with the potential to revolutionise business practices because of its human-centric design (Fetzer et al., 2017).

Research into gamification has been steadily increasing since 2011 (see Figure 2). Figure 2 indicates the increase in gamification research across three databases, EBSCOhost, Google Scholar and Web of Science, whereby the search term ‘gamification’ was used and only included scientific writings; magazines, citations, articles, and trade publications were excluded from these numbers. The growing research into gamification indicated a predominant focus on *does gamification work?* (Hamari et al., 2014).

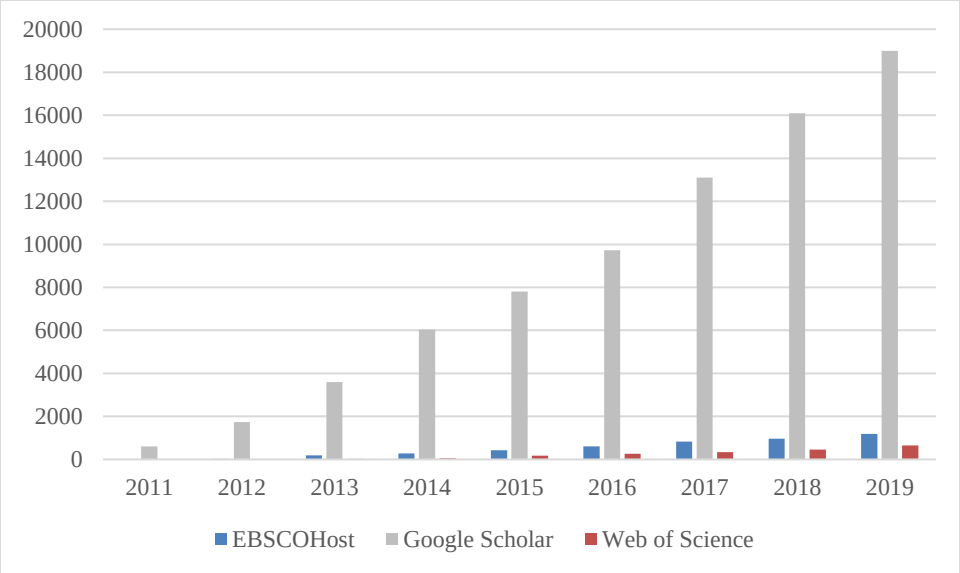
There is currently minimal research focusing on applicant reactions towards gamification in the personnel selection space. The lack of research regarding the psychometric principles of gamified assessments has been recognised, and the limited published research on the construct validity of these assessments has been acknowledged (Georgiou et al., 2019; Wood et al., 2020). Some examples of gamification in personnel selection have been reported to enhance user experiences (Montefiori, 2016) but other examples have elicited negative applicant reactions within personnel selection processes (Armstrong, Landers et al., 2016; Ellison et al., 2020).

One study considered a gamified Human Intelligence Task (HIT) assessment (Eickhoff et al., 2012). This study showed that the use of a gamified HIT has positive effects for attracting and retaining higher levels of personnel through the motivational affordance of levels. Players are awarded points (the gamification element for this assessment) for making decisions which align to a norm group. 80% of users completed the gamified HIT more than once compared to 25% of users who completed the assessment more than once when it was non gamified. Repetition of the gamified HIT was done to better their scores and subsequently improved their judgement. Gamifying the HIT, therefore, added more incentive for users to reconsider their decisions and this study highlighted the benefits of using gamified assessments. Similarly, a study for an incentive scheme also showed the benefits of gamification (Thom et al., 2012). This study removed the gamification elements from an incentive process to understand its impact. By removing the point system (the gamification element) from the incentive scheme the study found that overall staff participation rates reduced by almost 50% (Thom et al., 2012). These two studies (Eickhoff et al., 2012; Thom et al., 2012) are examples of existing research which highlights how gaming elements such as points and leaderboards are positively related to motivational affordance (Hamari et al., 2014).

Research considering engagement and enjoyment of gamified measures has been conducted (Cardador et al., 2017; Dong et al., 2012; Hamari et al., 2014; Koivisto & Hamari, 2014). While gamification is designed with the intention of increasing user engagement and enjoyment (Fetzer et al., 2017), there is currently no published research comparing user engagement or enjoyment levels across traditional versus gamified assessments. In general, it has been stated that there is a gap in research regarding the relationships between *cognitive processes* such as engagement and behavioural outcomes directed at an organisation, for example, intention to accept a job (McCarthy et al., 2013). The present study aims to clarify the relationship between applicant reactions, engagement, and perceived organisational attractiveness based on variations in assessment type (i.e., gamified and traditional). Overall, it is concluded that gamification does work given certain parameters such as context of its use and the personal qualities of users (Hamari et al., 2014). Gamification is discussed in more detail in Chapter 2 of the present study.

Figure 2

Gamification Research Results from Searched Databases



A recent study compared a traditional situational judgement test (SJT) with a gamified SJT to understand the applicant perception differences, if the candidates would recommend the organisation to others and the perceived organisational attractiveness, would the candidate view the organisation favourably (Gkorezis et al., 2020). Both the gamified and traditional SJT measured resilience, adaptability, decision-making and flexibility. An experimental approach was undertaken, whereby the treatment group was given a gamified SJT to complete and the control group completed a traditional SJT. Upon completion of the SJT, both groups then completed the same questionnaire which measured their reactions to the assessment method. It was found that applicant experience with gamification and, therefore, elements such as avatars, narratives and fantasy elicited more positive outcomes than a traditional SJT that did not include gaming elements. Exposure to the gaming elements of a gamified SJT created a more favourable perception of organisational attractiveness and increased the likelihood of the user recommending the company to others (Gkorezis et al., 2020). The comparison between test types (gamified SJT and traditional SJT) in the study of Gkorezis et al. (2020) considered an important behavioural outcome from applicant reactions—perceived organisational attractiveness. The study suggested that organisations could increase their attractiveness by replacing traditional SJTs with gamified SJTs. Further investigation of gamification, in a different industry and with a different assessment, not the same SJT used by Gkorezis et al. (2020), was suggested.

In a similar study using the same SJTs, applicant reactions were considered in the gamified SJT and the traditional SJT by measuring perceived fairness, process satisfaction, and predictive validity (Georgiou & Nikolaou, 2020). Using an experimental design, a control group was given a traditional SJT and a treatment group a gamified SJT to complete before also completing an applicant reaction questionnaire. The study found that the gamified SJT created

more favourable perceptions of the organisation. Furthermore, perceived fairness was found to be higher with the gamified SJT than the traditional SJT. This study presented novel insights into aspects of applicant reactions but did not consider the level of face validity as a construct of perceived fairness or anxiety as a construct of applicant reactions, both of which will be considered in the present study.

The recent inception of gamified assessments in personnel selection processes is an example of technology being used to create more user-centric activities. While the theory underlying gamification is that its use will improve user experiences, there is no published research to support gamification theory. Furthermore, gamification research has been limited because previous studies have not included important elements such as engagement and enjoyment (Cardador et al., 2017; Dong et al., 2012; Hamari et al., 2014; Koivisto & Hamari, 2014) as influencing factors in the personnel selection context on applicant reactions. The applicant reactions are unknown when comparing traditional assessments with gamified assessments and, therefore, the behavioural outcomes are also unknown. As such, the present study reviewed the applicant reactions comprising perceived fairness and anxiety and the outcome of perceived organisational attractiveness elicited from either a positive or a negative reaction to the personnel selection assessment that was undertaken (gamified or traditional).

Gamification Reviews: Criticism and Praise

Gamification has continued to draw the attention of academics, business professionals, and practitioners (Seaborn & Fels, 2015). As with many new solutions, gamification has also been subject to criticism. There is scepticism regarding the balance that exists between fun and accuracy in gamified solutions (Bersin & Chamorro-Premuzic, 2019). As enjoyment increases, the level of measurement accuracy may decrease. To obtain a more accurate understanding of a

candidate, a longer testing time is required, which might reduce the fun. Furthermore, the novelty of gamification is likely to be enjoyed in the short-term, with the level of interest possibly dwindling over time (Koivisto & Hamari, 2014). Gamified assessments, therefore, need to be designed to be robust enough to quantify their intended measurement constructs accurately but not to the extent that the assessment creates boredom among users.

The creation of gamified tools for businesses is criticised for being expensive (Bersin & Chamorro-Premuzic, 2019). Budgets associated with talent management processes are not generally considered high and, therefore, creating gamified solutions to appear like popular entertainment games is likely to be costly.

Furthermore, research has questioned whether applying games to a work context reduces the ‘fun’ element since completion of the game is not by choice (Dale, 2014). Traditional entertainment-based games are completed by players of their own free will and are considered leisure activities (Seaborn & Fels, 2015). Gamification is created with a purpose beyond entertainment, and users may not feel they have a choice in completing work-based gamified tasks. For example, in a personnel selection process, candidates may feel that not completing a gamified assessment will reduce their chances of being offered a vacant position. The reactions towards gamified assessments are likely to vary depending on its purpose (Fetzer et al., 2017). Thus, the methods, namely gamification of reward programmes versus personnel selection tools are all likely to be perceived differently. The notion of what is used to enhance enjoyment and engagement with gamified tools is the consideration of the internal mechanics and how gamification works.

Gamification: Construct or Method?

A construct driven approach typically involves a tool focused on measuring a single element such as a cognitive assessment measuring facets of cognition (Erker, et al., 2010). A method driven approach can measure multiple facets using a consistent style such as an SJT where the approach can be applied to multiple measurement constructs. Gamification is versatile across measurement constructs (for example different soft skills such as values and critical thinking) as well as across platforms (for example personnel selection tools, incentive schemes or performance management platforms). This suggests that gamification is a method driven approach in that the use of gamification is not limited to a specific construct (for example workplace values) or platform (for example performance management only) but can rather be applied across multiple areas (Arthur & Villado, 2008). In this sense, gamification can be compared with SJTs, which are designed to assess judgement across different workplace scenarios (Gkorezis et al., 2020), or assessment centres which are a series of different evaluations for determining if the candidate is fit for a role (Arthur & Villado, 2008). For example, a gamified SJT that uses a fantasy theme and has candidates complete a series of challenges has been designed to measure soft skills such as resilience, integrity, and flexibility (Gkorezis et al., 2020). The SJT method is used to measure more than one construct.

In a personnel selection process emphasis should remain on the construct rather than the method used to predict job success (Arthur & Villado, 2008). Focusing on which construct is being measured more than which method is being used will predict job success. Therefore, considering the present study's focus on gamification as a method approach a values-based and gamified psychometric assessment was used to gather data.

A Values-Based Gamified Psychometric Assessment

The assessment used in the present study measures the psychometric construct of personal values. Personal values refer to a complex set of beliefs regarding what is considered important and what is considered not important to an individual (Beck & Cowan, 2014). The use of a values-based psychometric assessment was considered appropriate for the present study because it is a construct that has not been researched yet in the gamification context. While there may be many constructs commonly associated with gamified assessments such as personality and cognitive ability, gaining insight into the gamification of a personal values measure is a novel research venture. Furthermore, personal values in the workplace are being increasingly recognised as a significant predictor of job satisfaction (Becker et al., 2017). Personal values are, therefore, a relevant construct in modern research.

Proposed Model

The present study developed a model to test the differences between a gamified assessment and a traditional assessment (see Table 1). This was undertaken to address limitations in gamification research, namely the lack of published empirical research on applicant reactions towards gamified assessments in the personnel selection space and the variations in applicant reactions and behavioural outcomes between assessment types (gamified and traditional).

While research focusing on gamification is increasing, there is currently no published literature with empirical findings of applicant reactions (consisting of perceived fairness and anxiety) towards gamified assessments in the personnel selection context. Applicant reactions are consequential to personnel selection (Truxillo & Bauer, 2011), specifically perceived fairness, anxiety, and the outcomes of these reactions (McCarthy, Bauer, Truxillo, Anderson et al., 2017). Research into the behavioural outcomes of applicants remains relevant to the field of I/O

Psychology because the consequences of negative reactions can be harmful to organisations. Recognition of behavioural outcomes is particularly important given the war for scarce talent currently confronting the market (McCarthy, Bauer, Truxillo, Anderson et al., 2017; Georgiou et al., 2019). In a study that compared a gamified STJ to a traditional SJT, applicant reactions were considered but not as a combination of perceived fairness and anxiety (Georgiou & Nikolaou, 2020). Additionally, while game features such as fantasy were considered to enhance enjoyment and engagement, neither enjoyment nor engagement was a variable in this study. Theory has suggested that the greater the number of game elements such as avatars, rewards and narratives present in a process, the more enjoyable and engaging the process will be rated by users (Downes-le Guin et al., 2012). To ensure novel contributions to gamification literature, the present study defines applicant reactions as perceived fairness, specifically as face validity, and anxiety, which has not been considered in previous research. The behavioural outcomes from the applicant reactions are defined as perceived organisational attractiveness (McCarthy, Bauer, Truxillo, Anderson et al., 2017). Finally, enjoyment and cognitive processes defined as engagement were also considered relevant as a central argument for the use of gamification in improving user experiences (Cardador et al., 2017; McCarthy, Bauer, Truxillo, Anderson et al., 2017).

The research objective of the present study was to examine the effects of applicant reactions across a gamified and a traditional values assessment and the subsequent behavioural outcomes in the form of perceived organisational attractiveness. The present study aimed to contribute to literature by examining a specific use of gamification in personnel selection assessments versus traditional assessments and the effect on applicant reactions regarding perceived fairness and anxiety.

Steps Taken to Develop a Research Framework

To meet the objectives of the present study, a distinction was made between a gamified assessment and a traditional assessment using a modular framework (Lievens & Sackett, 2017, see Table 1), thus making an additional contribution to literature. Using a modular framework is useful because it compartmentalises the underlying core components of different personnel selection processes, which in turn, allows for enhanced accuracy in understanding differences across test types (Lievens & Sackett, 2017). The modular framework used in the present study is outlined in more detail below. The present study provided novel insights by developing a model to understand the differences in personnel selection assessment types (gamified and traditional), applicant reactions, behavioural outcomes, enjoyment, and engagement.

Research Framework for the Present Research

The research framework (refer to Figure 1 for the research framework or conceptual model) created in the present study has two main components: the assessments used and the user outcomes. The first step in the model involves differentiating assessment types. A modular framework (Lievens & Sackett, 2017) was used to compartmentalise gamified assessments from traditional assessments appropriately. Compartmentalising assessment characteristics was a key aspect in being able to explain the potential effects of different assessment methods better and helped with addressing the shortfall in research that exists between assessment type and the user outcomes of applicant reactions and perceived organisational attractiveness. While a modular framework has been used to differentiate cognitive ability tests, personality tests, assessment centres, interviews and SJTs, no existing research has used this framework on a gamified assessment. The present study, therefore, provides novel insight into differentiating traditional values assessments from gamified values assessments.

Following the use of the modular framework, the present study draws on two relevant theoretical frameworks: *applicant perspective theory* and *theory of work gamification*. These theories will be explained broadly below and in more detail in Chapter 3.

Applicant Perspective Theory

Applicant perspective theory, (McCarthy, Bauer, Truxillo, Anderson et al., 2017) broadly is a framework whereby personnel selection tools, through their relationship with applicant perceptions, affect perceived organisational attractiveness (attitudes, intentions and behaviours). This framework was developed for the personnel selection space and was based on a comprehensive review of 145 published papers. In addition, the McCarthy et al (2017) research calls for further exploration and testing of the model due to technological advancements, which is a main contribution of the present study. Therefore, the theoretical applicant perception model was deemed appropriate to use. According to applicant perspective theory, applicant reactions refer to the naturally developed perceptions towards a tool or activity. This theory outlines that these perceptions commonly focus on areas such as perceived fairness and anxiety (McCarthy, Bauer, Truxillo, Anderson et al., 2017), which is a focus of the present study. The applicant perspective model also outlines the mediating relationship between applicant reactions and perceived organisational attractiveness in cognitive processes such as engagement. Given the significance of engagement as a variable in gamification research, the present study deemed this aspect of applicant perspective theory worthy of further consideration. Applicant reactions research remains relevant due to the consequences of negative reactions and has continued to provide substantial and meaningful contributions to the placement process over the last 15 years (McCarthy, Bauer, Truxillo, Anderson et al., 2017).

An applicant's experience can have significant influence on their attitudes, intentions, and behaviours and thus the *perceived attractiveness* of the organisation. Applicants who have experienced a negative selection process may have a negative view of the company, could dissuade others from applying at the company or may be less likely to accept a job offer (Hausknecht et al., 2004). Using the theoretical principles outlined by the applicant perspective theory, the model of the present study demonstrates applicant reactions (perceived fairness and anxiety) as mediators between assessment type and perceived organisational attractiveness. Formation of a model to test the impact of either a traditional or a gamified assessment on applicant reactions addresses the lack of empirical evidence comparing applicant reactions across different assessment tools (traditional and gamified) in the personnel selection context. To summarise and as previously mentioned, investigation of the variables in the present study aimed to answer the following expanded research question. The below research question, 1.1, is an extended variation of the main research question 1 and is presented based on the additional variables discussed above:

> *1.1 What are the differences in levels of applicant reactions between a gamified and a traditional assessment of personal values? Relatedly, do applicant reactions potentially explain the relationship between assessment type and perceived organisational attractiveness?*

Theory of Work Gamification: Understanding the Level of Enjoyment Elicited from the Use of Gamification

The framework in the present study also drew on the theory of work gamification (Cardador et al., 2017) to consider user outcomes. Broadly, this theory outlines a framework for

the relationships between work gamification, increased access to performance information and task enjoyment. This theory places work gamification (thus the application of digital principles to work contexts) as an enhancement to traditional performance management platforms. The inclusion of work gamification in the performance management context is to create higher access to information and improve enjoyment of the task (Cardador et al., 2017). The theoretical model of work gamification outlines an approach to performance management using *affective pathways.* The sense of play that increases enjoyment of the task in a performance management system is theorised. The theory of work gamification, therefore, shows how task enjoyment mediates the relationship between gamification and user outcomes. The present study's model considers the same mediating relationship and is novel in its use in the personnel selection context. The theoretical work gamification model is one of a few published models that focus on workplace gamification, and it offers an overview of the key relationships associated with gamification mechanisms. As a result, the theoretical model of work gamification was deemed appropriate to use in the present study.

The inclusion of game design elements is a significant differentiator between gamified and traditional assessments (Landers, 2020; Nikolaou et al., 2019). Traditional assessment research has mainly focused on perceptions of fairness in the form of face validity rather than on user enjoyment (Anderson et al., 2010). Good gamification design should not be mechanism-centric but rather user-centric (Dale, 2014). As such, game elements are often used to improve aspects of user enjoyment or engagement (Fetzer et al., 2017). Gamification research, for example, suggests that there is enjoyment when users can exercise creativity to create or to take initiative (Wrzesniewski & Dutton, 2001).

Gamification often assumes that it can improve a traditional process by making it appear less tedious and boring (Shi et al., 2012). The elements introduced to change traditional assessments into gamified assessments such as stories, badges and leaderboards are, therefore, often designed to influence an applicant's level of *perceived enjoyment* (Cardador et al., 2017). For example, badges refer to the collection of an item which indicates the achievement of a skill, or task. In the context of gamification, a user could collect badges for different skills such as critical thinking, resilience or assertiveness based on tasks completed. Stories in gamification would refer to a narrative that users follow which could be fantasy in nature that may prompt questions that need to be answered. Leaderboards in gamification refer to a ranking of candidates based on performance in the game, this would be viable to other users to create an atmosphere of competition (Landers, 2014). Enjoyment, in turn, alleviates boredom with the activity. While design elements such as leaderboards can be implemented to enhance the level of perceived enjoyment among candidates, continued use of the game could diminish enjoyment over time. Research has found that continued exposure to gamification can diminish enjoyment levels over time (b = .167) (Farzan et al., 2008; Koivisto & Hamari, 2014).

The addition of game design elements to enhance enjoyment is a common premise within gamification research (Dale, 2014; Cardador et al., 2017; Fetzer et al., 2017). The impact on applicant reactions from the additional elements to create enjoyment from gamification is, however, a premise that has not been published to date. To date, research has not yet considered the mediating relationship with enjoyment when comparing different test types (gamified versus traditional) and applicant reactions. Hence, to expand on the previously mentioned research problem 1 in more detail, the present study aims to investigate applicant reactions and enjoyment levels by considering:

1.2 Are applicant reactions higher for a gamified values assessment than for a traditional values assessment because of higher enjoyment levels?

1.3 How is the relationship between type of assessment (gamified versus traditional) and applicant reactions mediated by enjoyment of the assessment type?

Understanding the Level of Engagement Elicited from Using Gamification

Finally, game-based features are incorporated into non-gaming activities to enhance enjoyment and the engagement levels of users (Fetzer et al., 2017). Previous gamification research has considered how activities that elicit experiences of user enjoyment from a gamified assessment can elicit more favourable engagement levels from being considered more fun (Dindar, Ren & Järvenoja, 2021). Therefore, users who are enjoying the activity are less likely to lose focus and become bored with the task. Additionally, research has shown how gaming elements such as leaderboards stimulate extrinsic motivation and, therefore, enhance user engagement.

A gap in research exists in that much of the existing research focusing on gamification and user engagement is in the learning or marketing context only (Hamari et al., 2014; Looyestyn et al., 2017) with no current investigation of the relationship between applicant reactions towards gamified personnel selection measures and engagement levels. The applicant perspective theory shows that applicant reactions and the behavioural outcomes and perceived organisational attractiveness are mediated by cognitive processes such as engagement (McCarthy, Bauer, Truxillo, Anderson et al., 2017). The applicant perspective theory, therefore, highlights the impacts that favourable applicant reactions can have on user engagement levels. To expand on the research problem 1 given the additional variable, engagement, and to address

the gap in current research regarding applicant reactions and engagement levels when using gamified personnel selection tools, the present study considers, more specifically:

1.4 Are applicant reactions higher for a gamified values assessment than for a traditional values assessment because of higher engagement levels?

1.5 How is the relationship between the applicant reactions from different assessment types (gamified versus traditional) and perceived organisational attractiveness mediated by engagement?

The Present Study

To address the research question, a sample of university students was randomly divided into two condition groups: a control group and an experimental group. The respondents completed either a gamified (experimental group) or a traditional (control group) assessment measuring personal values. Post completion of the values assessment, all respondents completed the same test-taker perceptions questionnaire. Statistical comparisons between the condition groups were done in accordance with the model developed in the present study. Testing of the developed model was conducted to understand the theoretical and practical insights gathered across differing assessment types (gamified versus traditional).

Summary

Study Objectives

In summary, the present study created a model to consider the relationships that exist between different assessment types (gamified versus traditional) and the behavioural outcomes of applicants (applicant reactions and perceived organisational attractiveness) within the personnel selection context. The relevance of the present study to personnel selection practice was to highlight a new personnel selection trend, the use of gamified assessments. The present

study used a modular framework to differentiate traditional assessments from gamified assessments, thus contributing a novel method for compartmentalising the design aspects of these assessments.

Furthermore, research into the behavioural outcomes of applicants remains relevant to the field of I/O Psychology. The consequences of negative reactions can be harmful to organisations in terms of applicants rejecting job offers in a scarce talent market (Chamorro-Premuzic et al., 2016; Georgiou et al., 2019; McCarthy, Bauer, Truxillo, Anderson et al., 2017). While research focusing on gamification is increasing, there is currently no published literature with empirical findings of applicant reactions towards gamified assessments in the personnel selection context. The lack of published research and the growing popularity of the use of gamification within personnel selection (Nikolaou et al., 2019) is addressed by the present study. The present study developed a model by drawing on earlier frameworks that focus on work gamification (Cardador et al., 2017) and applicant reactions (McCarthy, Bauer, Truxillo, Anderson et al., 2017). The resulting model has several benefits.

Firstly, there is a call for models investigating technology-based change in the I/O Psychology field (Morelli et al., 2017), which the model addresses. As Morelli et al. (2017) said "theory development is needed to guide research hypotheses, manage expectations, and address these issues at this intersection of technology and I-O psychology" (p. 634). Technology continues to make rapid changes to traditional business activities, and this model addresses one of these areas—the adaptation of traditional assessments to gamified assessments. The model in the present study is the first model relating to applicant reactions for gamified assessments, and it provides a theoretical and scientific contribution to gamified assessment literature. Applicant reactions in assessment-related research is now considered an important and standard criterion

for a good test, placing the relevance of applicant reactions alongside criteria like reliability and validity (Farr & Tippins, 2017). Therefore, there is a significant need for continued research in this area (McCarthy, Bauer, Truxillo, Anderson et al., 2017).

Secondly, the present study's model provides insight into the significance of introducing a concept such as enjoyment into the workplace. Gamification is the transformation of traditionally non-gaming activities (Cardador et al., 2017). Therefore, the model investigated user perceptions of business-related tasks as being enjoyable and the resultant effect on applicant reactions. Enjoyment is not traditionally associated with workplace activities and, therefore, determining if it is beneficial in modern businesses is a key area that can be addressed through gamification.

Finally, as outlined by the applicant perspective theory, favourable applicant reactions can affect engagement levels (McCarthy, Bauer, Truxillo, Anderson et al., 2017). While existing research highlights that gamification can increase engagement levels (Looyestyn et al., 2017), how applicant reactions can mediate the relationship between gamification and engagement has not been considered. Thus, the present study's model was developed to investigate the gap in research regarding applicant reactions, gamification and engagement.

The present study's model aimed to demonstrate how a gamified assessment may differ from a traditional assessment on enjoyment level and applicant reactions and in turn, affect engagement and perceived organisational attractiveness. Testing the present study's model aimed to provide businesses and HR practitioners practical insights into the outcomes that can occur when replacing a traditional assessment with a gamified assessment.

The research objectives for the present study are summarised as follows:

- Review of current literature

- Development of a model based on current literature and identification of gaps within current literature
- Testing of applicant reactions across a traditional and a gamified values assessment
- Testing of the developed model
- Proposal of an agenda for future research

Overview of the Thesis

The present study focuses on applicant reactions towards a gamified assessment when compared to a traditional assessment. The present study begins with distinguishing gamified from traditional assessments using a modular approach and then moves on to the development of a theoretical model to test the theory. To accomplish the present study objectives this thesis contains six chapters: an Introduction Chapter, two Literature Review Chapters, a Method Chapter, a Results Chapter, and a Discussion Chapter.

The Introduction Chapter provided the background to the study and the research question. This chapter additionally provided an overview of key variables (applicant reactions and gamification) that will be researched in detail in the present study. The Introduction Chapter includes an introduction into the conceptual model (Figure 1) which will be explained in more detail in Chapter 3. Finally, this chapter concludes with a summary outlining what the study did not consider, the study objectives and the practical contributions.

Chapter 2 is the first literature review which covers the theory and key concepts in detail. Chapter 2 expands on the Introduction Chapter by dissecting the existing theory related to the key variables. Chapter 2 highlights what is already known in research and the relevant gaps.

Additionally, this chapter helps with a deeper understanding of the variables within the present study. It covers the detail of the modular framework and how this framework was utilised to distinguish different assessment types. The modular framework provides a clear and novel distinguish between gamified and traditional assessments. This compartmentalisation of assessment types in this was created greater clarity for the remainder of the study.

The second literature review, Chapter 3, outlines the formation of a model that is used to measure the key variables in the present study and to answer the research problem. This chapter was deemed necessary as it allowed for a clear distinction between existing theory and a conceptual model that can be used for empirical testing. Chapter 3 outlines how the model was constructed and provides direction for the empirical testing that follows in subsequent chapters in the present study. The hypotheses for the present study are presented in Chapter 3.

Chapter 4 outlines the methods used by the researcher to conduct this study. This chapter provides detail on the experimental nature of the study and the processes adhered to that ensure authenticity of the study design. Chapter 4 provides a review of the data collection process, scales used and demographic characteristics.

Chapter 5 contains the results of the study. This chapter highlights how data were cleaned and tested. The statistical procedures used and the outcomes from the analysis of each hypothesis tested are also contained in the Results Chapter. A summary of all statistical results per hypothesis concludes this chapter.

Chapter 6 concludes the present study with an overview of the results and explanation for these results in relation to each hypothesis. Key findings and the contributions of the study are explained in this chapter. Possible limitations of the study and direction for future research is covered in this chapter. Chapter 6 also contains the overall conclusion to the present study.

Delineating the Present Study

The present study focused on applicant reactions towards a gamified versus a traditional values assessment in a global context. Although the research was conducted in South Africa, there is no compelling research evidence yet to suggest that applicant reactions to gamification are not universally applicable. Furthermore, there is no evidence to suggest that applicant reactions to gamified assessments are shaped in a different way depending on national or cultural context. However, given that national or cultural context may potentially act as confounds within an experimental context, it was decided to limit the research to the South African context. South Africa is a country with a rich history which has influenced stringent legislation, particularly the labour laws governing workplaces (Becker et al., 2017). Despite its unique socio-political history, the decision of the researcher to focus the study within a South African sample was not intended to suggest that findings should not be generalised to other cultures and/or countries. To address this issue, more cross-cultural research is needed (as suggested in the Discussion Chapter of the present study). Ideally, studies of this nature would incorporate national and/or culture relevant variables as explicit study factors, ensure the sampling strategy provides necessary data for cross-national or cross-cultural comparisons, and finally, statistically evaluate the extent to which these factors may act as covariates.

The present study considered the concepts of perceived fairness, anxiety, perceived organisational attractiveness, enjoyment, and engagement. In terms of applicant reactions, the present study did not focus on the situationally based terms of discrimination and usefulness mentioned in the model of McCarthy et al. (2017). A narrower view was taken due to the experimental nature of the present study. The present study aimed to isolate the outcomes

generated from single explanations, which meant focusing on one aspect. Perceived fairness as a concept is one of the most pronounced outcomes within applicant reaction research (Chapman et al., 2005; Hausknecht et al., 2004).

Similarly, the present study did not focus on the dispositionally based factors of motivation and efficacy. Given the nature of the assessments used, measuring behaviourally based personal values (i.e., the motivation to achieve or to outperform others) was not considered appropriate. As with personality measures, a personal values measure has no right or wrong answers (Heneman & Judge, 2009). While different characteristics may suit some roles better than others (Heneman & Judge, 2009), the values assessments used in the present study gave no indication of what 'good' looks like. Furthermore, the values assessments used in the present study did not involve a leaderboard to stimulate motivation and self-efficacy to achieve the standard specified to differentiate candidates. As such, these dispositional aspects were not a focus point of the present study.

Finally, the present study did not test the measurement properties (reliability and measurement validity) of the gamified assessment used within the present study, as it is a proprietary assessment used within a consulting context. Permission to access measurement-level data so to review its measurement properties was not granted (based on a non-disclosure agreement) and thus, consideration of the reliability and validity of the gamified values assessment was not possible for the present study. Recommendations for relevant research in this regard are discussed within the present study.

Practical Contributions

The present study promises to offer much needed research evidence to guide organisations that are considering the use (or continued use) of gamified assessments within their

personnel selection programmes. In particular, the research aims to provide practice-relevant guidelines for business practitioners on the anticipated benefits of, and areas of caution when, applying gamified assessments within a personnel selection or placement process.

In addition to providing an evidential basis for gamified values assessment use, the novel approach of the present study to use the modular framework to decompose the gamified values assessment into predictor method factors provides enhanced understanding for organisations on how these methods may be used and/or modified in operational practice (Lievens & Sackett, 2017). As the study provides insight into how applicant reactions to a gamified values assessment differ from those to a traditional values assessment would allow organisational practitioners to make more informed decisions about the personnel selection processes that they practise (Lievens & Sackett, 2017).

Positive findings would suggest that gamified values assessments enhance applicant reactions and create better organisational perceptions and therefore, organisations will be able to make more informed choices regarding personnel selection activities. Organisations could incorporate gamified assessments into their practices to increase the number of applicants applying for positions and to enhance organisational reputation (Chow & Chapman, 2013). Conversely, negative findings would suggest that gamified assessments elicit lower applicant reactions and less favourable perceptions of the organisation therefore, organisations will be able to make more informed decisions regarding incorporating games into their personnel selection processes or continuing to use traditional assessments. The present study's findings could urge practitioners and businesses wanting to introduce new personnel selection practices to proceed with caution when considering new trends.

Chapter 2

Literature Review: Theory and Key Concepts

This chapter covers the theory and key concepts of the present study in detail. Chapter 2 expands on the Introduction Chapter by dissecting the existing theory related to the key variables: applicant reactions, gamification, organisational attractiveness, enjoyment, and engagement. Broadly, this chapter examines the following key themes that enabled the development of a new theoretical model: the impact of technology within personnel selection, specifically focusing on the use of assessments; 'traditional' assessments, and trends and findings within research relating to 'modern' assessment methods, notably gamification; and applicant reactions towards assessment methods and how these can affect the perceptions of prospective hires regarding the organisation. The following section lays the foundation for the empirical research and the theoretical model that was developed in the present study.

Although various theoretical perspectives exist on the benefits of gamified applications (Cardador et al., 2017; Fetzer et al., 2017; Georgiou et al., 2019), there is a call for the development of models investigating the outcomes from the application of novel solutions such as gamification used with the workplace (Morelli et al., 2017). In response to this call, the literature review of the present study, through the synthesis of theory and existing empirical work, provides the basis upon which a new theoretical model was built to understand applicant reactions towards a gamified personnel selection assessment.

Applicant Reactions

Applicant reactions refer to naturally developed perceptions and responses to activities (McCarthy, Bauer, Truxillo, Anderson et al., 2017). During a personnel selection process, applicants develop attitudes, emotions, or cognitions when completing placement activities

(Ryan & Ployhart, 2000). Applicant reactions are described as situational or dispositional in nature (McCarthy, Bauer, Truxillo, Anderson et al., 2017).

Situationally based applicant reactions refer to the perceptions, attitudes and cognitions that are developed based on the purpose, context, or intention of a selection activity (McCarthy, Bauer, Truxillo, Anderson et al., 2017). For example, perceived fairness is a situationally based applicant reaction. During a selection process, applicants consider the relevance of the activity in the context in which it is used and in turn, form a reaction.

Dispositionally based applicant reactions refer to the characteristics of the user undergoing the selection process (McCarthy, Bauer, Truxillo, Anderson et al., 2017). For example, the applicant's level of anxiety is dispositionally based. The emotional state of mind of the applicant as a result of completing a selection activity may or may not evoke a favourable reaction.

What is Known About Applicant Reactions, What is Unknown and Why?

Applicant reactions research continues to advance with relevance to personnel selection processes. The last decade has seen technology entering the personnel selection space in a prominent manner (Farr & Tippins, 2017). For example, video-based interviews, allowing applicants to record and submit interviews remotely. The changes in selection processes resulting from technology are likely to have significantly affected applicant reactions, however, research, particularly applicant reaction research, has not kept pace with the speed in which technology has influenced personnel selection practices (Nikolaou et al., 2019).

Fuelled by the desire to understand personnel selection procedures from the applicant's perspective, applicant reaction research began to surge in the 1980s and has remained relevant to date (McCarthy, Bauer, Truxillo, Anderson et al., 2017). Stemming from this surge in interest

was the *social psychological* applicant reaction framework (Herriot, 1989). This social psychological framework was one of the first to investigate the perspectives of applicants and organisations in a personnel selection process (Herriot, 1989; Nikolaou et al., 2019). The social psychological framework considered a two-way relationship between the applicant and the organisation, with the personnel selection process being the initial step in developing this relationship. The social psychology framework argued that if the expectations of the organisation and the applicant are not aligned, the applicant will be unlikely to continue pursuing a relationship with the organisation (Nikolaou et al., 2019). This initial framework has set the foundation for much research in this area, including the present study and while it has been expanded the fundamental outline has not been critically argued.

The social psychological framework has been expanded (Nikolaou et al., 2019), whereby researchers have turned their attention to incorporated elements of attribution theory and self-concept on the behavioural outcomes of applicant reactions with the social psychological framework as a foundation (Ryan & Ployhart, 2000). For example, a highly significant model that has emerged from applicant reaction research is the *organisational justice* framework (Gilliland, 1993). The organisational justice model states that applicants develop perceptions of fairness based on personnel selection practices, policies, and outcomes (Gilliland, 1993; Nikolaou et al., 2019). These created perceptions of fairness subsequently influence pre-hire and post-hire outcomes. For example, if applicants feel that the process is irrelevant to the position for which they are applying, they will be less likely to accept a position with the organisation. Perceived irrelevance of the process may seem unjust as applicants are likely to be left unsure if the process and the inherent requirements of the job are aligned. Applicants may view the

company as using unfair selection methods if the process to select candidates does not measure criteria that is necessary to be successful in the role.

More recently, applicant perspective theory was developed based on a comprehensive review of applicant reaction research in the personnel selection context (McCarthy, Bauer, Truxillo, Anderson et al., 2017). Applicant perspective theory outlines a general conceptual framework that measures various aspects that influence applicant reactions such as individual characteristics and environmental factors. The framework also involves behavioural outcomes elicited from applicant reactions, which include cognitive processes, such as engagement, and perceptions of the organisation, such as recommendation intentions.

Unknown aspects of the incorporation of technology into personnel selection processes are often attributed to the pace at which technology is developed (Nikolaou et al., 2019). Research has not yet matched the rate of technological development and as a result, gaps in research such as applicant reactions towards novel technologies in the personnel selection space exist. To expand on this, there are unknowns relating to how favourable applicant reactions are to new technologies. Thus, where technology is advancing or altering processes, such as traditional personnel selection tools or performance management systems, there is uncertainty about whether the changes are perceived as more or less favourable. The personnel selection process, in general, is often considered to be a stress-provoking process as the magnitude of the outcome is often of significance to the applicant (Farr & Tippins, 2017) and, therefore, any change to the process should be reviewed to understand the positive or negative impact of the change. Technology driven changes which are intended to create more improved candidate experiences or more efficient administration are occurring more rapidly and research is failing to match this rapid pace (Nikolaou et al., 2019). This leaves the implications of technological

changes on applicant experiences, even if intended for enhancement, with uncertainty. The following section will outline some of these changes and where research needs to be conducted to bridge gaps in this area.

Personnel Selection: What it is and how it is Changing

Personnel selection is defined as the process of identifying whether candidates who have applied for a particular role in an organisation have the required knowledge, skills, abilities, and other characteristics (KSAOs) to offer an effective contribution against set criteria (Farr & Tippins, 2017; Ployhart et al., 2017). Personnel selection is the process of hiring human capital and includes sourcing the right person and placing them into a role that enables them to implement business strategy (Morelli & Illingworth, 2019; Farr & Tippins, 2017).

For decades, personnel have been effectively evaluated using methods such as interviews, assessments, and self-reported biodata (Weidner & Short, 2019). Selection activities are used to aid employment decisions (Farr & Tippins, 2017). The length of the process and the number of activities used vary across organisations based on preferences, available resources, and job requirements.

Personnel selection methods have remained relevant and important and are subject to continuous development in modern businesses (Farr & Tippins, 2017). Enhancements to personnel selection tools are predominantly technology driven and user focused (Bruk-Lee et al., 2013; Farr & Tippins, 2017; Nikolaou et al., 2019). The proliferation of technological advancements has allowed for the creation and implementation of modified personnel selection methods (Chamorro-Premuzic et al., 2016; Nikolaou et al., 2019). In the United States alone, it is estimated that approximately US$240 billion was spent on personnel selection technologies in 2015 (Bersin, 2016). Technologies entering the personnel selection space such as artificial

intelligence, robotics, and internet-based solutions are rapidly transforming traditional selection processes (Bersin & Chamorro-Premuzic, 2019). Technological advancements in personnel selection methods include face-to-face interviews being replaced with video interviews, mobile-enabled testing, chatbots helping to write résumés, and gamified assessments (Weidner & Short, 2019).

The emergence of the internet in the 1980s led to some of the most significant changes in personnel selection methods (Nikolaou et al., 2019). For example, electronic recruitment (e-recruitment) stems from internet-based advancements and involves the process of using online technology specifically for personnel selection. E-recruitment has shifted traditional selection methods to internet-based solutions (Stone & Dulebohn, 2013). E-recruitment involves practices such as job boards, social network websites, virtual career fairs and gamified applications. E-recruitment has allowed selection processes to evolve from applicants seeking advertisements in a newspaper to offering applicants a more extensive search via online platforms. Through online selection platforms, large databases of résumés are captured and stored, easy access for users is amplified and time and costs are reduced for the organisation and the applicant (Nikolaou et al., 2019). Personnel selection assessments are another personnel selection method that has undergone significant change due to technology (Farr & Tippins, 2017). Applicant reactions towards personnel selection assessments are the focus of the present study as there is a call for the gap in understanding applicant reactions towards technologically changed personnel selection assessments.

Personnel Selection Assessments

Traditional Assessments: What They Are, Constructs Measured and How They Are Changing

Assessments involve the systematic process of gathering, describing, or quantifying information about individuals (American Psychological Association, 2020a; Rovai, 2000). Assessment insights help organisations to decide on the best candidate to place in a specific job (Farr & Tippins, 2017).

An assessment is defined as a multi-trait and a multi-method tool and hence can focus on a single variable or can be a comprehensive multi-construct procedure (Anderson, 1975; Rovai, 2000). Organisations will typically choose the appropriate combination of construct, nature of assessment and process to help in ensuring that the most suitable candidate is selected against specified job criteria (Heneman & Judge, 2009).

Assessment outputs offer insight into an individual, which can help predict future job success. Personnel selection assessments can measure a wide range of constructs, which helps organisations to make the most effective decision. While constructs such as cognitive ability, personality and emotional intelligence are commonly associated with personnel selection, there has recently been an increased research focus on personal values in relation to work (Becker et al., 2017).

Personal Values-Based Assessments

An individual's personal values are defined as inherently held views that guide how the individual makes decisions and that help with determining importance. Personal values are a complex set of beliefs that govern behaviours and motivations (Beck & Cowan, 2014). Personal values are considered an important aspect in modern organisations because they indicate an individual's normative actions and how the individual is likely to behave or make decisions

(Becker et al., 2017). Measuring values as part of a personnel selection process helps organisations determine if the applicant will be able to share the organisational values (Cable & Yu, 2007). There is likely to be higher levels of satisfaction if both the organisation and the employee have shared values. Furthermore, personal values can predict job satisfaction by the degree of alignment between personal and organisational values. Given the growing relevance of values in personnel selection and the expanding focus on values within the I/O field and among organisations (Becker et al., 2017), the present study used values-based assessments to collect data. These values assessments are discussed in detail in Chapter 4.

How Traditional Assessments Are Evolving. Despite being popular in personnel selection processes, traditional assessment elements, such as in-person administration and self-reporting methods, are subject to scrutiny (Farr & Tippins, 2017). The perceived limitations of traditional assessments are driving technology-based changes to these assessments (Arthur & Traylor, 2019).

Traditional assessments commonly include a multi-choice and/or a self-reporting measure with a simple text-based inventory (Shute, 2015). For example, multi-choice referring to the selection of a correct answer out of multiple options or self-reporting referring to selecting a preference or degree of agreement towards a phrase based on self-perception. Furthermore, traditional assessments often involve human interaction such as a face-to-face interaction or observation, manual scoring, or administration by facilitators (Rovai, 2000). Organisations are reviewing the features associated with traditional assessments to establish more efficient, accurate, and effective methods of attraction (Ployhart et al., 2017; Tippins, 2015).

Elements such as tedious response mechanics, paper-and-pencil designs and manual administration increasingly limit organisations' abilities to find talent (Georgiou et al., 2019).

This, for example, is because candidates are often restricted by geographic location with needing to attend testing in-person therefore, traditional assessment response mechanics are being reviewed to suit market demands better (Georgiou et al., 2019). Furthermore, organisations are competing for scarce talent and are more conscious of the processes to attract and place the available talent, not wanting to appear less advanced than competitors. As such, assessments are being reviewed with a more user-centric focus. To enhance the efficiency, accuracy or effectiveness of traditional assessments, technology is often used (Tippins, 2015).

There is a movement away from on-site assessments, which has resulted in the development of less invasive and more efficient remote-assessment methods (Kaminski & Hemingway, 2009). The computerised or mobile-enabled traditional assessment is the digitalisation of the original paper-and-pencil form of assessment (Tippins, 2015). No changes other than the platform of administration being online are made to the traditional on-site assessment. Mobile assessment methods are becoming increasingly noticed for their ability to reduce geographical limitations and to enhance ease of assessment completion (Kaminski & Hemingway, 2009). Mobile assessments enable applicants to complete assessments from locations and from devices of their choice such as smartphones, laptops, or tablets (Arthur & Traylor, 2019). Mobile assessments provide a more user-centric experience by being more efficient and less invasive for applicants.

Another example of how assessments are being technologically transformed to more user-centric solutions is *stealth assessments* (Armstrong, Landers et al., 2016). Stealth assessments can be defined as evidence-based assessments that are incorporated directly but invisibly into a learning or gaming environment (Shute, 2015). For example, a game known as *Physics Playground* is a game environment whereby users need to move a ball through a series

of obstacles. While Physics Playground is a game first, it is possible to measure individual creativity and persistence (Shute, 2015). Stealth assessments distract users from the purpose of the assessment or hide assessment constructs. Users, thus focus on completing the assessment rather than on the intention of the assessment, so for example the pressure related to performing well on a selection-based assessment. Stealth assessments can create more enjoyable assessment experiences for users and can elicit more honest and accurate candidate responses (Armstrong, Landers et al., 2016).

To further the creation of a more enjoyable assessment process, infiltration of game principles into traditional assessments is being introduced, creating a more user-centric experience for candidates (Fetzer et al., 2017). Many traditional assessments, having been developed decades ago, are now misaligned to the current generations (Shute, 2015), and are even perceived as mundane or dull (Bradley, 2013). The gamification of assessments is growing in popularity as a method of assessment that is more tailored to the current generations, engages users and increases enjoyment levels (Fetzer et al., 2017).

Gamified assessments are a focus of the present study and as such, are reviewed in further detail in the following section.

Introduction to Games and Gamification

The foundation of gamification is the concept of a ‘game’. Games have been in existence for centuries and are firmly entrenched in human culture as a form of entertainment, training, and teambuilding (Seaborn & Fels, 2015). Games are defined as voluntary activities within a controlled system where confining rules and procedures are structured to achieve an outcome (Juul, 2018). Games are also a representation of a reality in which the interaction between the user and the system can offer both safety and conflict (Crawford, 1984). The development and

the growth of computerised versions of games have become significant defining aspects of current generations spurring gaming relevance in the digital age (Seaborn & Fels, 2015). Globally, the *digital game* industry alone had an estimated value of US$139.7 billion in 2018 (Statista, 2020).

Games are widely recognised as fun, interactive, and engaging (Seaborn & Fels, 2015). The characteristics of games have led them to be increasingly more recognised as a platform for motivating desired behaviour among existing employees and attracting potential applicants (Collmus et al., 2016). Research predicted that organisations would begin to allocate up to US$2.8 billion for incorporating game elements into business processes by 2015 (Dale, 2014). The pursuit of game elements into business activities is commonly referred to as *gamification* (Fetzer et al., 2017).

Gamification refers to the application of game mechanics, elements, and features in non-game environments (Attali & Arieli-Attali, 2015; Dale, 2014; Deterding et al., 2011; Farr & Tippins, 2017). Gamification has also been defined as the selective inclusion of game elements into an interactive system without there being a complete game as the final product (Seaborn & Fels, 2015). There are many game attributes that can be incorporated into gamified activities, including action language, assessment, conflict/challenge, control, environment, game fiction, human interaction, immersion, and rules (Bedwell et al., 2012). Not all attributes need to be included in the design of a gamified assessment; required attributes are categories of elements that contribute to the gamification of a task. For example, gamification can be simply the inclusion of a leaderboard into a performance management system which previously did not have that feature. A leaderboard in a gamified assessment, for example, would refer to a live ranking of performance among those completing the assessment, thus allowing users to know how many

points they need to obtain to outperform other users (Landers, 2014). Points, levels and leaderboards are, commonly, the most employed game elements used to gamify a non-game activity (Mekler et al., 2013) In comparison to *serious games* whereby a product is developed using games for a particular purpose, gamification takes existing processes or activities and transforms them with gaming elements (Arthur et al., 2017; Kasurinen & Knutas, 2018). For example, gamification can refer to the addition of a leaderboard to a performance management system. An already existing performance management system can be altered using game elements whereby employees can compete by exhibiting desired organisational behaviour and climb the leaderboard.

Gamified assessments are constructed in a user-centric manner (Armstrong, Ferrell, & Collmus, 2016; Landers, 2020). Gamification is associated with the process of boosting services with motivational affordances to ensure a gameful experience and to encourage a behavioural outcome (Hamari et al., 2014). Gamification enhances a service by using gaming experiences to support the creation of user value (Huotari & Hamari, 2012). As such, one of the primary purposes of gamification is to engage and motivate participants (Dale, 2014). Game elements such as fantasy, merit badges, points and scoreboards become intrinsic to behavioural outcomes such as engagement, motivation, and enjoyment (Huotari & Hamari, 2012; Farr & Tippins, 2017). The use of gamification suggests heightened levels of user enjoyment and lower levels of anxiety (Georgiou et al., 2019), therefore applicant reactions is a key area of consideration when determining personnel selection methods (Lievens & Sackett, 2017). However, there is minimal empirical research to support this theory.

Gamification can manifest in many forms ranging from improving an individual's willingness to exercise to personnel selection to incentivising an individual to be more

financially competent (Kim,2015). Gamified programmes have been created to help users with achieving goals in the form of gamified solutions where users can obtain points for doing everyday tasks such as home-related chores (Kim, 2015). Once sufficient points have been accumulated, users can unlock additional levels and redeem points for rewards. Additionally, gamification has been used to incentivise users to save money as is the case with gamified banking initiatives whereby users are encouraged to set financial goals to work towards (Kim, 2015). Essentially, users of this banking application are encouraged to specify purchases ahead of time and then work towards these based on certain rules. This example of gamification does not include a leaderboard or levels but rather the incorporation of rules which is a characteristic of a game.

Further examples of gamification include adding gaming elements into an employee referral process (Armstrong, Landers et al., 2016). An employee referral process was, therefore, modified with game elements in the form of a point system. In this instance, employees earn points for every referral made concerning a possible new hire. The addition of the leaderboard feature creates competition among staff and rewards, such as financial bonuses or recognition, can be offered as additional incentive s for employees to refer candidates and climb the leaderboard. Using game features to encourage referrals can result in the organisations being afforded a higher number of applicants.

Furthermore, organisations have recognised the potential opportunity for games to increase the level of employee motivation by gamifying incentive schemes (Ueyama et al., 2014). Participants in an incentive scheme can achieve monetary rewards and a heightened sense of accomplishment by collecting badges based on exhibiting a desired behaviour effectively.

Gamification is also seen in assessment measures used to quantify human potential (Nikolaou et al., 2019). For example, traditional assessments with text-based items are being adapted to fantasy-based games whereby items are displayed as part of a storyline and avatars are used to navigate the assessment. For example, the gamified values assessment used in the present study uses a space theme with astronaut characters and aliens who present more detail of the story to the users as they move through the journey. Questions relating to personal values are woven into a narrative that follows a mission to save the universe rather than standalone items. Gamified versions of traditional assessments have been created to measure KSAOs relevant to vacant positions. This will be discussed in more detail further on in the present chapter.

Applicant Reactions Towards Gamified Assessments

As mentioned, a research gap exists regarding the understanding of applicant reactions and novel technologies within personnel selection practices (McCarthy, Bauer, Truxillo, Anderson et al., 2017; Nikolaou et al., 2019). Research has yet to highlight more or less favourable reactions towards traditional assessments when compared to a gamified assessment of the same construct. This gap reveals the current inability for research to match the pace of rapid technological advancements. Despite the growing presence and application of gamified assessments within personnel selection, there is currently no empirical or comparative research investigating the impact of the change from traditional assessments to gamified assessments on applicant reactions.

Existing Gamification Literature

Gamification has been a trending topic over recent years (Hamari et al., 2014). Gamification has become known as a means of supporting user engagement and positive user experience brought forth by game-inspired motivational affordances (Hamari et al., 2014).

Despite the popularity of gamification, understanding the effectiveness of gamified solutions is a pertinent practical issue within gamification research (Hamari et al., 2014). A review of gamification literature yielded that most of the empirical literature in existence focused on *does gamification work?* (Hamari et al., 2014). The measurement variables within the empirical literature measured gamification effectiveness by studying enjoyment, engagement, and behaviour-related outcomes.

Research considering engagement and enjoyment of gamified measures has shown both positive and negative results whereby some of the aspects used to enhance engagement resulted in respondents disliking the feature (Hamari et al., 2014). A qualitative study that was undertaken to determine if games can help with learning new information found that the game feature of *progressively challenging levels* can reduce user engagement (Dong et al., 2012). Participants completed puzzles which were aimed at teaching them new skills. The new skills taught were to help them with completing progressively more difficult puzzles. The study found that participants were able to learn new techniques but also found that the more difficult the game becomes, the more likely a user will quit (Dong et al., 2012). Furthermore, the effects of gamification elements have also been known to reduce over time as the novelty of the elements such as fantasy and leaderboards diminishes (Cardador et al., 2017) Gamified solutions, therefore, need to find a balance between ensuring enough engagement that users do not become bored and not too much engagement that users lose interest (Koivisto & Hamari, 2014; Cardador et al., 2017). A comparison between a traditional assessment with no levels was not done as part of the present study and therefore, consideration of perceptions and preferences when comparing two assessments (gamified and non-gamified) should be done to further understand the impact of levels. The gap in current knowledge relates to clarity on the impact of gamification on

engagement and enjoyment levels. The purpose of the present study, in this regard, is aimed and creating a higher understanding of the impact of gamification on engagement and enjoyment levels.

A further study considered a gamified trading solution (Hamari, 2017). The trading solution had been gamified using badges whereby badges are earned based on favourable trades made. A two-year experiment was conducted which involved monitoring the behaviours of participants playing the trading game. A significant relationship between gamification and certain behavioural outcomes was found (Hamari, 2017). Using gamification in the form of needing to collect badges, the study found that engagement and enjoyment positively mediated the relationship between the game and participants continuing to use the trading service. Users of the game were more likely to make transactions and post trades than those using the non-gamified trading solution. The study found that the presence of gamification, earning badges for displaying favourable trading behaviour, encouraged higher participation and loyalty within the trading context. The favourable results suggest further investigation of gamified solutions in other contexts would be beneficial to enhance understanding of the effectiveness of gamification. Expanding the scope of research focused on gamification will add to the current knowledge and help with bridging the gaps that exist with what is known and unknown.

A recent study considered applicant reactions between a traditional SJT and a gamified SJT whereby applicant reactions referred to level of process satisfaction, predictive validity, and fairness (Georgiou & Nikolaou, 2020). An experiment was undertaken to compare applicant reactions across a gamified SJT and a non-gamified SJT. Applicants who completed the gamified SJT were found to have higher levels of process satisfaction, perceived fairness, and perceived organisational attractiveness. This study concluded that further investigation into applicant

reaction elements was needed and because the study was limited to an SJT, research into applicant reactions towards other gamified measures was suggested. Essentially, there is a shortfall in extensive research that reviews different gamified assessments which needs to be addressed. As gamified assessments can take various forms, styles and can be used to measure various constructs which might elicit varying applicant responses. Based on the extent of combinations in gamified solutions that exists, there is a large opportunity for research to expand on what is known.

The following research hypothesis is proposed, and a graphic depiction of the relationship is presented in Figure 1:

> **Hypothesis 1:** Gamified assessments elicit more favourable applicant reactions (high perceived fairness and low anxiety) than their traditional assessment equivalents.

User characteristics. The impact of gamification on user attitudes is likely to differ (Eickhoff et al., 2012; Hamari, 2013; Hamari & Koivisto, 2013; Montola et al., 2009). Research has considered the impact across characteristics such as age group, gender, and level of gaming experience (Hwang & Nam, 2017; Nikolaou et al., 2019; Weidner & Short, 2019). Research, however, has not considered the differences in applicant reactions (perceived fairness and anxiety) between gamified and traditional assessments. This exists as an additional gap in research that is currently available and which the present study aims to bridge by investigating perceived fairness and anxiety levels associated with a gamified versus a traditional assessment.

The impact of gamification has been considered across age groups; the research highlights that younger generations are likely to be more predisposed towards electronic game features than older generations (Hwang & Nam, 2017; Nikolaou et al., 2019; Weidner & Short,

2019). Attitudes and reactions towards gamified solutions are likely to vary across generations (Cardador et al., 2017). A study conducted in the marketing context presented individuals with a gamified advertisement and a non-gamified advertisement to understand the motivation effects and age differences in product advertising (Bittner & Shipper, 2014). The gamified advertisement encouraged competition with friends and family by advertising the ability to track performance on a leaderboard whereas the non-gamified advertisement only marketed the product features such as comfort. The study concluded that older generations found the gamified product to be less useful, less engaging, and less enjoyable than the younger generations (Bittner & Shipper, 2014). Furthermore, studies have shown that the acceptance of technology and the perception of using technology vary with age groups (Silva, Leal & Rodrigues, 2017). Younger generations experience less anxiety when completing a gamified assessment because they are naturally more confident with technology. In turn, older generations prefer the simplicity of traditional assessments.

A further study considered user differences towards gamification based on video game experience among different generations (Gkorezis et al., 2020). An experimental design was utilised whereby an experimental group completed a gamified SJT, and a control group completed a non-gamified SJT. Post completion of the SJT, both groups then completed a questionnaire which considered their reactions to the SJT and their previous gaming experience levels. Gamification was found to be less demanding on users with previous exposure to video games than on users with no gaming history who may experience more discomfort using games ($n = 29$, $t = 3.65$, $p < 01$). The study was able to conclude that users with higher video game experience have more favourable perceptions of organisations using gamification (*effect* = .77, *SE* = .13, *LLCI* = .51, *ULCI* = 1.04; Gkorezis et al., 2020). Therefore, the incorporation of

gamification (such as avatar, storytelling, and graphics) in assessments affects applicant reactions positively for individuals with higher experience with gaming. This study highlights that since the majority of job seekers are from the younger generations and are likely to have gaming experience, organisations could benefit from replacing traditional assessments with gamified assessments to attract relevant talent. Further research that considers alternative gamified assessments could broaden the understanding of the impact for using gamified assessments.

Previous research and gamification theory highlight various factors that are likely to influence applicant reactions towards gamified solutions. Specific applicant reactions such as perceived fairness levels and anxiety elicited from gamified solutions, however, need further investigation. Applicant reactions to perceived fairness and anxiety towards gamification regarding traditional and gamified solutions in the personnel selection context are discussed in further detail in the subsequent section.

Gamification context. Due to the motivational affordances elicited by gamification, user engagement will depend on the context of its use (Hamari et al., 2014). Gamification does not yield positive results in all contexts (Cardador et al., 2017). A vast majority of existing gamification research has been conducted in the learning and development context or the marketing setting (Bittner & Shipper, 2014; Hamari et al., 2014; Huotari & Hamari, 2012).

Gamification, being associated with increased engagement, has been investigated to enhance the effectiveness of online educational programmes (Landers, 2014; Looyestyn et al., 2017). An experimental study aimed to expand gamification research by considering three common game design elements (points, leaderboards and levels) and user performance (Mekler et al., 2013). Participants were divided into a treatment group and a control group and given

activities to complete, which for the treatment group only were gamified. The study found that the addition of game elements (points, leaderboards and levels) into an online educational programme has proven effective in clarifying performance goals and enhancing participant performance in the learning context (Mekler et al., 2013). Participants who completed activities which had points, leaderboards or levels had enhanced performance levels when compared to the participants who completed activities without these game elements. While this study was able to show improvement in learner performance, it did not consider if learners had a preference for using gamified methods or what the longer-term effects of continued gamification use might be. Therefore, there is a need for continued exploration of gamification of which the present study aims to shed light on the applicant perspectives of gamification in the personnel selection context. Understanding different perspectives when using a gamified assessment versus the perspectives based on a traditional assessment would contribute novel research to the existing body of knowledge that is focused on gamification in the personnel selection space.

Within the marketing space, it was found that the use of a gamified element to encourage purchasing of a product was less effective among some users (Bittner & Shipper, 2014). Participants viewed two marketing campaigns, one with gamification and one with no gamification and were then questioned about their perceptions. The gamified advertisement included aspects such as the ability to challenge friends or track performance versus the non-gamified advertisement which only spoke to facts about the product such as its comfort levels. The results of the study found that the older generations were less likely to buy the product post a gamified sales initiative. As such, gamification seems to be more favourable among specific groups for example individuals with game experience or younger age groups. Within the personnel selection context, published gamification research is significantly scarce (Gkorezis et

al., 2020). Further investigation is needed to help understand if the same outcomes of gamification used in the marketing or educational space are present when gamifying personnel selection assessments.

More recently, an experimental study assessed the differences in perceived organisational attractiveness between a gamified SJT and a traditional SJT both measuring flexibility, resilience, adaptability, and decision-making (Gkorezis et al., 2020). A treatment group completed a gamified SJT, and a control group completed a non-gamified SJT before completing a perception survey. The study concluded that more favourable levels of perceived organisational attractiveness were elicited from the gamified SJT than from the traditional SJT within the personnel selection context. The study also suggested that future research continue to evaluate user perceptions of gamification in different contexts and with other assessments. Research again emphasises the gap in existing gamification literature, in that current research had not included consideration of user perceptions. Therefore, the present study addresses these differences by developing a model to investigate applicant reactions between a gamified and a traditional values assessment. To bridge this gap by empirically investigating applicant reactions across different assessment types (gamified and traditional), a clear distinction will be made between a gamified and a traditional personnel selection assessment as an initial step. The following section outlines the model used to differentiate a gamified and a traditional assessment.

Developing a Model to Understand Applicant Reactions Between Different Assessment Types: Gamified and Traditional Assessments

The model developed in the present study has two main components: the assessment used and the user outcomes (see Figure 1). The first step in the model involves differentiating

assessment types. The modular framework of Lievens and Sackett (2017), which compartmentalises selection methods to differentiate between assessment types, was used to differentiate between gamified and traditional assessments.

The second step taken to develop the model was to understand user outcomes, particularly applicant reactions, across different assessment methods. For this, the present study drew on two theories: the theory of work gamification (Cardador et al., 2017) and the applicant perspective theory (McCarthy, Bauer, Truxillo, Anderson et al., 2017).

Application of a Modular Framework on Types of Assessments

The relevance of using the modular framework in the present study was twofold. Firstly, the adaptation of a modular approach involves breaking down the selection method into its key components. The assessment-type definitions were reviewed using a modular framework (Lievens & Sackett, 2017). The modular framework helped in understanding differences between selection methods, which helped with differentiating traditional assessments from gamified assessments. In addition, particular reference is made to the values assessments used in the present study.

Secondly, the modular framework that was employed has been used previously to highlight *why* test method factors elicited specific outcomes (Lievens & Sackett, 2017). The present study investigated the outcomes resulting from variations in test types and, therefore, using the modular framework was deemed relevant. The present study considers applicant reactions (perceived fairness and anxiety) as an outcome variable emerging from test differences.

Using Method Components to Differentiate Personnel Selection Tests

When the approaches that are available for distinguishing products are considered, two central methods are highlighted (Lievens & Sackett, 2017). The first method involves viewing

the product holistically as an ‘all-in-one package’. The second method involves viewing the various components of the product (Lievens & Sackett, 2017). The present study used components of the modular framework of Lievens and Sackett (2017). The components approach was followed because gamification is a collection of conditions which are easier to distinguish in sections. For example, both assessments in general and gamification has multiple elements that need to be considered such as scoring procedures, multimedia styles and target audience, and thus, to differentiate gamification from traditional assessments, compartments are required.

The framework compartmentalises terms using seven predictor method factors: stimulus format, contextualisation, consistency of stimulus presentation, response format, consistency of response evaluation, information source, and instructions (Lievens & Sackett, 2017). To distinguish traditional assessments from gamified assessments, these seven predictor method factors are reviewed in the following section (see Table 1).

Stimulus Format. Stimulus format refers to how the test stimuli are presented to users (Lievens & Sackett, 2017). Stimulus format involves the information, questions, or prompts that are included. There are six stimulus formats: textual, pictorial, auditory, dynamic audio-visual, video conference / remote interactive, and face-to-face interactive. The first category, textual stimuli, refers to written or verbal reasoning items or email responses. For example, an in-basket activity where users read emails and response to the scenarios presented in an email format. The second category, pictorial stimuli, is depicted as charts or even pictures. For example, the use of faces in an emotional intelligence test whereby users select a word which they feel best represents the expression on the face presented. The auditory category comprises assessments that use samples of music or voice messages. For example, an interview conducted telephonically whereby users do not see the questions but rather they hear them. The dynamic

audio-visual category refers to examples of two-dimensional (2D) animation, three-dimensional (3D) animation or avatar-based formats. For example, the use of avatars that guide users through the assessment and provide detail about the storyline or guidelines to complete the assessment. The fifth category, video conferencing or remote interactive stimuli. For example, users could be sitting in different countries but communicating via a video platform thus simulating an 'in-person' interview. The final category, face-to-face stimuli, involves personal interaction. For example, an in-person role plays or interview where the users and assessors are physically present in the same room or location.

The stimulus format of traditional and gamified assessments is a key variable for differentiating the terms based on the additional stimuli incorporated using game elements.

Stimulus Format for Gamified and Traditional Assessments. The modular approach outlined auditory and dynamic audio-visual as types of stimulus formats (Lievens & Sackett, 2017); these are considered key differentiators when distinguishing gamified and traditional assessments.

Gamified designs involve elements of games that have been repurposed (Deterding et al., 2011). Common game mechanics used in non-game activities include colour systems, avatars, risk-taking, narratives, music systems, and level systems (Landers, 2020). Gamification is a technique that can be designed in a manner that draws on multiple modalities such as using text, pictures, or audio effects to elicit the intended outcome and to increase immersion in the game (Fetzer et al., 2017; Farr & Tippins, 2017). To create more immersive environments and to encourage learning, gamified solutions can also involve users interacting with the aesthetics, avatars, or storylines (Deterding et al., 2011; Fetzer et al., 2017; Landers, 2020). Game elements such as avatars and immersive storylines used in creating gamified elements are examples of

both auditory and dynamic audio-visual stimuli. The gamified assessment used in the present study, for example, uses a combination of the textual, auditory, and dynamic audio-visual categories. Users are taken on a space-theme (dynamic audio-visual) adventure with suspense building music and a voiceover which provides an overview of the user's mission (auditory). Questions are presented in a comic-book style speech bubble (textual) that prompts users to make decisions.

When gamified assessments are compared with traditional assessments, gamified solutions using game mechanics commonly use more robust stimulus formats. Traditional assessments are often associated with a 'paper-and-pencil' format (Vallejo et al., 2007), thus a textual format. This format is often representative of a standard sentence of text with which applicants agree or disagree. However, some constructs within traditional assessments such as measures of cognitive ability may use pictorial stimuli (Lievens & Sackett, 2017). The differences that exist between traditional and gamified assessments regarding stimulus format affect not only how these methods are distinguished but also the user outcomes that may be elicited, for example the level of user enjoyment.

Gamified solutions are inherently designed to enable a more enjoyable experience than the experience attained with the traditional version of the same activity (Fetzer et al., 2017). Assessments that use audio-visual stimuli such as SJTs have more favourable applicant perceptions (Kanning et al., 2006; Lievens & Sackett, 2017). The types of aesthetics in gamification include sensation (providing a new experience), narrative (a gripping story), and fantasy (an immersive world) (Landers, 2020). These aesthetics result in the immersion of users into the game (Landers, 2020), an entirely new experience compared with traditional methods.

Contextualisation. Contextualisation is defined as the authenticity of a measure, that is, the degree to which the test stimuli are represented in a realistic and detailed fashion (Lievens & Sackett, 2017). Tests can range in their level of contextualisation, moving from being decontextualised (referring to tests such as verbal or numerical reasoning assessments) to having a high level of contextualisation by specifically referring to contextual information (referring to exercises such as assessment centre activities). Contextualisation is in essence, the degree to which an assessment relates directly to the job or work activity.

A moderate level of contextualisation refers to tests that have the context described in terms of 'who, what, where and how' (referring to assessments such as STJs) (Lievens & Sackett, 2017). For example, personality assessments can be adapted to relate to the working environment, which can increase the level of contextualisation by focusing the applicant's behavioural responses to a specific context. Contextualisation, like stimulus format, provides key differentiators across traditional and gamified assessments.

Contextualisation for Gamified and Traditional Assessments. The design of gamification is based on gaming elements (Armstrong, Ferrell, & Collmus, 2016; Deterding et al., 2011). Research considers the term gamification in two distinct classes: structural and content (Kapp, 2013). Structural gamification refers to the application of game elements to encourage participation in an activity without changing the content. Structural gamification, for example, could be the addition of a leaderboard or point system to an employee referral programme (Kapp, 2013). Content gamification refers to an activity that includes gaming elements, for example storylines, fantasy or avatars which ultimately alter the content and make it more gamelike (Kapp, 2013; Landers, 2020).

The elements of content gamification create distractions for users and a more immersive process (Deterding et al., 2011; Landers, 2020). As such, gamified solutions do not necessarily have to present realistic work environments (Woods et al., 2020). Unlike serious games that are built to resemble a more realistic work environment for learning skills (Farr & Tippins, 2017), gamified solutions are built to be more enjoyable and, therefore, are more likely to remove users from the work context through fantasy. For example, the gamified assessment used in the present study used a space theme whereby users visit different planets and encounter alien avatars. As such, the degree of contextualisation of gamified assessments is likely to be low.

In contrast, traditional assessments have been described as tools used to measure the application of knowledge to real-life situations (Dochy, 2001; Nasab, 2015), thus indicating a higher level of contextualisation. When the contextualisation level of traditional assessments is considered, it is likely to vary from generic items to items set in a business context (Lievens & Sackett, 2017). Traditional assessments are, therefore, less removed from reality than gamified assessments.

The degree of contextualisation is known to influence user outcomes (Lievens & Sackett, 2017). While decontextualised measures may elicit more enjoyable experiences by removing the user from the work environment, decontextualised measures could be perceived as less fair or less relevant to the workplace.

Contextualisation relates to procedural justice theory when considering applicant reactions. It is a test characteristic associated with the level of job relatedness (Gilliland, 1993). The more apparent that a personnel selection method is to the work context, the higher applicant perceptions will be. Transparency and relevance are more obvious to the applicants and, therefore, the perception of fairness is increased. The impact on applicant reactions due to the

level of contextualisation is mainly seen in personality assessments, interviews, and ability tests (Lievens & Sackett, 2017). Perceptions of fairness created by using decontextualised fantasy environments have not been considered in previous research. It is assumed, however, that the higher level of contextualisation associated with traditional assessments will elicit more positive applicant reactions than those elicited through gamified assessments set in fantasy settings. This assumption is based on procedural justice theory whereby less perceived relevance to the workplace regarding personnel selection methods reduces perceptions of fairness (Gilliland, 1993; McCarthy, Bauer, Truxillo, Campion et al., 2017).

Stimulus Presentation Consistency. Stimulus presentation consistency refers to the extent of standardisation that administrators use to present the test stimuli to users (Lievens & Sackett, 2017). In this category, three types of standardisations can occur, *free stimuli*, *adaptive stimuli*, and *fixed stimuli*.

Free stimuli relate to a situation where there are no predetermined guidelines regarding what is to be presented (Lievens & Sackett, 2017). With free stimuli, users may respond in a manner that requires improvised or unexpected presentation of stimuli. Examples of free stimuli presentation are activities such as role play or interviews whereby users can answer in unlimited ways. Adaptive stimuli refer to predetermined and standardised guidelines for presenting the stimuli (Lievens & Sackett, 2017). With adaptive stimuli, users' responses guide the process and, therefore, create a sense of interactivity. For example, with computerised adaptive assessments, the degree of difficulty increases based on the continued capture of correct responses. Fixed stimuli refer to a situation in which all users are presented with the same set of items (Lievens & Sackett, 2017). With fixed stimuli, there is a high level of standardisation, and predetermined

guidelines are in place. A traditional paper-and-pencil assessment is an example of a test that has fixed stimuli.

Stimulus Presentation Consistency for Gamified and Traditional Assessments.

Gamification has been outlined using six main features or conditions: rules, structure, variable, quantifiable outcomes, value-laden outcomes, user effort, user investment, and negotiable consequences (Juul, 2018). Games that are designed with predetermined rules, conflicts, structures, or resolutions indicate standardisation (Seaborn & Fels, 2015). The rule-bound and structured elements of gamified assessments allude to a fixed-stimulus presentation consistency.

Some gamified assessments are, however, inclusive of levels (Armstrong, Landers et al., 2016; Landers, 2020). For example, users can only progress to higher levels by providing correct responses or obtaining enough points. Game features such as progression through levels or point systems are associated more with an adaptive stimulus presentation consistency.

Conversely, traditional assessments are designed using multiple methods (Rovai, 2000) and may have varying characteristics that can affect the stimulus presentation consistency. The traditional paper-and-pencil style assessment is an example of a fixed stimulus presentation consistency in which all applicants receive the same set of questions. Traditional assessments are often consistent with item presentation to ensure reliability and consistency (Lievens & Sackett, 2017).

Ensuring consistency across applicants during a personnel selection process can be linked to a form of procedural justice (Hausknecht et al., 2004). In addition, higher applicant perceptions are associated with consistency in assessments through standardisation across users. Research has found a moderate correlation between stimulus presentation-related consistency and applicant reactions (Hausknecht et al., 2004).

Response Format. Response format is defined as the way a user is required to respond to the presented test stimuli (Edwards & Arthur, 2007; Lievens & Sackett, 2017). Fundamentally, responses can present as a closed-ended format or an open-ended format. With the closed-ended format, there is a degree of predetermined and prompted responding (Lievens & Sackett, 2017). Users can select or rank their responses, and these may be textual, auditory, pictorial, or video-based options. With open-ended responses, there are minimal requirements or guidelines (Lievens & Sackett, 2017). Users, for example, may be required to provide a textual response in the form of an essay or depict a pictorial response by drawing an image. Across personnel selection methods, the response format is likely to vary. However, across gamified and traditional assessments, there are likely to be similarities in the response format.

Response Format for Gamified and Traditional Assessments. The creation of digital platforms and games indicates a relatively high level of standardisation and structure (Kapp, 2013). Games are characterised by rule-bound systems and quantifiable outcomes (Landers, 2020; Salen & Zammerman, 2004). It is likely that gamified assessments will have a closed-response format considering the game mechanics involved. With a closed-response format, the gamified solution comprises answers that allow users to advance to higher levels or choices that are set for users to select.

Like gamified assessments, traditional assessments are likely to be presented in a force-choice or multiple-choice manner. Responses are likely to be closed. For example, in personality assessments, users must indicate their level of agreement to a given item using a standard scale (Lievens & Sackett, 2017).

Response Evaluation Consistency. Response evaluation consistency is defined as the degree of standardisation that is applied by an administrator to evaluate user responses (Lievens

& Sackett, 2017). Therefore, response evaluation refers to elements such as scoring algorithms and evaluation sheets. There are three formats for response evaluation: *unconstrained judgement, calibrated judgement,* and *automated scoring*. Unconstrained judgement relates to administrators who do not have predetermined answers or evaluation standards (Lievens & Sackett, 2017). Calibrated judgement involves trained administrators who use predetermined answers and standards to score user responses. The final category, automated scoring, has the highest level of standardisation because no degree of subjectivity can enter the process (Lievens & Sackett, 2017). Automated scoring draws on computer-based algorithms to capture the scores rather than human ability.

Response Evaluation Consistency for Gamified and Traditional Assessments. There is a standardised level of objectivity for both gamified and traditional assessments and, therefore, similarities in response evaluation consistency are based more on the measurement aim than the design features.

Automated scoring formats are used when considering gamified assessments since the assessments are created using computer-based platforms (Armstrong, Landers et al., 2016; Fetzer et al., 2017). Gamification acts as a vehicle through which users can experience instant feedback regarding their performance or behaviour (Cardador et al., 2017). Digitalised games are built using computer-based algorithms that automatically score responses to provide immediate feedback (Cardador et al., 2017; Dale, 2014). Scores and answers are, therefore, pre-programmed, and subjectivity does not enter the process. In this regard, some games are even beginning to incorporate artificial intelligence, which increases the number of potential outcomes and paths that players can take (Fetzer et al., 2017).

Similarly, traditional assessments are built using scientific principles and, therefore, have predetermined scoring formats (Lievens & Sackett, 2017). For example, *dichotomous scoring,* an algorithm that is often used with traditional assessments, can determine a correct or incorrect value on an individual's response to an assessment question (Vispoel & Kim, 2014).

In terms of user outcomes, response evaluation consistency is another assessment component that is likely to influence applicant reactions through perceptions of fairness (Lievens & Sackett, 2017). Response evaluation consistency in relation to applicant perceptions is likely to be related to the level of consistency associated with the method. Automated scoring procedures are less prone to subjectivity or bias since there is automation and consistency in administration (Konradt et al., 2013). Consistency improves applicant perceptions through procedural justice. Consistency of administration is a strong predictor of fairness perceptions.

Information Source. The definition of information source refers to how the user is responding to the test stimuli and who is defined as the user (Lievens & Sackett, 2017). Research has shown three main categories that fall under information source. The first, *behaviour exhibited by the candidate or choices made by the candidate in the assessment context*, refers to the users themselves responding to the test stimuli. The second, *self-reports by the candidate about events beyond the assessment context*, implies users' capture of dimensions such as their behaviours, attitudes, values, or beliefs that are not bound by the assessment context (Lievens & Sackett, 2017). The final category, *reports by others about events outside the assessment context*, refers to a report by a person other than the candidate who is well informed of the behaviours, attitudes, values, or beliefs of the candidate. An example of this type of response provider is a manager, co-worker, or family member.

Information Source for Gamified and Traditional Assessments. Assessments, including gamified and traditional assessments, typically draw on the second category (self-reports by the candidate) as an information source in which the assessments are completed by the users themselves. Psychometric assessments in the personnel selection context aim to gather additional information about the candidates themselves (Heneman & Judge, 2009). Assessment information often relates to the characteristics of an individual that cannot easily be seen by human evaluators, for example, personality, attitudes, thinking styles and aptitude. As such, assessment information is predominantly gathered directly from the candidate being assessed.

Notable is that the use of game features in gamified assessments is theorised to provide more honest first-hand accounts of the individual (Fetzer et al., 2017). Gamified assessments often use game features to immerse candidates and distract users from the assessment purpose (Fetzer et al., 2017; Landers, 2020). In turn, users provide a more honest self-report (Ewing, 2012). The candidate is focused more on the story or objectives than on the provision of a socially desirable self-report (Cerrato et al., 2017).

Previous meta-analysis research has shown that a moderate relationship exists between applicant reactions and self-reporting measures (Hausknecht et al., 2004). Applicant reactions Are likely to be more favourable with gamified assessments, which immerse users more intensely.

Instruction. Instruction refers to the degree of explicit direction given to users about which perspective to take when responding (Lievens & Sackett, 2017). The level of instruction provided on tests can range from general to specific information. General instructions specify how to respond but not which perspective to take when responding (Lievens & Sackett, 2017).

Specific instructions, in contrast, provide users with a set perspective for responding to assessment stimuli.

The degree of specification can vary across assessments and can include examples such as asking candidates to rate themselves on statements or explaining time-bound limitations (Lievens & Sackett, 2017). Specific instructions are intended to reduce construct-irrelevant variance and are, therefore, commonly preferred.

Instruction for Gamified and Traditional Assessments. Regardless of whether the assessment type is gamified or traditional, in a personnel selection process, a degree of standardisation and instruction regarding the process needs to be provided for candidates (Heneman & Judge, 2009). Linked to the provision of instruction are the standards outlined by the *International Guidelines for Test Use* (International Test Commission, 2001). Instructions can limit potential test-user problems and thus are considered critical to fair and standardised testing practice. Assessments are used in personnel selection processes to gain a more accurate, scientific, and objective view of candidates (Heneman & Judge, 2009).

Assessments that align with international test-use guidelines are applicable to both gamified and traditional assessments. These instructions provide guidance on elements such as the constructs that are measured and penalties for fake answers or guesses (Lievens & Sackett, 2017). For example, with computer-based assessments, instruction that specifies mechanisms to detect dishonest responding is often provided (Landers et al., 2011). These mechanisms do not necessarily differ between gamified and traditional assessments. However, regarding gamified assessments, the assessments are often created using game design features, such as a storyline or the use of fantasy, that create an immersive environment (Landers, 2020). As such, the measurement constructs are not easily identifiable with gamified assessments (Arthur et al.,

2017). The use of gaming elements can create a situation whereby users are less able to determine the behaviour desired by the organisation presenting the assessment (Georgiou et al., 2019).

In relation to applicant reactions, specific instructions are often preferred by candidates since they enhance the perception of how to perform on an assessment (Lievens & Sackett, 2017). Specific instructions create a sense of transparency and while this may improve candidate perceptions, it could encourage socially desirable responses (Farr & Tippins, 2017). The creation of transparency through clear and specific instruction can, however, be associated with reduced ambiguity and uncertainty (International Test Commission, 2001). Anxiety among test-takers can be reduced through transparency, and perceptions of fairness can be increased. As such, applicant reactions should be more favourable when specific instructions are provided.

Summary for Chapter 2. In conclusion, Table 1 below summarises the modular approach to differentiating a gamified assessment from a traditional assessment. The table highlights potential applicant reactions based on seven predictor stimuli (stimulus format, contextualisation, stimulus presentation consistency, response format, response evaluation consistency, information source, and instructions) drawn from previous research into similar areas. User outcomes and relation to applicant reactions are briefly considered but are discussed further in Chapter 3. Table 1 helps in distinguishing the type of assessment being used in the personnel selection process and provides a method for systematically investigating the components of a new assessment type. As mentioned, this forms the first step in the model developed in the present study. The second step focuses on user outcomes, as explained in Chapter 3.

Table 1

Modular Framework for Traditional versus Gamified Assessments

Stimuli	Traditional	Gamification	Applicant Reactions	Directions for Future Research
Stimulus format	Textual tests Pictorial tests	Textual tests Pictorial tests Auditory tests Dynamic audio-visual tests General sensory stimuli (Fetzer et al., 2017) Colour and music systems, avatars, storyline, sound effects, and fantasy (Landers, 2020)	Situational Judgement Test (SJT) research showed more favourable applicant perceptions towards audio vs. textual stimulus formats (Kanning et al., 2006; Lievens & Sackett, 2017). User-centric design elements are used in gamification to enhance enjoyment (Dale, 2014) and, therefore, affect applicant reactions.	Gamified assessments can be designed using multiple combinations of stimulus (formats (Landers, 2019a), future research should consider if there are more favourable stimulus format combinations. For example, if a storyline only approach compared to a storyline using colourful graphics elicits more or less favourable applicant reactions.
Contextualisation	Generic items Items set in business context	Decontextualised items – gamification set in a fantasy setting (Landers, 2020)	Relation to procedural fairness and relevance to the job. The more apparent that a placement method is to the work context, the higher applicant perceptions will be (Gilliland, 1993).	To date there is no research which considers the contextualisation of gamified assessments and if there are more favourable perceptions with a decontextualized measure versus a contextualised measure. Future research should explore contextualisation of gamified assessments.
Stimulus presentation consistency	Traditional/fixed Item Response Theory-based tests	Fixed Adaptive if built with levels	Consistency of assessment administration across users is linked to procedural fairness. A moderate relationship between consistency and applicant reactions has been found (Hausknecht et al., 2004)	Future research should understand the use of levels in personnel selection assessments and if more favourable perceptions exist with more traditional approaches when compared to a gamified assessment with levels.
Response format	Closed-ended	Closed-ended Rule-bound (Fetzer et al., 2017)		

Stimuli	Traditional	Gamification	Applicant Reactions	Directions for Future Research
Response evaluation consistency	Different automated scoring formats	Different automated scoring formats Artificial intelligence (Fetzer et al., 2017)	Moderate relationship between applicant reactions and the consistency of scoring mechanisms (Hausknecht et al., 2004). Consistency of assessment scoring mechanisms is linked to procedural fairness.	
Information source	Self-reports	Self-reports Control (Fetzer et al., 2017)	Research has shown that a moderate relationship exists between applicant reactions and self-reporting measures (Hausknecht et al., 2004).	
Instructions	Specific information: Penalties for guessing or providing dishonest answers	Specific information: Penalties for guessing or providing dishonest answers Information could include a description of required behaviour to advance to a subsequent/higher game level (Fetzer et al., 2017).	Specific instructions create a sense of transparency and while this may improve candidate perceptions, it could also encourage candidates to respond how they think they should rather than choose for themselves (Ingold et al., 2016).	

Chapter 3

Literature Review: Development of a Model to Measure Applicant Reactions to Gamified Assessments

Chapter 3 outlines the relevant theory and concepts for the development of a model to measure applicant reactions towards gamified assessments. The model developed in Chapter 3 is used to measure the key variables in the present study and to answer the research problem. The conceptual model of the present study can be viewed in Figure 1 in the Introduction Chapter.

The modular framework was used to differentiate gamified assessments from traditional assessments using a compartmentalised approach (Lievens & Sackett, 2017) so that a clear distinction could be made between the assessments that were tested using the model. The present chapter provides an overview of the two theories used to develop the model. Chapter 3 begins by reviewing applicant perspective theory (McCarthy, Bauer, Truxillo, Anderson et al., 2017), which compartmentalises applicant reactions into dispositionally based (anxiety) and situationally based (perceived fairness). Chapter 3 explains and draws on the theory of work gamification (Cardador et al., 2017) to consider additional mediating relationships relating to user outcomes associated with gamified assessments, namely enjoyment and engagement. Broadly, the theory of work gamification outlines a framework for the relationships between work gamification, increased access to performance information, and task enjoyment. Thereafter, the components of applicant reactions (composite) and the importance of applicant reactions (outcomes) are reviewed, and based on this review, a model to test applicant reactions across assessment types including gamified assessments is developed.

Applicant Reactions and User Behavioural Outcomes

User behavioural outcomes are elicited when responding to personnel selection tools (McCarthy, Bauer, Truxillo, Anderson et al., 2017). During a personnel selection process, applicants naturally develop perceptions and reactions towards the tool, process, or organisation. Among researchers, the importance of these reactions remains prominent since the reactions can result in significant behavioural outcomes (McCarthy, Bauer, Truxillo, Campion et al., 2017; Tippins, 2015).

A scarce talent market has shifted processes to consider the candidate 'king' rather than the organisation (Nikolaou et al., 2019). A fundamental objective of any personnel selection process is to obtain the best talent (Heneman & Judge, 2009) and, therefore, processes or activities that might deter candidates need to be avoided. To remain competitive, organisations are more cognisant of what will set them apart in the market (Chamorro-Premuzic et al., 2016). The impact of negative behavioural outcomes highlights the importance of positive applicant reactions (Nikolaou et al., 2019).

Applicant Reaction Frameworks. Various theoretical frameworks have been developed in the field of applicant reactions (Nikolaou et al., 2019). One of the most influential models is the *organisational justice framework* (Gilliland, 1993). The organisational justice model highlights how perceptions of selection processes influence perceived organisational justice and, therefore, perceptions of fairness.

A more recent framework is the applicant perspective theory (McCarthy, Bauer, Truxillo, Anderson et al., 2017). This framework provides a theoretical integration of key applicant reaction findings within personnel selection. The applicant perspective framework was

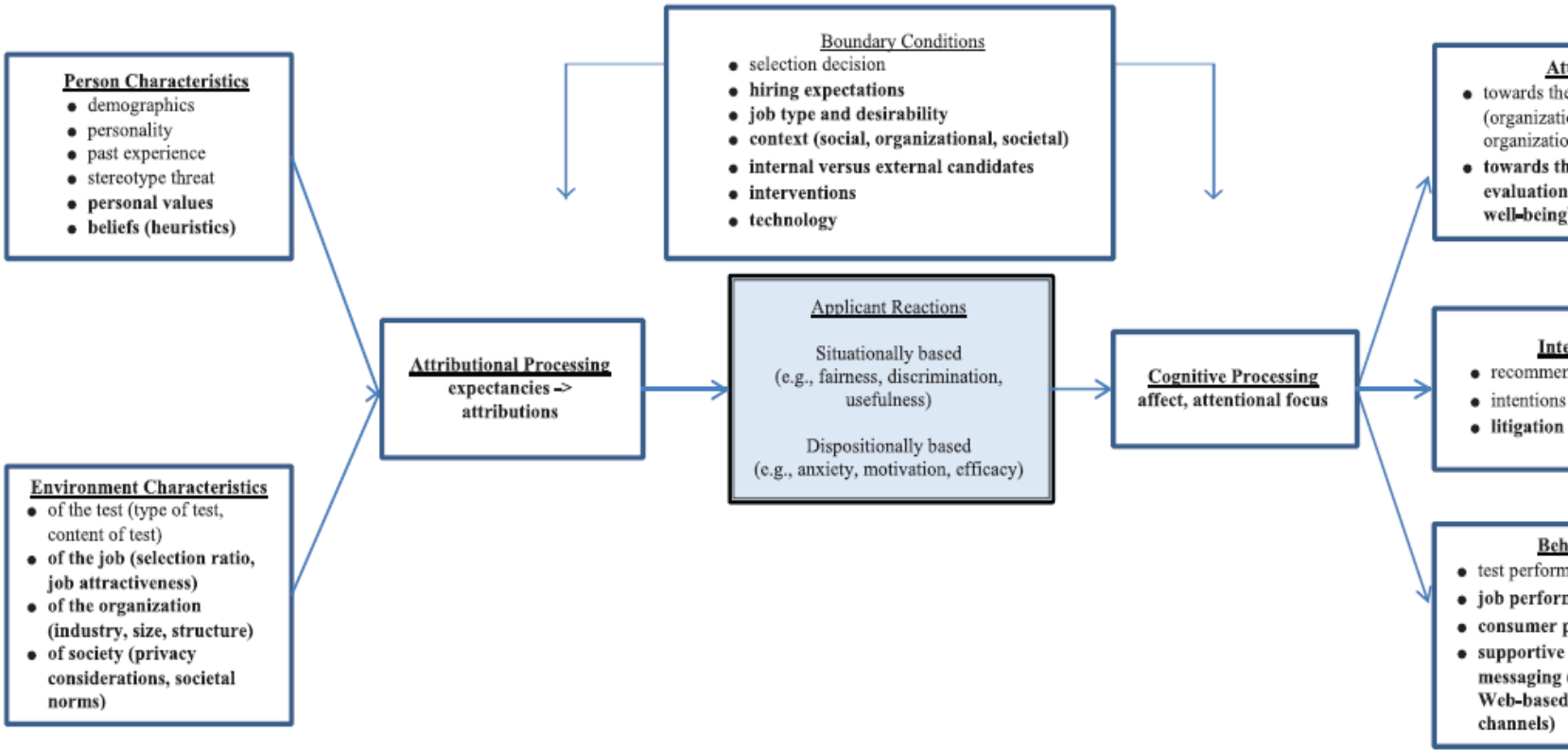
developed to address changes in personnel selection processes based on technological advances and was thus deemed appropriate and relevant for the present study.

Applicant Perspective Theory. The applicant perspective theory presents a general conceptual model outlining applicant perceptions in personnel selection (McCarthy, Bauer, Truxillo, Anderson et al., 2017) (see Figure 3, without permission to reproduce). The applicant perspective model is a means for exploring research gaps and questions that are evidently the result of technological changes. The model provides a framework in which personnel selection activities affect applicant perceptions, which in turn, predict perceived organisational attractiveness (attitudes, intentions, and behaviours).

The model created in the present study draws on key relationships outlined in applicant perspective theory, mainly the relationship between applicant reactions towards the personnel selection tool and behavioural outcomes. To understand the relationship between applicant reactions and behavioural outcomes further, the components of applicant reactions are reviewed.

Figure 3

Applicant Perspective Theory (McCarthy, Bauer, Truxillo, Anderson, Costa, & Ahmed, 2017)



Components of Applicant Reactions. In the applicant perspective model, applicant reactions consist of perceptions of fairness, levels of anxiety, and motivation levels (McCarthy, Bauer, Truxillo, Anderson et al., 2017). Most research into applicant reactions, however, focuses on perceptions of fairness and anxiety (McCarthy et al., 2013). In line with previous research, the present study focuses on applicant reactions that comprise perceived fairness and anxiety. Furthermore, because the assessment construct was personal values, using aspects of motivation such as the drive to perform well was not appropriate. Individuals cannot perform well or poorly in behaviourally based assessments, unlike cognitive assessments (Heneman & Judge, 2009).

Applicant reaction components were considered with dispositionally based reactions referring to anxiety and situationally based reactions referring to perceived fairness.

Dispositionally Based Reactions: Anxiety. Dispositional reactions are related to stable individual differences (McCarthy et al., 2013). Dispositional reactions represent relatively stable cognitions and personality traits in individuals. Anxiety is an example of a dispositional reaction (McCarthy, Bauer, Truxillo, Anderson et al., 2017).

Test-taker anxiety relates to the emotional state of an individual when completing an evaluation in which the threat of failure may have negative consequences such as not securing a vacant job (Bonaccio & Reeve, 2010). Higher levels of anxiety, a subscale of applicant reactions, have a significant impact on applicant attitudes, behaviours, and intentions towards the company (McCarthy, Bauer, Truxillo, Campion et al., 2017). Higher levels of anxiety can result in less favourable perceptions of the organisation and lower test performance (r = -.28) (Ackerman & Heggestad, 1997; Bonaccio & Reeve, 2010; Hausknecht et al., 2004) and lower job performance (r = -.08) (McCarthy et al., 2013).

The *International Guidelines for Test Use* provide a governing standard for what is deemed good practice in the testing space (International Test Commission, 2001). Imbedded in these guidelines is a testing principle stating that when using a test, the administrator is required to take action to reduce test-taker anxiety and to avoid creating unnecessary anxiety when conducting the test. Hence, anxiety remains an important concept to consider with personnel selection assessments. However, there is currently no published research that compares anxiety levels of a gamified assessment with anxiety levels of a traditional assessment in the personnel selection context. The applicant reactions fostered because of anxiety with new assessment techniques such as gamified assessments are currently unknown.

It is not uncommon for technological change to foster anxiety (Farr & Tippins, 2017). There is often newness and uncertainty associated with technology-based change that individuals are not familiar with and thus, they may feel unprepared for such change. Gamification is theorised, however, to offer an improved testing experience as a result of the game elements (Akoodie, 2020; Fetzer et al., 2017; Lieberoth, 2015). The use of game elements is said to foster enjoyment and immersion (Landers, 2020) and as such, users are less focused on the notion of being evaluated (Lieberoth, 2015). A gamified activity (M = 3.366, SD = 0.596) was found to elicit higher levels of interest from users than a non-gamified activity (M = 2.602, SD = 0.614; Lieberoth, 2015). In essence, the user becomes engrossed in the game more than when the game elements are not present (like with traditional activities), the immersion into a gamified activity likely places less emphasis on the purpose for being assessed as there is an element of distraction experienced by the user.

Game elements such as reaching a new level, creating a story, upward movements on a leaderboard or obtaining high scores can act as achievements or accomplishments (Cardador et

al., 2017). The motivational affordances stimulated through game elements are consequently able to enhance engagement and help with distracting the individual from elements that may cause anxiety. The focus that is created is on gameplay rather than taking a test. Thus, a more positive experience could be created with gamified assessments (Deterding et al., 2011; Marczewski, 2013).

Studies have considered the positive influence of gamification on health and wellbeing such as reducing user anxiety (Dennis & O'Toole, 2014; Johnson et al., 2016). A study conducted among highly anxious participants showed through pre- and post-test measurements of their stress levels how gamified reward featured in a training simulation reduced participant anxiety ($F = 2.48$, $p = .07$) (Dennis & O'Toole, 2014). This study was limited to game features in attention bias modification training, therapeutic approach to treating anxiety, rather than in the personnel selection context (Dennis & O'Toole, 2014). Self-reported anxiety of participants was measured before and after the game, with no differences in anxiety reported. The study concluded that further consideration of anxiety elicited from being exposed to gamified elements was needed (Dennis & O'Toole, 2014). The levels of anxiety elicited from gamification in the personnel selection context need to be investigated.

In comparison, traditional assessments do not include game features. Personnel selection assessments in general are commonly associated with higher levels of anxiety (Zeidner, 2010). The competition for available jobs naturally increases the impact of the assessment process on individuals' lives. Because traditional assessments do not include game elements to enhance enjoyment and engagement in their design, the following hypothesis is proposed:

Hypothesis 2a: Gamified assessments elicit a lower level of perceived anxiety than their traditional equivalents.

A graphic depiction of the conceptual framework is presented in Figure 1 in the Introduction Chapter.

Situationally Based Applicant Reactions: Perceived Fairness. Situationally based applicant reactions refer to the context in which the assessment is taking place and allude to concepts such as fairness, test usefulness, and job discrimination (McCarthy, Bauer, Truxillo, Anderson et al., 2017; McCarthy, Bauer, Truxillo, Campion et al., 2017). Based on perceived fairness being the most widely researched component relating to situationally based applicant reactions (McCarthy, Bauer, Truxillo, Anderson et al., 2017), it was deemed the most relevant aspect to consider in the present study.

Research into the perceived fairness of organisational processes has been an area of importance within literature and practice for many years (Ellison et al., 2020; McCarthy, Bauer, Truxillo, Campion et al., 2017). Perceived fairness is an extensive concept that is commonly inclusive of procedural justice and distributive justice (Ellison et al., 2020; van Vianen et al., 2004). In the personnel selection context, procedural justice refers to the perception of fairness in the selection procedure that is used to decide upon an applicant (Gilliland, 1993; van Vianen et al., 2004). Distributive justice refers to the perceived fairness of the decision made or to the outcome of the personnel selection process.

Research has shown that perceived procedural and distributive justice have influence on favourable perceived organisational attractiveness, including the likelihood of an applicant accepting a job and whether an applicant is likely to recommend the company to others (Bauer et al., 1998; Konradt et al., 2017; McCarthy, Bauer, Truxillo, Campion et al., 2017). Furthermore, an applicant's reaction to the perceived fairness of an organisational process can influence whether the organisation will face litigation and whether the procedure can be defended

(Chapman et al., 2005; Smither et al., 1993). Essentially, if an applicant has unfavourable perceptions towards the organisation because of feeling the process was unnecessary, unfair, or irrelevant to the vacant job then the applicant can seek guidance in line with labour legislation on how to undertake legal action against the organisation. Therefore, a lack of fairness, transparency or understanding for applicant selection processes can possibly subject organisations to significant implications.

A key aspect of perceived fairness is the concept of face validity (Gilliland, 1993; Nikolaou & Georgiou, 2018; Smither et al., 1993). Face validity refers to the apparent appropriateness of a measure (American Psychological Association, 2020c). Face validity is an aspect of perceived fairness that covers the degree of job relatedness that applicants perceive. Face validity was deemed the most appropriate aspect to measure perceived fairness because the application of game elements to non-game contexts has been scrutinised for the degree of face validity (Fleming et al., 2017). The common perception regarding personnel selection activities is that each step in the process is aimed at uncovering fundamental information involving inherent requirements for the job (Heneman & Judge, 2009Each step in a personnel selection process should be related to the job. Games have the ability to move individuals from a realistic setting to a fantasy environment (Landers, 2020). The removal of realism associated with games reduces the face validity (Fleming et al., 2017). With a gamified measure, the constructs of the measure can be intentionally hidden behind gaming principles (Lieberoth, 2015). The present study, therefore, measures face validity as the perception of fairness.

A paper by Callan et al. (2015) outlines different scenarios in which gamification can and is being used in addition to why gamification might fail. For example, relating to perceived fairness, the research found that negative perceptions of fairness are likely to induce

counterproductive work behaviours, to reduce loyalty towards the company, and to lessen employee trust levels (Callan et al., 2015). Making activities more fun through gamification may reduce user perceptions of fairness and ultimately may result in negative organisational outcomes (Callan et al., 2015).

Organisational justice theory and gamification have been integrated to enhance participation on a crowdsourcing tool (Yang et al., 2018). A recent study developed a model explaining the effects of gamified reward systems on perceived justice (Yang et al., 2018). The theory supporting the model suggests that users who receive rewards during an experience are likely to view the activity as fair (Yang et al., 2018). To the knowledge of the present researcher, perceived fairness as an aspect of applicant reactions has only been considered in one other published study relating to gamification (Georgiou & Nikolaou, 2020). Perceived fairness as part of applicant reactions towards a traditional SJT and a gamified SJT was recently considered (Georgiou & Nikolaou, 2020). The SJT used in this study was a decision-making assessment, exposing users to different scenarios and prompting a selection of choices which measured soft skills such as adaptability. Perceived fairness in the study refers to the level of perceived procedural justice, that is, the degree of fairness that is perceived regarding the assessment for the selection process. Perceived fairness in the study did not consider face validity of the assessment but rather the test's level of justness (Georgiou & Nikolaou, 2020). Applicants who completed the gamified SJT were found to have higher levels of perceived fairness than those who completed the traditional SJT. The study by Georgiou and Nikolaou (2020) concluded that further investigation into applicant reaction elements was needed and since the study was limited to an SJT, investigation into applicant reactions towards other gamified measures was suggested. SJTs are specific assessments that consider decision making and, therefore, the recommendation

is to expand this to additional methods of assessment such as cognitive assessments or motivation inventory assessments. Additionally, the study found that the SJT assessment method (gamified versus traditional) and perceived fairness were mediated by satisfaction of the selection process (Georgiou & Nikolaou, 2020). Higher perceptions of fairness were found for the gamified STJ than for the traditional SJT (Georgiou & Nikolaou, 2020). Furthermore, a study which focused on exploring the assumptions of Gililand's (1993) procedural justice model when using a cognitive gamified assessments found that job-relatedness and opportunity to perform had the strongest relationships with fairness perceptions (Ellison et al., 2020). Ellison et al's. (2016) study suggested that where a gamified assessment does not present clear job relatedness, the organisation will need to take further steps to ensure job relatedness is explained for users to have a positive experience. Organisations that actively consider applicant reactions are likely to be more successful with gamification implementation (Ellison et al., 2020).

Given the contradictory nature of existing theories regarding perceived fairness and gamification and the minimal empirical research, it is evident that more scientific evidence is required, particularly in the personnel selection context. The present study considers perceived fairness as a measure of face validity and as such, the degree to which the assessment is seen as relevant to the workplace. The following hypothesis is proposed, and a graphic depiction of these relationships is presented in Figure 1:

> **Hypothesis 2b**: Gamified assessments elicit less favourable perceptions of fairness than their traditional equivalents.

As mentioned, applicant perspective theory presents a framework whereby personnel selection tests influence applicant reactions, which in turn, affect perceived organisational attractiveness (attitudes, intentions, and behaviours). The model in the present study shows how

applicant reactions elicited from different assessment types (gamified or traditional) can affect perceived organisational attractiveness. Behavioural outcomes are reviewed in the following section.

Behavioural Outcomes from Applicant Reactions

Significant behavioural outcomes elicited from applicant reactions ensure continued investment into applicant reaction research (McCarthy, Bauer, Truxillo, Anderson et al., 2017). The applicant perspective theory shows that an applicant's experience can have significant influence on the level of perceived organisational attractiveness.

Perceived Organisational Attractiveness

Perceived organisational attractiveness comprises aspects that include attitude towards company reputation, recommendation intentions, litigation intentions, lack of future consideration for the company, and organisational support (McCarthy, Bauer, Truxillo, Anderson et al., 2017). According to the research of Hausknecht et al. (2004), the significance of perceived organisational attractiveness can be based on five key arguments: 1. applicants who have experienced poor or invasive placement processes may have a less positive view of the company and possibly consider the position as less attractive, 2. negative applicant reactions could lead the applicant to dissuade others from applying at the same company, 3. applicants may be less likely to accept an offer of employment if they were dissatisfied with the process, 4. the company may be more likely to experience legal complaints following negative placement experiences, and 5. applicants may be less likely to reapply at the company in future or to promote or use products associated with the company if they have had negative placement experiences. Research has shown the significance of applicant reaction on perceived organisational attractiveness, with more than 145 studies indicating significant effects of applicant reactions on applicant

behaviours, attitudes, and intentions towards the organisation (McCarthy, Bauer, Truxillo, Anderson et al., 2017). Applicants who have experienced poor or invasive personnel selection processes are likely to demonstrate negative behavioural outcomes (Hausknecht et al., 2004).

For example, a study considering applicant reactions, fairness and acceptance of job offers had participants complete a series of personality and cognitive assessments, interviews, and group activities (Konradt et al., 2017). The study assessed applicant reactions and perceptions of fairness towards the process pre-and post the assessments. It was found that applicants were less likely to accept job offers from an organisation if they perceived the process to be unfair, $r = .12$. This study indicated that transparency and post-assessment feedback were key contributors to ensuring more favourable applicant reactions. The study found that applicants are more likely to accept a job if there is a clear link between the assessment and the position available, and if they receive feedback on their performance in the selection process immediately after the assessments have been completed (Konradt et al., 2017). The negative behavioural outcomes associated with poorly perceived selection processes warrants the continued investigation into applicant reactions which is a key focus area of the present study.

The Impact of Technology on Perceptions of Organisational Attractiveness: Gamification. Organisations demonstrating technologically advanced processes create more positive perceptions among potential recruits (Fetzer et al., 2017). Demonstration of technology-based business evolution has become an enduring advantage for companies. Gamified assessments in personnel selection processes are an example of technology-based changes. Gamified assessments use digital game mechanics to transform traditional assessments for example aesthetically using fantasy or avatars or through the addition of features such as

leaderboards (Landers, 2020). Therefore, the demonstration of technical advancements is more prominent with novel assessment trends such as gamified assessments (Weidner & Short, 2019).

In addition to gamified assessments being more technology forward than traditional assessments, the game design elements incorporated into gamified assessments are likely to adjust perceptions (Fetzer et al., 2017). A positive personnel selection experience is more likely to produce favourable perceptions of an organisation's level of attractiveness. A recent study reported that higher levels of assessment satisfaction correlated with higher levels of perceived organisational attractiveness (Georgiou & Nikolaou, 2020). A gamified SJT was found to elicit higher levels of perceived organisational attractiveness than a traditional SJT. The use of a gamified SJT in the personnel selection process made the employer appear more desirable (Georgiou & Nikolaou, 2020).

Within the context of personnel selection, applicant reactions (perceived fairness and anxiety) are important and can have a significant influence on perceived organisational attractiveness, including applicants' willingness to accept offers or to refer the company (Hausknecht et al., 2004). In a paper presented at an international conference on gamification, gamification was claimed to be an effective mechanism for attracting high numbers of applicants, improving organisational image, and eliciting positive job-pursuit behaviours from applicants (Chow & Chapman, 2013). While these claims were made, no empirical evidence was presented to support the theory. A scientific study was, however, conducted to review the differences in applicant outcomes between a gamified SJT and a traditional SJT (Gkorezis et al., 2020). This study considered the relationship between different SJTs (gamified and traditional), perceived organisational attractiveness and recommendation intentions. They found that the use of gamification on an SJT in the form of avatars and narratives had a positive effect on perceived

organisational attractiveness and recommendation intentions ($t = 5.51$, $p < .01$). The study called for further research to be conducted based on its limitations. These included its comparison of STJs only measuring specific constructs and its sample comprising individuals within a technology-based industry, which might have enhanced the participants' familiarity with gamified methods. In addition, the authors indicated the need for future research to extend the variables to include other important aspects of applicant reactions such as perceptions of fairness (Gkoreziset al., 2020).

In relation to personnel selection assessment types (gamified and traditional), the following hypothesis is proposed, and a graphic depiction of this relationship is presented in Figure 1:

> **Hypothesis 3a:** Gamified assessments elicit more favourable perceptions of organisational attractiveness than their traditional equivalents.

Applicant perspective theory also shows the mediating relationship of cognitive processes between applicant reactions and perceived organisational attractiveness McCarthy, Bauer, Truxillo, Anderson et al., 2017). Cognitive processes refer to elements of engagement, that is, affect and attentional focus exhibited by test-takers. Engagement as a cognitive process is often considered a component associated with gamification (Fetzer et al, 2017; Looyestyn et al., 2017; Muntean, 2011).

Test-Taker Engagement

Engagement refers to a cognitive and emotional state of focus (Wise et al., 2020). Engagement is the degree of interest, drive, and inclination towards the task being completed (Martin, 2009). A balance is required whereby tasks are challenging enough to maintain user focus but not too challenging whereby users become demotivated or bored (Barzilai & Blau,

2014). Gamification involves the inclusion of game elements into traditionally non-gaming contexts to elicit emotions such as heightened engagement (Fetzer et al., 2017; Looyestyn et al., 2017).

Engagement has been a common variable in gamified studies within the learning and development context (da Rocha Seixas et al., 2016; Krause et al., 2015; Guin et al., 2012; Looyestyn et al., 2017). A systematic review of engagement and gamification studies found 1 017 available studies, mostly conducted in the tertiary education context, and concluded that gamification is effective in increasing user engagement levels when using online programs (Looyestyn et al., 2017). Researchers have investigated how game-based elements might enhance learning, retention of knowledge, and attention by offering a more engaging process (Krause et al., 2015; Looyestyn et al., 2017). A study was conducted in the learning context in which a reward system was introduced to learners to understand if this gaming element improved academic performance (da Rocha Seixas et al., 2016). Participants were exposed to a gamified platform and their behaviour monitored using semi-structured interviews and questionnaires. The gamified platform included a game design element which offered rewards for participants who displayed desired behaviour. The study concluded that learners who received more rewards performed significantly better than students who did not receive rewards. The game element of rewarding desired behaviour increased the engagement of students, and the outcome was higher average performance. Another experimental study, however, found no significant differences in engagement scores when exposing students to presentations with different designs varying from a text-only presentation to a gamified presentation (Guin et al., 2012). An experimental design was used to assess participant reactions to different presentations. While the experiences of the different presentations yielded significantly better enjoyment scores, engagement was relatively

stable in this study (Guin et al., 2012). Further investigation into the relationship between gamified activities and engagement is suggested.

How Games Can Create a More Engaging User Experience. As mentioned, one of the main motivators behind the inception of gamification is to create higher levels of user engagement (Fetzer et al., 2017). The level of engagement in the personnel selection context is not unlike the concept of flow and thus refers to a state of concentration in which feelings, thoughts, and senses are focused on the same goal (Barzilai & Blau, 2014).

An increased level of engagement is predicted to result in important business gains that include employee retention, product awareness, enhanced performance, and talent measurements (Barzilai & Blau, 2014). Furthermore, when engagement is high, the awareness of being assessed is reduced (Csikszentmihalyi & Csikzentmihaly, 1990; Fetzer et al., 2017). Applicants are so immersed in the process that their true behaviours emerge, thus providing organisations with more accurate responses (Fetzer et al., 2017). Engagement levels are also related to behavioural outcomes such as levels of perceived organisational attractiveness (McCarthy, Bauer, Truxillo, Anderson et al., 2017). Applicant perspective theory outlines how negative applicant reactions (high levels of anxiety and low levels of perceived fairness) can reduce focus on the task being undertaken. In turn, a subsequent negative perception towards the organisation can be formed. Engagement is, therefore, an important cognitive process in determining how applicant reactions determine desired outcomes in a personnel selection process.

Gamification invokes motivational affordances that induce behavioural changes (Hamari et al., 2014), for example, the use of a fantasy setting to create an immersive atmosphere and engage users more (Landers, 2020). Previous research in the marketing context highlighted the significant impact of gamification on customer engagement (Eisingerich et al., 2019). The

presence of a gamified marketing platform encouraged increased product sales and financial performance by improving customer engagement. An extensive literature review of empirical studies on gamification concluded that gamification positively affects engagement (Hamari et al., 2014).

In relation to personnel selection assessment types (gamified and traditional), the following hypotheses are proposed, and a graphic depiction of these relationships is presented in Figure 1:

Hypothesis 4a. Gamified assessments elicit a higher level of perceived engagement than their traditional equivalents.

Hypothesis 4b. The relationship between assessment type and perceived organisational attractiveness is mediated by engagement.

Hypothesis 4c. The relationship between applicant reactions (high perceived fairness and low anxiety) and perceived organisational attractiveness is mediated by engagement.

The final component of the model involves a review of the theory of work gamification (Cardador et al., 2017). The theory of work gamification outlines specific relationships that are formed as a result of using gamification within a business practice. The following section finalises the development of the model in the present study by reviewing the theory of work gamification and outlining the mediating variable of enjoyment on the relationship between applicant reactions and test types.

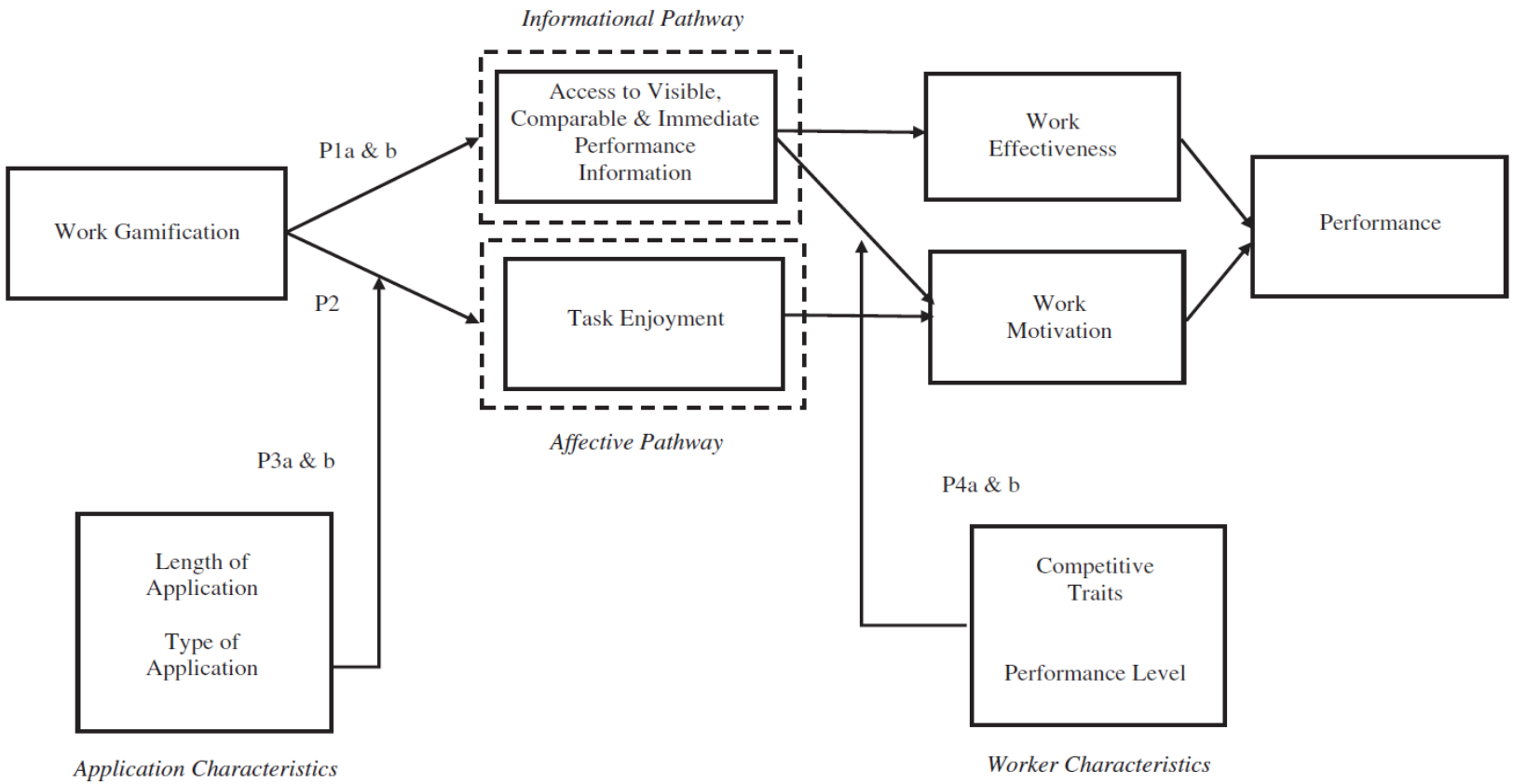
The Theory of Work Gamification

Work gamification outlines how gamification can be used to enhance a traditional performance management system (Cardador et al., 2017) (see Figure 4, without permission to reproduce). The theory of work gamification presents a framework for the relationships between

work gamification, increased access to performance information, and task enjoyment. The theoretical model of work gamification outlines an approach to performance management using two pathways: *affective pathways* and *informational pathways* (see Figure 4 with the arrows showing direction of the expected relationships in the model). Affective pathways increase enjoyment of the task by making them feel playful (Cardador et al., 2017). Additionally, informational pathways, timely access to information, are used to determine how work gamification can provide users with faster access to performance information, thus improving learning and motivation and increasing enjoyment. The model also highlights how the effectiveness of work gamification can be determined by application characteristics and worker characteristics. Application characteristics relate to the length and type of application and worker characteristics refer to the competitive traits and performance level of users (Cardador et al., 2017)

Figure 4

The Theory of Work Gamification (Cardador, Northcraft & Whicker, 2017)



The theoretical model of work gamification provides an extensive overview of key considerations for the implementation of gamification. However, the theory of work gamification does not consider applicant perceptions and was not built in the personnel selection context for gamified assessments. Nonetheless, the model offers a solid framework for considering elements that are important to gamification principles and was thus considered appropriate.

Enjoyment as a Mediating Variable for This Model. Enjoyment can be defined as an experience that results in a positive reaction based on physiological and cognitive dimensions (Barzilai & Blau, 2014). Enjoyment of user experience refers to elements of sensory delight, suspense, thrill, and relief together with achievement control and self-efficiency (Ritterfeld & Weber, 2006). Gamification uses game-based elements to create a more enjoyable user experience (Seaborn & Fels, 2014).

Enjoyment may result from stimulated sensory delight, suspense, or achievement, which is why it is a key motive within the creation of digital games (Barzilai & Blau, 2014). More specifically, game features such as fantasy, avatars, points, and levels are used to invoke higher levels of enjoyment (Cardador et al., 2017). For example, adding levels (a game element) to an activity is likely to promote vigour and dedication thus increasing enjoyment when completing the task. Game features like levels and leaderboards, therefore, create challenges and thrills which encourages risk-taking and fosters enjoyment (Ritterfeld & Weber, 2006).

How Game Elements Can Influence Applicant Reactions by Being More Enjoyable. The concept of enjoyment has become a more prominent research focus with modern advances, particularly with reference to gamification (Cardador et al., 2017). Gamified solutions are created with a user-centric focus (Dale, 2014). When creating gamified solutions, game elements are used to create more favourable user experiences (Dale, 2014; Fetzer et al., 2017). The

creation of more favourable user experiences is highlighted in the theory of the work gamification model in which gamification is explained as working through a central pathway called the affective pathway (Cardador et al., 2017). Affective pathways refer to the input that aids in creating more intrinsically motivating work. In a gamified context, affective pathways refer to the use of game features that make work activities more enjoyable (Cardador et al., 2017) and enhance candidate experience through elements such as immersive scenarios (Bersin & Chamorro-Premuzic, 2019). Elements of applicant reactions (perceived fairness and anxiety) are influenced by concepts such as *enjoyment of user experience* (Woods et al., 2020). However, there is currently no research on the mediating relationship between enjoyment in a work context and applicant reactions. As such, the following hypothesis is presented:

> **Hypothesis 5a.** The relationship between assessment type and applicant reactions (high perceived fairness and low anxiety) is mediated by perceived enjoyment.

Many user-centric designs reflect how businesses have shifted to using processes that provide benefits for not only the company but also the applicants (Gkorezis et al., 2020). Game-based features are used to invoke the same psychological experiences as those elicited through traditional games (Huotari & Hamari, 2012). Sensory stimulation, interactive problem solving, uncertainty, and technology-enabled features are all elements indicative of gamified assessments (Fetzer et al., 2017). Gamification is the process of redesigning an activity, originally for business purposes only, with game-based features that are likely to elicit higher levels of enjoyment among users. As such, gamification is designing an activity to offer a higher level of enjoyment than its traditional version. The following hypothesis is, therefore, presented:

> **Hypothesis 5b.** Gamified assessments elicit a higher level of perceived enjoyment than their traditional equivalents.

How Game Elements Can Influence Perceived Organisational Attractiveness by Being More Enjoyable. Enjoyment of user experience as a key consideration in the personnel selection process emphasises the scarcity of talent in the market and the level of competition among organisations. As mentioned, there is discussion regarding whether enjoyment is perceived as relevant in the workplace (Dale, 2014). Some applicants feel that the emotions elicited by games do not match those elicited when working and, therefore, they question the acceptability of a game being used for non-game contexts. The present study aims to explain whether enjoyment influences perceptions of the organisation's level of attractiveness.

The present study and the theoretical model of work gamification (Cardador et al., 2017) considered how enjoyment mediates the relationship between the type of assessment and behavioural outcomes. The behavioural outcomes investigated in the present study are applicant reactions and perceived organisational attractiveness. The following hypothesis is, therefore, proposed, with a graphic depiction in Figure 1:

Hypothesis 5c. The relationship between assessment type and perceived organisational attractiveness is mediated by perceived enjoyment.

Figure 1 (Chapter 1) is a graphic depiction of the proposed relationships discussed above and the model created based on the theory of work gamification and the applicant perspective theory. The subsequent chapters investigate the expected relationships presented in the model.

Chapter 4: Method

The Method Chapter outlines the way in which the study was conducted. Chapter 4 presents the research design used and the procedure followed. Furthermore, the chapter describes the sample, the measures used and the data analysis that was executed.

Research Approach and Design

A deductive approach was followed for the present study since existing theory was drawn upon to develop new hypotheses (Kirk, 2009). A deductive approach was followed because existing research was accessed for the purpose of the current study.

The aim of the present study was to understand the relationships that exist between the independent variable (different test types—gamified and traditional) and the dependent variables (applicant reactions and perceived organisational attractiveness). To achieve this, a research design that offers a high level of control over the independent variable and comparisons across random independent groups was needed (Field, 2018). Considering the objectives and the need for control, an experimental design was deemed appropriate. To maximise experimental variance and to isolate the explanation of differences, the MAX-MIN-CON principle was followed (Kerlinger, 1986; Krumwide, 2002).

Maximisation (MAX) of experimental variance was achieved using an experimental design to isolate the explanation of differences. Experimental research is the systematic investigation of cause-and-effect relationships through the manipulation of an independent variable under controlled conditions (Field, 2018). It involves the random assignment of individuals to a control group with no treatment administered and the random assignment of individuals to an experimental group in which treatment is administered and thereafter observing the impact of manipulation of the independent variable across these conditions (Highhouse,

2009). An experimental design is considered one of the most effective research methods in eliciting objective, reliable, and relevant findings from tests of theory in specific environments (Bryman & Bell, 2015). An experiment helps with determining if different variables influence the research results and offers researchers a high degree of control over these variables (Field, 2018).

Referring to the MAX-MIN-CON principle, MIN involves a review of strategies for reducing error variance (Krumwide, 2002). For example, to attempt potential bias from entering the present study random assignment of respondents to each experimental group was done (Highhouse, 2009). Random assignment was achieved by using the computer-based program Microsoft Excel to assign respondents randomly to a research group through either the number zero (the control group) or the number one (the experimental group).

CON refers to the control of extraneous variance in variables (Krumwide, 2002). In the present study, this was done by attempting to limit the artificiality of the study, therefore attempting to create a realistic personnel selection process, and by ensuring a basis for comparison between conditions (a gamified versus a traditional values assessment; Krumwide, 2002). The assessment involved emailing links to complete the assessments, thus representing a realistic personnel selection process. Furthermore, a control group comprising individuals who completed a non-gamified, traditional assessment was included in the analysis to allow for determination of effects due to the experimental variable.

In summary, an experimental design was used with a cross-sectional time dimension to investigate the relationship. Data were collected through self-report assessments and surveys.

Respondents and Sampling

The present study aimed to target a sample of the population that will likely be exposed to a personnel selection process. In the South African context, graduate unemployment has been increasing gradually, indicating that a growing portion of those looking for work are university or college students (Boccanfuso et al., 2015). While this experiment involved data collection from students from a South African university in the Western Cape the study aimed to take a less narrow view then just the South African context as applicant reactions are global concerns. Therefore, the South African context of the study will not be discussed in the present study. Students were deemed appropriate since they represent a large portion of the global population that is in the job market, and they are thus likely to be subjected to placement processes (Boccanfuso et al., 2015). Hence, this experiment involved students for data collection.

Convenience sampling was used to select respondents; all students within the university where the study was conducted were invited to partake in this study. The university where the study took place offers a research service in which the entire student population receives email communication about specific research initiatives and studies which they can partake in, and those who are interested can volunteer. This is a form of non-probability sampling characterised by the process of sample selection being based on simplicity and accessibility (Highhouse, 2009).

In line with the process of convenience sampling, there was no selection of specific groups through demographic categories or faculties, and all students were given an equal opportunity to be involved. However, there is the risk of introducing sampling bias with this type of sampling and the generalisation of results may be limited (Cozby, 2009). While a laboratory setting was considered due to the increase in control over variables that it offers, a remote survey

format was selected to increase the external validity or generalisability of the study. Therefore, convenience sampling was deemed most suitable.

All university students were approached since most of the students would be entering the job market after graduation. A remote survey allowed for a wider reach of participants (Braun et al., 2020). Furthermore, remote assessments are more authentically associated with real-life personnel selection processes (Woods et al., 2020). Organisations, globally, are moving away from using in-person assessments in favour of more technologically advanced solutions (Landers, 2019b). The present study aimed to make this process of assessment as authentic and genuine as possible and, therefore, did not monitor control over assessments in a laboratory setting.

There are an estimated 28 600 students enrolled at the university (About UCT, 2020); 1 000 students participated in the study by responding to the initial email inviting them to participate, giving a response rate of 3.5%. The response rate of the present study is low; however, this is considered as not uncommon in survey method research, particularly online surveys (Anseel, Lievens, Schollaert & Choragwicka, 2010; Gabriel, Podsakoff, Beal, Scott, Sonnentag Trougakos & Butts, 2019). Additionally, to increase the sample, reminder emails were sent out to encourage participation and completion of the survey.

Of the 1 000 students who volunteered, 159 completed both the assessment and the survey with usable data. All responses were screened based on duration by filtering out, using Microsoft Excel, responses that were less than 8 minutes in total duration. Responses that were less than eight minutes were regarded as careless responses and were removed so that results were not negatively affected. The dropout rate was 84.10%. University students (N = 159) were randomly assigned to complete either a traditional assessment (n = 81) or a gamified assessment

(n = 78). The sample was split 69% female (N = 110) and 30% male (N = 47), with two candidates not providing sex. Of the sample, 68% had an undergraduate degree (N = 50) and 26% had a postgraduate degree (N = 19). See Table 2 below for a more detailed summary of the sample demographics.

English is the primary language medium of teaching, examination, and literature at this institution (University of Cape Town, 2013) and, therefore, all the survey components of this study including the assessments were only offered in English.

Procedure

The study gained ethical clearance from the relevant university (see Appendix A). The study did not pose any ethical threats to the respondents, participation was optional, and all data were collected anonymously as no identifiable information, such as names, surname, or student identification number, was collected. Previous research has shown that clarity regarding the study purpose and reassurance about confidentiality shows researcher professionalism and increases participation rates (Saleh & Bista, 2017). Therefore, written consent was obtained to use a gamified assessment to collect the necessary data contingent upon the organisation and the gamified psychometric measure remaining anonymous.

The consent form (see Appendix B) informed the respondents that the process was voluntary, and they had the right to withdraw at any time. The aim of the study was stated as ‘how individuals experience new assessments used in selection’, and this intention was communicated to the respondents to ensure transparency of the study. As suggested by previous research, the consent form was written clearly and provided study transparency with the aim of encouraging participation by reducing anxiety and ambiguity (Saleh & Bista, 2017). The student population of this Western Cape university was invited to partake in the study through an email

invitation and while participation was voluntary, the students were offered a lottery prize to participate. The use of rewards or incentives is common in web-based survey processes to increase participation rates (Saleh & Bista, 2017). The incentive in this study was a chance to win one of five R500 shopping vouchers.

As previously mentioned, students who volunteered to participate were randomly assigned to either the experimental group (gamified assessment) (see Appendix C) or the control group (traditional assessment) (see Appendix D). Table 2 shows the sample characteristics for the experimental group, the control group, and the combined data.

Random assignment of the 159 respondents was achieved by using the computer-based program Microsoft Excel to assign respondents at random to their research group through either the number zero (the control group) or the number one (the experimental group).

Once all the respondents had been randomly allocated to a group, emails were sent to them. This method followed the structure outlined in recent research that considered applicant reactions between a traditional and a gamified SJT (Gkorezis et al., 2020). The method outlined in this previous study involved emailing each respondents an assessment and upon completion of the assessment, another email was sent with a questionnaire measuring their reactions and demographics. Similarly, in the present study, each respondent received an email with instructions to complete the consent form, the assessment, and the questionnaire. As much information as possible was provided in a clear and precise manner. This was done to increase completion rates (Saleh & Bista, 2017). The information included guidance for completing the study, the aim of the research, notes on security of the data and the respondents' identities in addition to an indication of the time required for the process, which differed for each group.

Previous research comparing a traditional SJT and a gamified SJT outlined that the gamified assessment required the additional step of logging onto a company website (Gkorezis et al., 2020). The present study required a similar additional step. For the experimental group, the email sent included login details and a website address together with the questionnaire link. For the control group, the assessment was built using the electronic survey tool Qualtrics and contained a link to a Qualtrics questionnaire and the perceptions questionnaire. All the data were collected using Qualtrics. The data collection process involved two steps for both the control group and the experimental group. Each group completed a personal values assessment that was either traditional or gamified in nature. Thereafter, all respondents completed an additional questionnaire to determine their perceptions of the assessment experience. The traditional or gamified assessment value outcomes were not considered; only perceptions of the assessment experience were investigated.

In terms of the duration of the process, the gamified assessment was longer in nature due to the story that was included in the process. As such, the entire process for the experimental group took 45 minutes on average: 30 minutes for the gamified values assessment and 15 minutes for the questionnaire on demographics and applicant reactions. The entire process for the control group was shorter, with the traditional values assessment taking 15 minutes and 15 minutes for the questionnaire on demographics and applicant reactions.

Table 2

Demographic Frequencies of the Sample

		Condition					
		Experimental (Gamified)	Experimental (Gamified)	Control (Traditional)	Control (Traditional)	Combined	Combined
Demographic	Category	Frequency	%	Frequency	%	Frequency	%
Sample	Total number	78	49.06	81	50.94	159	100
Highest level of education	High school	5	6.41	6	7.41	11	6.92
	1st year undergraduate	14	17.95	13	16.05	27	16.98
	2nd year undergraduate	13	16.67	14	17.28	27	16.98
	3rd year undergraduate	11	14.10	12	14.81	23	14.47
	4th year undergraduate	9	11.54	13	16.05	22	13.84
	Postgraduate	4	5.13	6	7.41	10	6.29
	Honours	12	15.38	7	8.64	19	11.95
	Master's	8	10.26	9	11.11	17	10.69
	Doctorate	0	0	1	1.23	1	0.63
	Professional qualification / Certificate	0	0	0	0	0	0
	Other	2	2.56	0	0	2	1.26
Sex	Male	29	37.18	18	22.22	47	29.56
	Female	48	61.54	62	76.54	110	69.18
	Prefer not to answer	1	1.28	1	1.23	2	1.26
Ethnicity	Asian	4	5.13	6	7.4	10	6.29
	Black	27	34.62	36	44.44	63	39.62
	Coloured	20	25.64	9	11.11	29	18.24
	White	25	32.05	28	34.57	53	33.33
	Other	2	2.56	1	1.23	3	1.89
	Prefer not to answer	0	0	1	1.23	1	0.63
Do you have work experience?	Yes	52	66.67	57	70.37	109	68.55
	No	26	33.33	24	29.63	50	31.45
Do you foresee applying for jobs in the next 12 months?	Yes	54	69.23	59	72.84	113	71.07
	No	24	30.77	22	27.16	46	28.93

Experimental Control Measures

Various measures were employed in the present study to enhance the internal and external validity. Internal validity is defined as the extent to which the internal structure of a study is free from flaws and the results obtained within a controlled setting are sound (American Psychological Association, 2020d). External validity refers to the generalisability of the results obtained beyond the sample that generated them (American Psychological Association, 2020b). In terms of instructions, all respondents were provided with the exact same detail prior to completing the assessments. The nature of the study, the aim and the criteria for participation were consistent. As per research guidelines, consistency in data collection processes enhances participant experience and produces more accurate results (Makel & Plucker, 2017). Results are not easily generalised or reproduced when inconsistent research methods are deployed. The present study ensured consistency in the instructions that were provided to both conditions.

Research guidelines also suggest transparency when collecting data (Makel & Plucker, 2017). Transparency was provided regarding the research purpose, aim, and intended outcomes. The only information omitted was regarding which assessment each group was to receive, the participants were not made aware that they would receive one of two assessments, either a gamified assessment or a traditional assessment. As in the study of Gkorezis et al. (2020) either a traditional SJT or a gamified SJT was allocated, this study followed the same method of withholding that there were two types of assessments available from the respondents. Research has shown that the presence of games and technology elicits more favourable reactions among students (Landers & Armstrong, 2017). To avoid pre-emptive perceptions regarding the assessment versions such as which assessment is more or less attractive, the assessment given to

each group was not indicated, each group only completed one of the assessments and were unaware of the other assessment version.

Additionally, both the assessments used (gamified and traditional) measured the same construct, personal values. This was the same process followed by a study comparing SJTs (Gkorezis et al., 2020) whereby a traditional assessment and a gamified assessment both measuring resilience, adaptability, flexibility, and decision-making were used to assess candidate perceptions. Each participants' outcome from the value-based assessments was not considered in the present study, for example it remained unknown with the present study if the individual was orientated towards being more benevolent versus power oriented. However, to enhance fairness and to standardise comparisons across conditions, the same construct, personal values, was measured on both the gamified and the traditional assessment.

Finally, to control for the sample being representative of potential recruits or job seekers, the following question was included, "*Do you foresee applying for jobs in the next 12 months?*" This was done to determine if respondents were in a job-seeking mindset. As in the study of Gkorezis et al. (2020), participants were instructed to consider themselves as applicants for a job vacancy.

Instruments

The assessments used in this research were carefully selected to ensure a difference in experience between a traditional assessment and a gamified assessment. Furthermore, the scales measuring the constructs in this experimental model were selected so that items accurately reflected the perceptions of the respondents. Since English is the universal language, all instruments remained in English and there was no need for translation (Davis, 2013). Together, the study instruments included a traditional personal values assessment, a gamified personal

values assessment, and an applicant perception and behavioural outcomes questionnaire. Specifically, this questionnaire measured perceived fairness, enjoyment, anxiety, and perceived organisational attractiveness and sought demographic information. The instruments and scales used to measure the variables in this study are described below.

Values Assessments

The Gamified Personal Values Assessment

To conduct this research, access to a proprietary gamified vales assessment was granted by a large financial company that will remain anonymous. As a result of financial restraints and expertise a custom game was not built for the purpose of the present study. The finance company did not allow for validity and reliability testing of the internal assessment mechanics and requested that user access to the assessment was anonymous. Thus, no personal data, such as participant names or email addresses were captured when links to the assessment were shared.

Development of the Game. Gamification involves the use of game features, such as leaderboards, point systems, avatars and / or storytelling, in non-gaming systems to improve applicant experiences (Deterding et al., 2011; Landers, 2014). The gamified assessment used in the present study was built to enhance user experience by employing gaming elements, particularly a fantasy theme, storyline, and suspenseful music, to measure a psychological construct, personal values (Company A, 2020). The gamified assessment used in the present study was developed to assess an individual's personal values using psychometric principles and is a gamified version of a traditional values assessment (Company A, 2020).

Theoretical Basis. This assessment measures personal values based on spiral dynamics theory (Beck & Cowan, 2014). Spiral dynamics theory considers how individuals oscillate between lower- and higher-order behaviour systems when confronted with problems (Beck &

Cowan, 2014). The personal values measured in spiral dynamics theory are defined as a complex set of beliefs that motivate an individual's decisions regarding right and wrong (Beck & Cowan, 2014). The theory used for the gamified assessment outlines eight value orientations with which an individual can be aligned. These eight orientations (from the bottom of the spiral upwards) are survival, security, power, order, success, community, synergy, and holistic (Beck & Cowan, 2014).

The value orientations outlined in the assessment are linked to traits, ideas, and preferences that individuals draw on to make decisions (Beck & Cowan, 2014). The decisions that an individual makes and the motives behind these decisions are reflected in their behaviours. Personal values are inherent principles that individuals let govern their actions, and consideration of these values in a work context is becoming significantly prominent (Beck & Cowan, 2014).

Design, Aesthetics and Internal Mechanics of the Gamified Assessment. The gamified assessment used was developed by a South African-based team of industrial psychologists and psychometrists within a large financial institution. The gamified assessment was not built for the present research paper but for commercial use. The intentions for developing a gamified assessment were threefold: (a) the team wanted to be able to offer a more positive assessment experience to users and clients; (b) the organisation wanted an assessment that was digitally enabled and in line with new global assessment trends; and (c) the organisation wanted an assessment that measured behavioural traits that are important within the work context (Company A, 2020). Therefore, a gamified values assessment was developed.

The assessment was developed using game-based principles. the gamified assessment that was used in the present study incorporates colourful graphics throughout, characters, a storyline and audio stimuli in the form of a narrative and music. The graphics and storyline draw

on a comic-book theme. The use of graphics, music and storyline are attributes of game fiction, a fictional game world in which players experience adventure, monsters, and immersion (a perceptual experience of a space adventure in real-time) (Landers, 2014). Furthermore, game attributes of rules, clearly defined goals to be achieved, and challenges and problems experienced by players are evident in the storyline that has missions for players to complete (Landers, 2014). There is a central story that follows the actions of a team that completes six intergalactic missions to save the universe. To complete the missions and to move ahead in the assessment, there are decisions that need to be made regarding the course of action to take. Users are presented with only two options for every decision and are required to select one before proceeding. Once the selection is made, the user continues to read the story until the next question is prompted with no additional feedback or outcome on the choice provided. The decisions are made purely by the candidate and no consequences follow based on any of the user's choices.

In summary, the designers of the gamified assessment used in this study drew on game attributes to incorporate specific elements into an assessment activity, thereby transforming it into a gamified measure. As outlined by the taxonomy of gamification research (Bedwell et al., 2012), a values assessment was developed by borrowing attributes commonly associated with video games, thus transforming a traditional assessment into a gamified assessment.

Furthermore, regarding the development of the gamified assessment, the assessment was created to be used on a global scale (Company A, 2020). Since the assessment was developed for global use, the developers tried to reduce cultural bias by opting for a space-themed assessment. The rationale behind a space-themed environment was that the developers considered space to be

a neutral and unbiased setting, an unfamiliar place for most individuals since few have been to space (Company A, 2020).

Additionally, the assessment was developed in English, a universal language (Al-Dabbagh, 2005), so that it could be used more extensively across the globe. While the assessment was developed by a South African-based team, it was not built with the intention of being used only in the South African context but rather across all countries. The level of English offered was set at a high-school reading level to target both younger and older individuals who are entering or who have entered the job market (Company A, 2020). An example of an item showing the language and reading level in the gamified assessment is, “You agree and play it safe?”

The gamified assessment was designed to take approximately 30 minutes to complete the entire assessment. The gamified assessment uses a forced choice, users could not complete the assessment unless all the decisions prompted were made, and self-reporting, the user would answer individually based on their opinion and judgement, approach. Players are presented with a story that they read through. While reading the story, as players read the story they become prompted with questions, 90 in total, that have two choices. The instructions for this gamified assessment only allow one of the two choices to be selected. For example, the first question of the gamified assessment asks users to choose what they consider the best option when confronted with danger: “You agree and play it safe” or “You make a run for it” (see Appendix C). In line with standard assessment guidelines, to ensure consistency and fairness among users (International Test Commission, 2001), all the players are presented with the same 90 questions. The choice of answer does not alter the game storyline or the order of the questions. There is consistency throughout the gamified assessment regardless of the choices that the players make.

The standard scoring method for this gamified assessment followed an *ipsative* forma. An ipsative scale refers to a scale in which the points distributed to the various items must total the same specific score (American Psychological Association, 2020e). When compared with normative scales, which are recommended when evaluating traits across individuals, ipsative assessments are more relevant in evaluating traits within individuals (Watrin et al., 2019).

The gamified assessment is based on the six value orientations that it measures. The assessment follows a storyline that involves players completing six missions that take place on six different planets. Each planet is aligned with one of the six value orientations. For example, the first planet that users visit is known as the *purple planet*. On this planet, one of the two options that uses can select per scenario is always aligned to the value orientation of *security*. Therefore, out of the ten items on the purple planet, five of the items are related to security with the remaining five items aligning to one of each of remaining value orientations. There are thus 10 items or choices per planet. The scoring is such that players accumulate points towards each of the six value orientations. For example, if they are on the first planet, they will accumulate points for that value and on the second planet, they will accumulate points towards the second value. Should a player select an item that is the same value orientation as the planet, then a score of three is assigned to that value orientation. For example, when on the purple planet, if the user selects the option related to security, then they will accumulate three points. A score of zero is assigned when the value orientation of a selected item does not match the value orientation of the planet.

The Traditional Personal Values Assessment. The traditional assessment used was the self-report value orientation measure of Schwartz (2003). The Schwartz value orientation measure is based on the theory that values are beliefs or goals that motivate action and serve as

standards for behaviour (Schwartz, 2012). Fundamentally, the theory outlines 10 broad personal-related values that underlie human behaviours. These 10 values are self-direction, stimulation, hedonism, achievement, power, security, conformity, tradition, benevolence, and universalism.

The traditional values assessment comprised 21 items and was deemed appropriate because it allowed for ‘same construct’ comparison. The values used in the traditional assessment were the same as the personal values measured in the gamified assessment, universalism, benevolence, conformity, tradition, security, power, achievement, hedonism, simulation, and self-direction (see Appendix C). Responses were measured using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). An example of an item from the traditional values assessment is, “Thinking up new ideas and being creative is important to me”. Furthermore, the Schwartz Value Survey is, commonly, the most used method of measurement in values research and has been used across many different cultures to collect data (Lindeman & Verkasalo, 2005; Malka et al., 2014).

A previous study using the Schwartz values scale in the South African context indicated test retest and internal reliability coefficients ranging from .58 to .78 across the value types (Becker et al., 2017). Regarding validity, confirmatory factor analysis showed 26% of the items inter-correlations were greater than .80 and the assessment was considered appropriate for measuring values The Schwartz values scale showed potential in the South African context (Becker et al., 2017) and the previous reliability and validity analysis was considered sufficient for the present study. This was because the assessment was only a treatment in the present study and the outcomes from the assessment were not a dependent variable. As such the Schwartz Value Survey was deemed appropriate for this study.

Comparison: Modular Framework Elements. A modular framework (Lievens & Sackett, 2017) was used to differentiate traditional and gamified assessments earlier in the present study. With specific reference to the assessments used in the present study, a comparative table based on the modular framework is presented (see Table 3).

Regarding the seven predictor factors, the gamified assessment differed in its stimulus format and key contextualisation factors from the traditional assessment (see Table 1). Stimulus format refers to the presentation of an assessment to users (Lievens & Sackett, 2017). There are six stimulus formats: textual, pictorial, auditory, dynamic audio-visual, video conference / remote interactive, and face-to-face interactive. In a comparison between the traditional assessment and the gamified assessment, the gamified assessment drew on more stimulus formats than the traditional assessment. The traditional assessment used in the present study had a textual-only (black and white colouring) stimulus format that is computer-based but which has no auditory or sound, pictorial, or dynamic audio-visual stimuli. In comparison, the gamified assessment had an auditory section in which the mission that the user needed to complete was narrated to them, and music played throughout the assessment to build suspense. The gamified assessment also used dynamic audio-visual features to present the graphic comic-book theme and colourful pictures throughout the game which included space-themed characters and an outer space setting. Finally, the gamified assessment used textual-based stimulus for users to read the storyline which appeared in comic style speech bubbles and narrative blocks.

Contextualisation is defined as the authenticity of a measure, thus the degree to which the test stimuli are represented in a realistic and detailed fashion (Lievens & Sackett, 2017). Contextualisation was the second main differentiator between the traditional and the gamified assessment in the present study. The traditional assessment used generic items and had a high

level of contextualisation. The questions were presented in a more direct and obvious manner to respondents. In comparison, the gamified measure followed a story set in outer space and thus had a low level of contextualisation. A mission in space is not what candidates would see in the workplace (Company A, 2020). In addition, the presentation of items in the gamified assessment was opaque in that the meaning behind the questions was not obvious. For example, the traditional assessment asked for the level of agreement for the item measuring egocentricity with, "I look for adventures and like to take risks". However, the gamified assessment measured the same value by asking players to decide if they wanted to risk their team's safety by "making a run for it" over a dangerous land or not put their team at risk by "playing it safe" and going through a cave. As demonstrated in the example, the link to the workplace with the gamified assessment is less clear due to the storyline that is used (Company A, 2020).

Regarding the remaining predictors from the modular framework (Lievens & Sackett, 2017), the stimulus presentation consistency was fixed, and a closed-ended response format was used for both assessments in the present study. All candidates were given the same questions. Scoring was automated for the gamified assessment whereas manual scoring was employed for the traditional assessment. The gamified assessment used a computerised scoring algorithm to count the scores, thus providing respondents immediate feedback on their value orientation. The traditional assessment responses needed to be counted manually by the researcher to obtain a score. Originally, the traditional assessment was a paper-and-pencil assessment, but it was adapted to a computerised version for this research, which allowed for remote administration of the assessment. According to Makel and Plucker (2017), remote survey methods are used to increase the number of applicants reached. For both the gamified assessment and the traditional

assessment, the information source is self-reported. All instructions were clear and specific for both the value assessments used in the present study.

Table 3

Comparison of the Traditional Values Assessment Against the Gamified Values Assessment Using a Modular Framework

Assessment type	Stimulus format	Contextualisation	Stimulus presentation consistency	Response format	Response evaluation consistency	Information source	Instructions
Gamified	Textual tests Pictorial tests Auditory tests Dynamic audio-visual tests General sensory stimuli (Fetzer et al., 2017) Aesthetics (Landers, 2020)	Decontextualised Fantasy (space theme) Avatars (alien characters)	Fixed	Closed-ended	Different automated scoring formats	Self-report	Specific information
Traditional	Textual	Generic items	Fixed	Closed-ended	Different automated scoring formats	Self-report	Specific information

Applicant Reactions. The present study measured applicant reactions using two subscales: perceived fairness and anxiety. Favourable applicant reactions would indicate high levels of perceived fairness and low levels of anxiety (See Appendix E).

Perceived Fairness. Perceived fairness was measured with five items adapted from the study of Smither et al. (1993). As explained in previous chapters, perceived fairness is a broad construct and can be measured using subscales such as procedural fairness, substantive fairness, and face validity. For the purpose of this research, perceived fairness was measured using face validity items (Smither et al., 1993). To date, face validity as an aspect of perceived fairness has not been considered when comparing a traditional assessment with a gamified assessment and was deemed an acceptable way of providing novel insights to gamification effects.

The perceived fairness scale assesses participants'/respondents' perceptions of the procedural justice of selection methods (Nikolaou & Georgiou, 2018). A sample item from the original research is, "It is obvious that the examination is related to the job". The original five-item scale assessed the face validity of tests using a self-reporting mechanism. Respondents were asked to indicate their level of agreement for the items on a five-point Likert scale. Responses for the scale ranged from 1 (strongly disagree) to 5 (strongly agree) with a scale mid-point of 3.00 (see Appendix E). The item scale was anchored such that a higher level of agreement indicated more favourable perceptions of fairness towards the assessment. Three of the items from the original research were worded to suggest low perceptions of fairness and were, therefore, reverse scored during analysis. These items were "I did not understand what the examination had to do with the job", "I could not see any relationship between the examination and what is required in the job", and "There is no real connection between the examination that I went through and the job".

The five items had a high Cronbach's alpha of .86 (Smither et al., 1993). More recently, these items were used to understand applicant perceptions of job interviews with a Cronbach's alpha of .80 and an acceptable fit displayed from a confirmatory factor analysis: $x^2 = 347.53$, $df = 113$, $p = .00$; CFI = .91 (Hiemstra et al., 2019). Given the acceptability of this analysis (Hiemstra et al., 2019) and the extensive use of the scale (Gkorezis et al., 2020; Hiemstra et al., 2019; Schinkel et al., 2016), this measure was deemed appropriate for the present study.

The items from the original scale were adapted; items referring to an 'examination' were changed to refer to an 'assessment'. For example, the original item, "I did not understand what the examination had to do with the job" was adapted to, "I did not understand what the assessment had to do with the work context". See all perceived fairness items in Appendix E.

Anxiety. Anxiety was measured with five items adapted from the study of Cassady and Johnson (2002). The original scale consisted of 27 items, with an example item being, "While taking a test, I feel confident and relaxed". Respondents were asked to indicate their level of agreement with each item on a five-point Likert scale. Self-reported responses for the anxiety scale ranged from 1 (strongly disagree) to 5 (strongly agree) with a scale mid-point of 3.00 (see Appendix E). The item scale was anchored such that a higher level of agreement indicated a higher perception of stress regarding the assessment experience. One of the items was worded to suggest low anxiety and was, therefore, reverse scored during analysis: "While taking the assessment, I felt confident and relaxed". See all anxiety items in Appendix E.

Regarding the applicant reaction variable, when aggregated with perceived fairness, the anxiety scale was coded differently. To reflect favourable applicant perceptions accurately, the anxiety scale was coded so that a high score on the scale indicated low levels of stress. When anxiety was aggregated with perceived fairness to create the applicant reaction scale, the

following four items were reverse coded: “During the assessment, I had the feeling that I was not doing well”, “During the assessment, I found myself thinking of the consequences of failing”, “During the assessment I was anxious about how I would perform”, and “During the assessment, I find myself wondering whether the other applicants are doing better than I am”. The internal consistency of this 27-item scale was strong, with a Cronbach’s alpha of .92. Factor loadings showed that all correlations were $r = .35$ or higher and, therefore, the scale was considered a valid and reliable measure of anxiety (Cassady & Johnson, 2002).

This scale was specifically adapted for the assessments used in the present study. Not all the items were deemed appropriate for these assessments and ultimately, only five items were selected for the final scale. The assessments measured personal values and, therefore, questions relating to grades and score were not relevant. Furthermore, this reduced the length of the questionnaire since shorter questionnaires are more likely to elicit more usable responses (Makel & Plucker, 2017). The original 27-item scale was developed in an examination context and was, therefore, adapted to refer to assessments in the work context. An item example is, “While taking the traditional assessment, I felt confident and relaxed”. See all anxiety items in Appendix E.

Perceived Organisational Attractiveness. Perceived organisational attractiveness was measured using four items. One item, “Based on my experience with the assessment I would encourage others to apply for employment with the company”, was adapted from Smither et al. (1993) and the three remaining items were adapted from the study of Schwoerer and Rosen (1989). Responses for this scale ranged from 1 (strongly disagree) to 5 (strongly agree) with a scale mid-point of 3.00. The item scale was anchored such that a higher level of agreement indicated more favourable perceptions of the organisation using the assessment.

The three items from the study of Schwoerer and Rosen (1989) have been adapted and used in recent research that considered the perceptions of respondents regarding e-recruitment (Harrison & Stone, 2018). In this study (Harrison & Stone, 2018), a Cronbach's alpha of .89 and an acceptable confirmatory factory analysis fit of .98 was recorded and as such, the items were considered appropriate. Furthermore, these items were considered relevant since previous research has adapted them for use in the South African context (de Waal, 2018). The latter considered how happiness at work can increase perceptions of organisational attractiveness (de Waal, 2018), and the items of Schwoerer and Rosen (1989) were adapted to understand this relationship in the South African context. The previous analysis (Harrison & Stone, 2018) and cross-cultural adaptation (de Waal, 2018) motivated the use of these items in the present study. An example item from this scale is, "I would sign up for an interview with the organisation".

For the purpose of the research in the present study, items were adapted to refer to the assessment experience. This was done to reduce ambiguity and to enhance clarity of the research questions (Makel & Plucker, 2017). An example of the adapted items is, "I would sign up of an interview with the organisation based on my experience with the assessment".

Enjoyment. Enjoyment was measured with three items adapted from the scale of Barzilai and Blau (2014) measuring the same concept and three items from the Smither et al. (1993) affect scale.

The three items for enjoyment had a Cronbach's alpha of .88 (Barzilai & Blau, 2014) and the three items for affect had a Cronbach's alpha of .70 (Smither et al., 1993). These analyses were deemed appropriate and, therefore, this scale was used in the present study. Furthermore, the enjoyment scale was specifically developed and used to assess a game-based experience

(Barzilai & Blau, 2014) and thus the context in which it was previously used was deemed relevant for the present study.

Respondents were asked to rate their level of agreement to the given items, specifying that there were no right or wrong answers. Responses for the enjoyment scale ranged from 1 (strongly disagree) to 5 (strongly agree) with a scale mid-point of 3.00. A high score on this scale indicated an individual with high levels of task enjoyment. An example of one of these items is, "I enjoyed the assessment".

Engagement. Engagement was measured by five items adapted from the scale of Barzilai and Blau (2014) measuring flow. The five items had a Cronbach's alpha of .89 (Barzilai & Blau, 2014). This analysis was deemed appropriate and hence, this scale was used in the present study. Furthermore, the items were designed to measure the degree of concentration and immersion in a gamified activity (Barzilai & Blau, 2014). Because the present study aimed to measure engagement regarding a gamified assessment, the scale was considered applicable to the context.

Respondents were asked to rate their level of agreement to the given items, specifying that there were no right or wrong answers. Responses for the engagement scale ranged from 1 (strongly disagree) to 5 (strongly agree) with a scale mid-point of 3.00. A high score on this scale indicated an individual with high levels of task engagement. An example of one of the items is, "I lost track of time when I played the assessment".

Additional Variables. Additional data were collected in the perception questionnaire, which included social desirability, ability to identify criteria (ATIC), and cognitive load. To delineate the present study and narrow the focus, these variables were not included in the analysis. The variables will, however, be used for further analysis in future research.

Demographic Characteristics

The questionnaire included questions regarding the sex and racial group of the respondents and questions pertaining to their age and level of education. Inclusion of demographic questions helped in gaining insight into the diversity of the sample used in the study. There was an option of 'prefer not to answer' for the demographic questions relating to sex and race due to the sensitive nature of these questions.

Respondents were also asked how many traditional or gamified assessments they had completed previously. Understanding a respondent's previous experience with assessments gave an indication of their level of exposure to psychometric assessments.

In addition, the demographic section of the questionnaire included questions regarding previous work experience and if respondents could foresee applying for a job in the next 12 months. These questions were included to obtain insight into the market readiness of the respondents in terms of the application of this study in the selection context (see Appendix F).

Statistical Analysis

Data Analysis Programmes

Data collected for this study were downloaded from Qualtrics (Qualtrics, 2020) to the IBM Statistical Package for the Social Sciences (SPSS) version 26 to conduct the necessary analysis (IBM Corp., 2020).

Measurement Properties

Reliability and validity tests were run using SPSS to verify the appropriateness of the scales used in this study. Scale reliability was tested using Cronbach's alpha and the appropriateness of individual scale items via corrected item-total correlations. Validity of the scales was assessed using exploratory factor analysis (EFA). Reliability and validity testing were

not conducted on the values-based assessment items (gamified and traditional) since the values and results obtained from these assessments were not considered part of this research. In addition, reviewing the internal mechanics of the gamified assessment was not permitted by the company that owns the tool.

Descriptive and Inferential Statistics

Descriptive statistics including frequencies, range, mean, and standard deviation were used to describe the data. Pearson product correlations were used to describe the relationships among the variables. Pearson product-moment correlation coefficient was considered appropriate for use as it is one of the most widely used analyses for describing relationships (Rosenthal & Rosnow, 2009).

To test for mean differences across the experimental group and the control group variables, independent sample t-tests and Mann-Whitney U tests were used for each hypothesis with a 5% level of significance. Independent sample t-tests are a form of statistical analysis across means where there is no difference, and the data are normally distributed about the mean (Rosenthal & Rosnow, 2009). Independent sample t-tests provide statistical evidence about whether the sample population means are significantly different. Mann-Whitney U tests provide the same statistical evidence but are used to compare conditions when the data are not normally distributed around the mean.

All mediating relationships between test type and applicant reactions, perceived organisational attractiveness and enjoyment were tested using the PROCESS macro (Hayes & Preacher, 2014) for SPSS. Mediation is said to occur if the strength of the relationship between the independent variable and the outcome is reduced by adding the mediator (Field, 2018).

PROCESS allows for the statistical investigation of the degree of mediating relationships by estimating the indirect effect between variables and the confidence intervals.

Finally, a multivariate analysis of variance (MANOVA) considered the relationship between the independent variable (test type) and the multiple dependent variables (applicant reactions, perceived organisational attractiveness and enjoyment) (Field, 2018).

Chapter 5: Results Section

Chapter 5 outlines the flow of participants and information regarding the statistical and data-analytic methods that were employed. Analysis of the reliability and validity of the scales used in this study (applicant reactions, perceived organisational attractiveness and enjoyment) follows the outline of the flow and thereafter, the descriptive statistics are explained. Finally, assumptions for the statistical analysis tests (t-tests and MANOVA) are conducted, and the results relating to the hypotheses tests are presented.

Data Preparation

As an initial step in the data analysis, the data set was screened for missing data points or incomplete responses and coding of the data points. Data preparation was done using SPSS Frequencies.

In addition, respondent data were deleted if the responses on the variable scales were not 100% complete since this is the simplest method for working with missing data and for ensuring accuracy when running statistical methods (Field, 2018).

Regarding the applicant reaction scale, the scale consisted of two subscales, perceived fairness, and anxiety. The applicant reaction variable was the aggregated values from the perceived fairness scale and the anxiety scale and as such, the direction of these subscales needed to be the same for the applicant reaction variable to be valid. A high score on the perceived fairness scale indicated more favourable perceptions, which is a positive result, whereas a high score on the anxiety scale indicated high levels of stress, which is a negative result. Therefore, for a high score on applicant reactions to reflect favourable reactions, anxiety was reverse coded to show that a high score on the anxiety scale indicated low levels of stress. Reverse coding on

anxiety was only conducted for the research pertaining to the applicant reaction variable. For individual analysis on anxiety, the variable coding remained that a high score on the anxiety scale suggested high levels of stress.

Flow of Participation

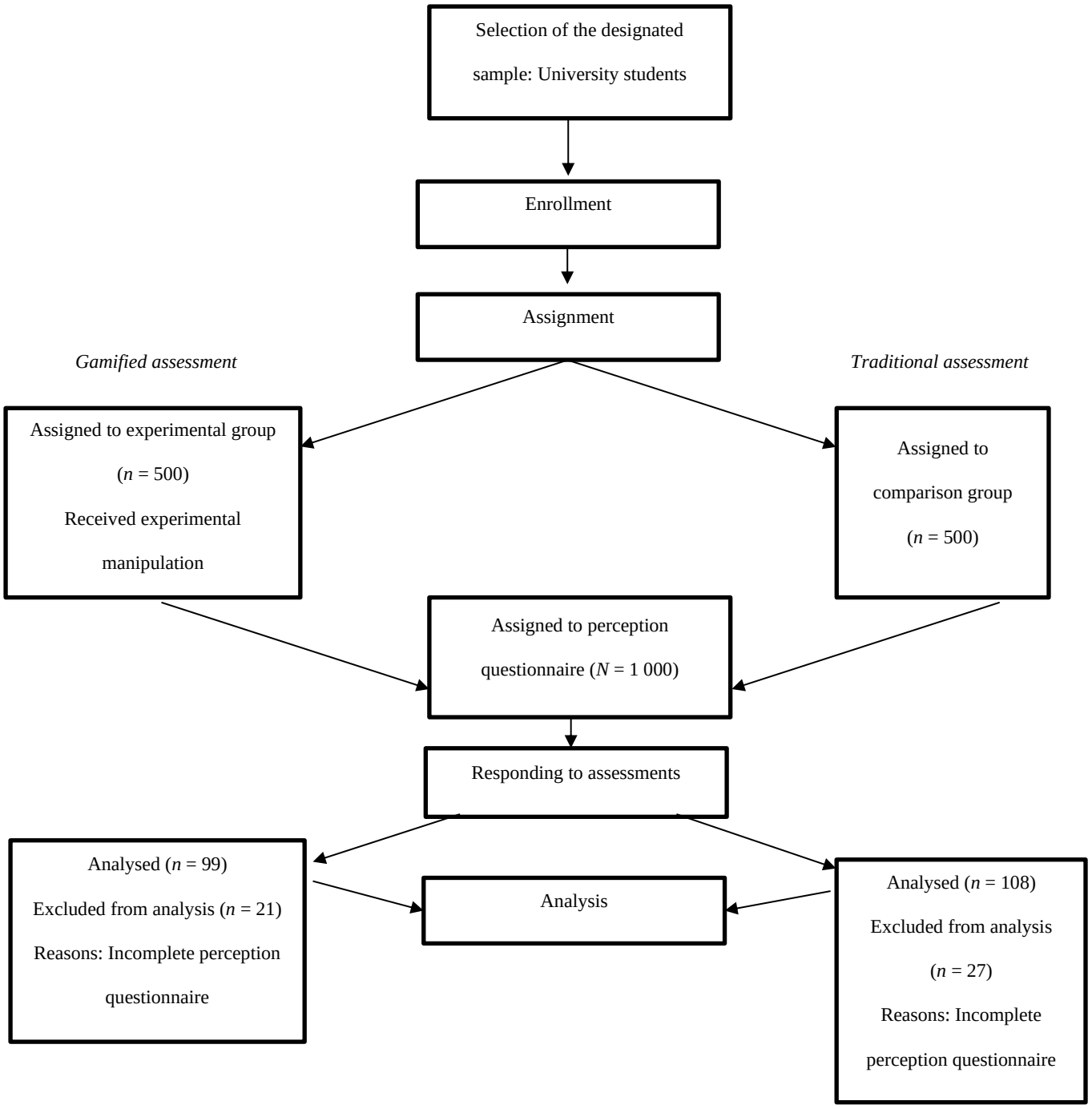
To outline data that were removed, the process for obtaining the experimental and the control group data is discussed in detail, followed by the removal of missing data in each group. Figure 5 outlines the flow of participation that this study followed.

University students were invited via email to complete the survey. Of a group of 1000 volunteers, 500 students were randomly assigned to complete a gamified assessment and the remaining 500 students were assigned to complete a traditional assessment. Both conditional groups completed the same perceptions survey, an electronic survey constructed with the survey tool Qualtrics. The study received 99 responses on the gamified assessment and perception survey and 108 responses on the traditional assessment and perception survey. The questionnaire yielded a response rate of 20.70%. For the gamified assessment and applicant perception of the assessment experience survey, 10 respondents were removed for failure to complete any survey questions, 10 respondents were removed for only providing demographic information and one respondent was removed for not providing consent, resulting in a total of 78 (15.6%) cases in the experimental group.

For the traditional assessment and applicant perception of the assessment experience survey, 27 respondents were removed for not completing 100% of the questions relating to the variables. This left 81 (16.2%) cases in the control group. The participation rate was, therefore, 15.90% post data cleaning. Flow of respondents through each stage of the study is shown in Figure 5.

Figure 5

Flow of Respondents through the Study



Reliability

Reliability analysis refers to the consistency of a measure (Guion, 2002; Rosenthal & Rosnow, 2008). It is the degree to which a measure is free of random error and therefore yields the same results over repeated use in the same sample. In this study, reliability and item analyses were conducted on each scale by determining the corrected item-total correlations and Cronbach's alpha (α), the internal consistency of a scale. Reliability analysis preceded factor analysis in the present study.

Reliability analysis was conducted on the applicant reaction variable and its sub-variables, perceived fairness, and anxiety, perceived organisational attractiveness and enjoyment. Reliability analysis was not conducted on the values-based assessment tools. The value alignment for each respondent obtained from the value-based assessments was not considered in this study and, therefore, the psychometric properties of the assessments were not reviewed. In line with a recent applicant reaction study (Gkorezis et al., 2020), research into the measurement properties of personnel selection methods is not always included in the process when the assessments are used only as treatments. Additionally, the gamified values assessment is a proprietary measure and permission was not granted by the company that owns the gamified assessment to review the internal mechanics of the assessment so the item-level data needed to conduct measurement property analysis was not provided for the present research.

Prior to the analyses, all reverse-scored items were re-coded using SPSS. Items with corrected item-total correlations equal to or greater than .30 were considered significant and, therefore, were retained in the scale. If the scale contained items with corrected item-total correlations of less than .30, these items were removed, and the Cronbach's alpha reliability was re-examined. A scale was considered sufficiently reliable if its Cronbach's alpha had a minimum

value of .70 (Nunnally & Bernstein, 1994). To interpret the size of the reliability coefficient, the following guideline was used: an alpha below .50 is unacceptable, an alpha between .60 and .70 is questionable, an alpha between .70 and .80 is good, and an alpha between .80 and .90 is excellent (Guion, 2002; George & Mallery, 2003). Post review of the reliability of the scales, factor analysis was conducted.

Investigation of Cronbach's Alpha Internal Consistency Reliability for the Applicant Reaction Scale

Cronbach's alpha internal consistency reliability was measured on the applicant reaction scale as a whole and separately on each of the applicant reaction subscales: perceived fairness and anxiety (see Table 4).

Combined Data Set (Gamified and Traditional). The applicant reaction subscales for the combined data set were acceptable with no items needing to be removed: anxiety Cronbach's alpha of .81 (item-total correlations: $.43 < r < .78$) and perceived fairness Cronbach's alpha of .80 (item-total correlations: $.54 < r < .66$).

Cronbach's alpha internal consistency reliability for the applicant reaction scale as a whole (the five perceived fairness items and the five anxiety items) showed reliability of $\alpha = .76$ (item-total correlations:$.29 < r < .53$) with no items needing to be removed because the removal of items did not significantly increase the reliability of the scale. Because there were two conditions (gamified and traditional), independent reliability estimates were also explored with equally satisfactory results across the scales (see Table 4).

Experimental Group Data Set: Gamified Assessment. The applicant reaction subscales for the experimental data set were acceptable with no items needing to be removed: anxiety

Cronbach's alpha of .79 (item-total correlations: .44 < *r* < .76) and perceived fairness Cronbach's alpha of .75 (item-total correlations: .45 < *r* < .64). See Table 4.

Cronbach's alpha internal consistency reliability of the five perceived fairness items and the five anxiety items that made up the applicant reaction scale showed reliability of α = .77. All items had a corrected item-total correlation of greater than .30 (.33 < *r* < .61). All items were retained for this scale.

Control Group Data Set: Traditional Assessment. The applicant reaction subscales for the control data set were acceptable with no items needing to be removed: anxiety Cronbach's alpha of .85 (item-total correlations: .41 < *r* < .79) and perceived fairness Cronbach's alpha of .81 (item-total correlations: .51 < *r* < .70).

Cronbach's alpha internal consistency reliability of the five perceived fairness items and the five anxiety items that made up the applicant reaction scale showed reliability of α = .78 (see Table 4). There was one item with a corrected item-total correlation of less than .30. Removal of this item did not, however, significantly improve the reliability analysis and, therefore, the item was retained (item-total correlations: .24 < *r* < .53).

Perceived Organisational Attractiveness

Item analysis and reliability analysis of the 4-item perceived organisational attractiveness scale on the combined data set (gamified and traditional) revealed that the scale had acceptable reliability (α = .77, item-total correlations: .44 < *r* < .71) (see Table 4). No items needed to be removed from the scale.

In both the experimental group (gamified, α = .75, item-total correlations: 34 < *r* < .77) and the control group (traditional, α = .77, item-total correlations: .53 < *r* < .62), the scores were

considered acceptable and all corrected item-total correlations were greater than .30 (see Table 4).

Enjoyment

Item analysis and reliability analysis of the 6-item enjoyment scale on the combined data set (gamified and traditional) revealed that the scale had acceptable reliability ($\alpha = .95$, item-total correlations: $.74 < r < .91$). No items needed to be removed from the scale.

With both the experimental group (gamified, $\alpha = .95$, item-total correlations: $.75 < r < .92$) and the control group (traditional, $\alpha = 94$, item-total correlations: $.72 < r < .90$), acceptable reliability analysis was determined, and no items needed to be removed (See Table 4).

Engagement

Item analysis and reliability analysis of the 5-item engagement scale on the combined data set (gamified and traditional) revealed that the scale had acceptable reliability ($\alpha = .82$, item-total correlations: $.35 < r < .76$).

With both the experimental group (gamified, $\alpha = .88$, item-total correlations: $.48 < r < .82$) and the control group (traditional, $\alpha = .71$), acceptable scores were also obtained. For one item, “I lost track of time when I played the assessment” on the traditional assessment, the data had a corrected item-total correlation of less than .30 and was, therefore, removed from this data set as well as from the control group set to ensure consistency when testing hypotheses. Removal of this item resulted in an improved internal consistency reliability score of $\alpha = .81$ (item-total correlations: $.51 < r < .75$) (see Table 4).

Table 4

Internal Consistencies of the Scales and Subscales Used in this Study

Condition	Scale	Cronbach's alpha coefficient (α)	Corrected item-total correlations	Total number of items in the scale
Experimental Group (Gamified, n = 78)	Applicant Reactions	.77	.33 < r < .61	10
	Perceived Fairness	.75	.45 < r < .64	5
	Anxiety	.79	.44 < r < .76	5
	Perceived Organisational Attractiveness	.75	.34 < r < .77	4
	Enjoyment	.95	.75 < r < .92	6
	Engagement	.88	.48 < r < .82	5
Control Group (Traditional, n = 81)	Applicant Reactions	.78	.24 < r < .53	10
	Perceived Fairness	.81	.51 < r < .70	5
	Anxiety	.85	.41 < r < .79	5
	Perceived Organisational Attractiveness	.77	.53 < r < .62	4
	Enjoyment	.94	.72 < r < .90	6
	Engagement	.81	.51 < r < .75	4
Combined (N = 159)	Applicant Reactions	.76	.29 < r < .53	10
	Perceived Fairness	.80	.54 < r < .66	5
	Anxiety	.81	.43 < r < .78	5
	Perceived Organisational Attractiveness	.77	.44 < r < .71	4
	Enjoyment	.95	.74 < r < .91	6
	Engagement	.82	.35 < r < .76	5

Validity

Validity analysis outlines the degree to which the conclusions drawn from a measure are supported by empirical evidence or theoretical basis (Rosenthal & Rosnow, 2008). There are multiple forms of validity testing. Three central tests of validity are content validity based on the subject matter of a measure, criterion-related validity based on accepted standards of correlations, and construct validity based ensuring that the measurement method matches the construct, for example personal values, being measured (Rosenthal & Rosnow, 2008). This research considered the construct validity of the measure. Construct validity was assessed to ensure that the scales were measuring the intended variables. Exploratory factor analysis, a statistical procedure used to understand the underlying structure of a measure, is a typical mechanic used to investigate construct validity (Fabrigar & Wegener, 2011) and was conducted for this study.

Exploratory factor analysis involves the exploration of data to explain the interrelationships among a large set of observable variables (Fabrigar & Wegener, 2011; Guion, 2002; Rosenthal & Rosnow, 2008). Due to the small sample size, separate EFAs were conducted on the applicant reaction scales regarding perceived fairness and anxiety. Separate EFAs were run on the item's enjoyment and perceived organisational attractiveness.

Principal axis factoring (PAF) was used in the EFAs because this method is most likely to provide the best results, particularly if the data are not normally distributed (Costello & Osborne, 2016). Principal axis factoring derives a mathematical model from estimated factors whereas PCA derives a set of linear variates by decomposing the original data (Field, 2018). As such, PAF was deemed appropriate to ensure validity of the scales in this study.

Further analysis included varimax rotation since this is considered the best and most well-used orthogonal rotation (Guion, 2002). The Kaiser-Meyer-Olkin (KMO) measure for sampling adequacy and Bartlett's test of sphericity for indicating the degree of correlation between variables were used to determine the appropriateness of the data for factor analysis. Data were considered suitable if the KMO measure yielded a result greater than .50 and if Bartlett's test of sphericity was significant ($p < .05$) (Field, 2018; Guion, 2002).

Applicant Reactions

For the combined data, factor analysis was appropriate as revealed by the KMO measure and Bartlett's test of sphericity for the applicant reaction scale (.72; $F(45) = 604.95$; $p < .001$). Principal axis factoring revealed that the five perceived fairness items loaded significantly onto two factors (eigenvalue: 2.12; explained variance: 21.17%; factor loadings $.34 < r < .79$ and eigenvalue: .63; explained variance: 6.29%; factor loadings $.55 < r < .89$). The second factor on the perceived fairness scale is known as a methods effect. A method effect explains the systematic variances resulting from the method of measurement rather than the constructs measured. The negatively worded items in this scale appear to have resulted in the lack of fit to a unidimensional model and as such, the second factor was not considered for this research. A single dimensional model measuring perceived fairness was retained as a subscale for applicant reactions.[1] For the second subscale of applicant reactions, the results showed the five anxiety

[1] This scale should be treated technically using bi-factor analysis due to the lack of univariate items. McDonald's or Revelle's omega analysis could be conducted on the scale in order to determine if the negative wording on three of the five items is resulting in two factors.

items loaded onto the final factor (eigenvalue: 2.821; explained variance: 28.17%; factor loadings .48 < *r* < .90).

Table 5 contains the eigenvalues, explained variance and factor loadings for each condition for applicant reactions. For the experimental data (gamified assessment), factor analysis was appropriate as revealed by the KMO measure and Bartlett's test of sphericity for perceived fairness (.69; $F(10) = 107.21$; $p < .001$) and anxiety (.65; $F(10) = 156.46$; $p < .001$) (see Table 5).

Principal axis factoring with subsequent rotation (Varimax) revealed that the five perceived fairness items loaded significantly on two factors. The three items that loaded on the first factor reflected general perceptions of fairness and accounted for 42.97% of the variance (eigenvalue: 2.15; factor loadings .57 < *r* < .82). The two items that loaded on the second factor were the only two items in the perceived fairness scale that were not negatively worded and, therefore, this is a method effect (Rauch et al., 2007). For the purpose of this research, the scale remained unidimensional. The five anxiety items loaded on a single factor, which explained 45.36% of the variance (eigenvalue: 2.27; factor loadings .49 < *r* < .91).

For the control data (traditional assessment), factor analysis was appropriate as revealed by the KMO measure and Bartlett's test of sphericity for perceived fairness (.73; $F(10) = 136.75$; $p < .001$) and anxiety (.77; $F(10) = 194.30$; $p < .001$) (see Table 5). Principal axis factoring with subsequent rotation (Varimax) revealed that the five perceived fairness items loaded significantly on one factor and accounted for 46.24% of the variance (eigenvalue: 2.31; factor loadings .57 < *r* < .79). Similarly, the five anxiety items loaded on a single factor, which explained 54.70% of the variance (eigenvalue: 2.74; factor loadings .44 < *r* < .78).

Table 5

Eigenvalues, Explained Variance and Factor Loadings for the Applicant Reaction Scale

Items	Condition							
	Gamified			Traditional		Combined		
	Factors							
	Applicant Reactions							
	Perceived Fairness Eigenvalue:		Anxiety Eigenvalue:	Perceived Fairness Eigenvalue:	Anxiety Eigenvalue:	Perceived Fairness Eigenvalue:		Anxiety Eigenvalue:
	2.15 (42.97%)*	.69 (13.71%)	2.27 (45.36%)	2.31 (46.24%)	2.74 (54.70%)	2.12 (21.17%)	.63 (6.29%)	2.82 (28.17%)
I did not understand what the assessment had to do with a work context	.71			.67		.72		
I could not see any relationship between the assessment and what is required in a work context	.82			.72		.79		
It is obvious that the assessment is related to a work context		.87		.79		.34	.89	
The actual content of the assessment was clearly related to a work context		.59		.57		.34	55	
There is no real connection between the assessment that I went through and a work context	.57			.62		.62		
While taking the assessment, I felt confident and relaxed			.50		.44			.48
During the assessment, I had the feeling that I was not doing well			.67		.74			.68
During the assessment, I found myself thinking of the consequences of failing			.70		.81			.74
During the assessment I was anxious about how I would perform			.91		.87			.90
During the assessment, I find myself wondering whether the other applicants are doing better than I am			.49		.77			.62

Note. Principal Axis Factoring with varimax; Only loadings >.30 are shown.
*Explained variance in brackets

Perceived Organisational Attractiveness

For the combined data set, factor analysis was appropriate as revealed by the KMO measure (.73) and Bartlett's test of sphericity ($F(6) = 174.16$; $p < .001$) (see Table 6). Principal axis factoring revealed that all four perceived organisational attractiveness items loaded significantly on one factor (eigenvalue: 1.89; explained variance: 47.29%; factor loadings $.51 < r < .87$). This scale is, therefore, unidimensional, and the factor is assumed to indicate the applicant outcome of perceived organisational attractiveness towards the workplace.

Table 6 contains the contains the eigenvalues, explained variance and factor loadings for each condition for perceived organisational attractiveness. For the experimental data (gamified assessment), factor analysis was appropriate as revealed by the KMO measure and Bartlett's test of sphericity for perceived organisational attractiveness (.66; $F(6) = 95.08$; $p < .001$) (see Table 6). Principal axis factoring with subsequent rotation (Varimax) revealed that the four perceived organisational attractiveness items loaded significantly on one factor (eigenvalue: 1.95; explained variance: 48.81%; factor loadings $.39 < r < .97$). This scale is, therefore, unidimensional, and the factor is assumed to indicate perceived organisational attractiveness.

For the control group data (traditional assessment), factor analysis was appropriate as revealed by the KMO measure and Bartlett's test of sphericity for enjoyment (.73; $F(6) = 81.34$; $p < .001$). Principal axis factoring revealed that the four perceived organisational attractiveness items loaded significantly on one factor (eigenvalue: 1.83; explained variance: 45.69%; factor loadings $.61 < r < .75$). This scale is, therefore, unidimensional, and the factor is assumed to indicate perceived organisational attractiveness.

Table 6

Eigenvalues, Explained Variance and Factor Loadings for the Perceived Organisational Attractiveness Scale

Items	Condition		
	Gamified	Traditional	Combined
	Factors		
	Perceived Organisational Attractiveness		
	Eigenvalue: 1.95 (48.81%)*	Eigenvalue: 1.83 (45.69%)	Eigenvalue: 1.89 (47.29%)
Based on my experience with the assessment, I would encourage others to apply for employment with the company	.74	.62	.70
I would request additional information about the organisation based on my experience with the assessment	.39	.64	.51
I would sign up of an interview with the organisation based on my experience with the assessment	.97	.75	.87
I would accept an employment offer with the organisation based on my experience with the assessment	.55	.69	.62

Note. Principal Axis Factoring with varimax; Only loadings >.30 are shown.
*Explained variance in brackets

Enjoyment

For the combined data, factor analysis was appropriate as revealed by the KMO measure (.89) and Bartlett's test of sphericity ($F(15) = 1077.87$; $p < .001$) (see Table7). Principal axis factoring revealed that all six enjoyment items loaded significantly on one factor (eigenvalue: 4.60; explained variance: 76.62%; factor loadings $.80 < r < .95$). This scale is, therefore, unidimensional, and the factor is assumed to indicate enjoyment.

Table 7 contains the contains the eigenvalues, explained variance and factor loadings for each condition for enjoyment. For the experimental data (gamified assessment), factor analysis was appropriate as revealed by the KMO measure and Bartlett's test of sphericity for enjoyment (.87; $F(15) = 605.79$; $p < .001$) (see Table 7). Principal axis factoring with subsequent rotation

(Varimax) revealed that the five enjoyment items loaded significantly on one factor (eigenvalue: 4.65; explained variance: 77.55%; factor loadings .76 < *r* < .96). This scale is, therefore, unidimensional, and the factor is assumed to indicate enjoyment.

For the control group data (traditional assessment), factor analysis was appropriate as revealed by the KMO measure and Bartlett's test of sphericity for enjoyment (.89; $F(15) = 448.95$; $p < .001$). Principal axis factoring revealed that the six enjoyment items loaded significantly on one factor (eigenvalue: 4.36; explained variance: 72.68%; factor loadings .75 < *r* < .94). This scale is, therefore, unidimensional, and the factor is assumed to indicate enjoyment.

Table 7

Eigenvalues, Explained Variance and Factor Loadings for the Enjoyment Scale

Items	Condition		
	Gamified	Traditional	Combined
	Factors		
	Enjoyment		
	Eigenvalue: 4.65 (77.55%)*	Eigenvalue: 4.36 (72.68%)	Eigenvalue: 4.60 (76.62%)
I enjoyed the assessment	.92	.89	.91
I had fun playing the assessment	.94	.92	.94
Playing the assessment was fun	.96	.94	.95
I enjoyed the assessment to a great degree	.91	.79	.87
I would look forward to going through the same type of assessment in the future	.77	.82	.81
I did not enjoy completing this assessment	.76	.75	.76

Note. Principal Axis Factoring with varimax; Only loadings >.30 are shown.
*Explained variance in brackets

Engagement

For the combined data, factor analysis was appropriate as revealed by the KMO measure (.76) and Bartlett's test of sphericity ($F(10) = 428.10$; $p < .001$) (see Table 8). Principal axis factoring revealed that all five engagement items loaded significantly on one factor (eigenvalue:

2.76; explained variance: 55.25%; factor loadings .38 < *r* < .86). This scale is, therefore, unidimensional, and the factor is assumed to indicate engagement.

Table 8 contains the contains the eigenvalues, explained variance and factor loadings for each condition for engagement. For the experimental group data (gamified assessment), factor analysis was appropriate as revealed by the KMO measure and Bartlett's test of sphericity for engagement (.80; $F(10) = 270.44$; $p < .001$) (see Table 8). Principal axis factoring with subsequent rotation (Varimax) revealed that all five engagement items loaded significantly on one factor (eigenvalue: 3.23; explained variance: 64.17%; factor loadings .50 < *r* < .90). The engagement scale is, therefore, unidimensional, and the factor is assumed to indicate engagement.

For the control group data (traditional assessment), factor analysis was appropriate as revealed by the KMO measure and Bartlett's test of sphericity for engagement (.68; $F(6) = 146.63$; $p < .001$). Principal axis factoring revealed that the four engagement items loaded significantly on one factor (eigenvalue: 2.19; explained variance: 54.70%; factor loadings .56 < *r* < .81). The engagement scale is, therefore, unidimensional, and the factor is assumed to indicate engagement.

Table 8

Eigenvalues, Explained Variance and Factor Loadings for the Engagement Scale

Items	Condition		
	Gamified	Traditional	Combined
	Factors		
	Engagement		
	Eigenvalue: 3.21 (64.17)*	Eigenvalue: 2.19 (54.70%)	Eigenvalue: 2.76 (55.25%)
I lost track of time when I played the assessment	.50		.38
I really got into the assessment	.88	.74	.84
I was very involved in the assessment	.90	.81	.86
When I played the assessment, I did not think of anything else	.77	.56	.66
I was totally immersed in the assessment	.89	.82	.86

Note. Principal Axis Factoring with varimax; Only loadings >.30 are shown.
*Explained variance in brackets

Descriptive Statistics

The descriptive statistics for each scale used in the study are provided in Table 9 below. A 5-point Likert scale was used to collect the response scores, with > 4 indicating a 'positive' rating and ≤ 2 indicating a 'negative' rating. Figure 6 below shows a graphic depiction of the means across the two experimental groups, gamified versus traditional.

Table 9

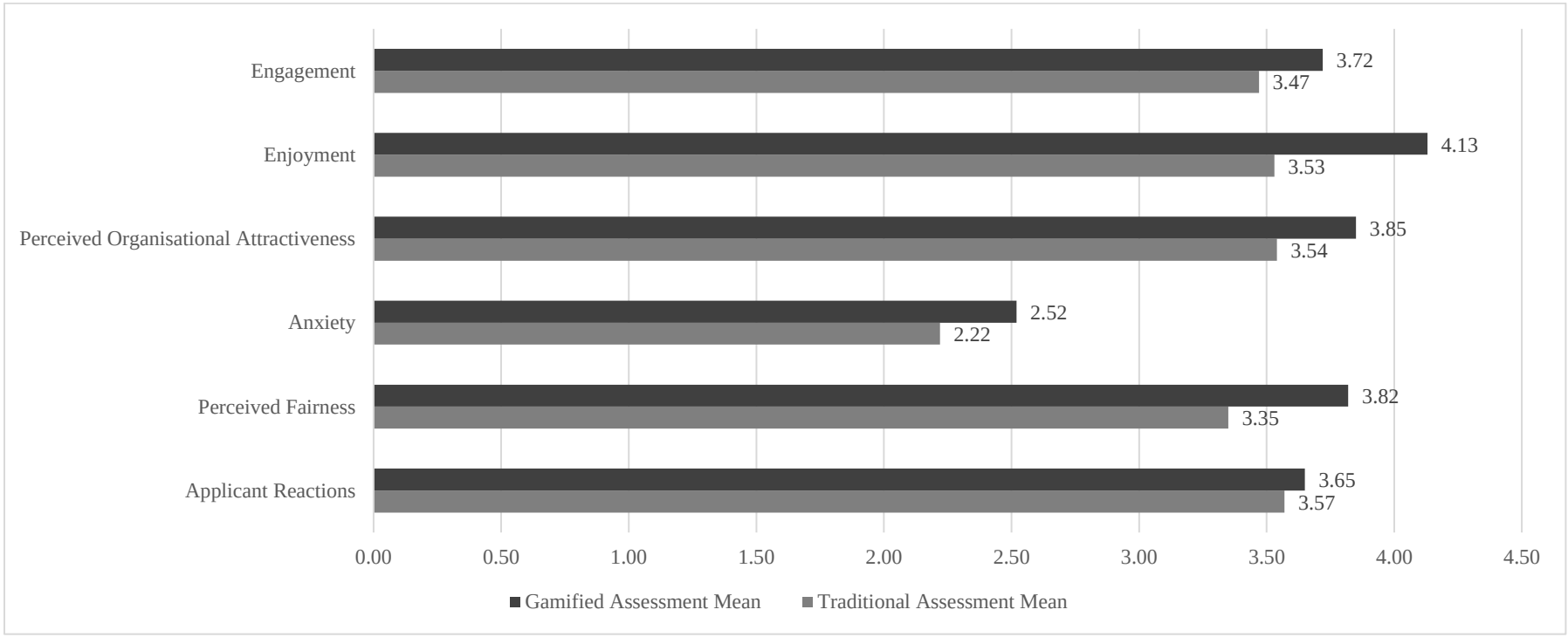
Descriptive Statistics for Applicant Reactions towards Traditional and Gamified Assessments

Variables	Traditional (*n* = 81)				Gamified (*n = 78*)				Combined (*N* = 159)			
	M	*SD*	*Variance*	*Range*	*M*	*SD*	*Variance*	*Range*	*M*	*SD*	*Variance*	*Range*
Applicant Reactions	3.57	.57	.33	3.30	3.65	.59	.35	2.60	3.61	.58	.34	3.30
Perceived	3.35	.72	.52	3.60	3.82	.69	.48	3.40	3.58	.74	.55	3.60
Fairness	2.22	.80	.65	3.40	2.52	.79	.63	3.00	2.36	.81	.66	3.40
Anxiety												
Perceived Organisational Attractiveness	3.54	.66	.44	3.00	3.85	.72	.52	4.00	3.71	.67	.45	3.00
Enjoyment	3.53	.75	.56	3.33	4.13	.82	.68	3.17	3.82	.84	.70	3.33
Engagement	3.47	.79	.63	4.00	3.72	.89	.79	3.20	3.48	.82	.68	4.00

Note. $p < .05$; *N* = Number of respondents for the entire sample, *n* = number of participants for each condition; *M* = mean, *SD* = standard deviation

Figure 6

Bar Graph: Mean Comparisons between the Two Experimental Groups (Gamified Versus Traditional)



Correlation Analysis

Correlation analysis was conducted to investigate the relationships among all the variables in the present study. There are various correlation indexes that have been developed, with the most widely used method being the Pearson product-moment correlation (Field, 2018) (see Table 10). Pearson correlations were computed to determine if any significant relationships existed between experimental conditions and the outcome variables: applicant reactions (perceived fairness and anxiety), perceived organisational attractiveness and fairness. All correlation coefficients were interpreted using the effect size guideline suggested by Cohen (1988, 1992, 2013) in which $r = .10$ suggests a small effect, $r = .30$ suggests a medium effect, and $r = .50$ suggests a large effect.

Experimental Group Correlation Analysis. For the gamified assessment issued to the experimental group, there were positive correlations between applicant reactions and enjoyment ($r = .43$, $p < .01$) with a large effect and engagement ($r = .27$, $p < .05$) with a medium effect. Similarly, there was a medium effect between applicant reactions and perceived organisational attractiveness ($r = .38$, $p < .01$). With more favourable applicant reactions (increased perceptions of fairness and reduced anxiety), applicants are more likely to enjoy the assessment process, be more engaged and have more favourable perceptions of the organisation.

The analysis of the relationship between perception of fairness, a subscale of applicant reactions, and perceived organisational attractiveness suggests a large effect size ($r = .46$, $p < .01$). With more favourable perceptions of fairness, there will likely be more favourable perceptions of organisational attractiveness. The coefficient of determination suggests 21.16% of perceived organisational attractiveness is accounted for by perceived fairness.

Perceived fairness also had positive relationships with enjoyment ($r = .40$, $p < .01$) and engagement ($r = .27$, $p < .05$), suggesting a medium effect with approximately 9% of the variance explained by the effect (Cohen, 1992, 2013). With more favourable perceptions of fairness, there is likely to be higher levels of engagement and enjoyment when completing the assessment.

Anxiety, the second subscale of applicant reactions, did not significantly correlate with perceived organisational attractiveness ($r = -.17$, $p = .15$) or engagement ($r = -.16$, $p = .1$). However, there was a negative and significant relationship with enjoyment, indicating a medium effect size ($r = -.28$, $p < .05$). Hence, with higher levels of anxiety for an assessment, applicants are less likely to enjoy the assessment.

The correlation coefficient result between enjoyment and perceived organisational attractiveness suggests a large effect size ($r = .57$, $p < .01$), with 25% of the variance explained by the effect (Cohen, 1992, 2013). Applicants who enjoy the personnel selection assessment process are likely to have more favourable perceptions of the organisation. The coefficient of determination suggests that 32.49% of the variance in perceived organisational attractiveness is accounted for by enjoyment. Similarly, the correlation coefficient result between enjoyment and engagement suggests a large effect size ($r = .80$, $p < .01$), with 25% of the variance explained by the effect (Cohen, 1992, 2013). As such, applicants who enjoy the personnel selection assessment process are likely to be more engaged. The coefficient of determination suggests that 64% of the variance is explained.

The correlation coefficient between engagement and perceived organisational attractiveness suggests a large effect size ($r = .48$, $p < .001$). There are likely to be more favourable perceptions of the organisation if the applicants are more engaged in the assessment.

The coefficient of determination suggests that 23.04% of the variance in perceived organisational attractiveness is explained by engagement.

Control Group Correlation Analysis. For the traditional assessment, the correlation coefficient results can be viewed in Table 10. The correlation coefficient between applicant reactions and perceived organisational attractiveness suggests a medium effect size ($r = .29$, $p < .01$). The coefficient of determination suggests that 8.41% of the variance is explained. Similarly, there was a large effect between applicant reactions and enjoyment ($r = .40$, $p < .01$). With more favourable applicant reactions (increased perceptions of fairness and reduced anxiety), applicants are more likely to enjoy the assessment process and have more favourable perceptions of the organisation.

The correlation coefficient for the relationship between perception of fairness, a subscale of applicant reactions, and perceived organisational attractiveness suggests a medium effect size ($r = .40$, $p < .01$), with an estimated 9% of the total variance accounted for by the effect (Cohen, 1992). The coefficient of determination suggests that 16% of perceived organisational attractiveness is explained by perceived fairness.

Perceived fairness also correlated with enjoyment with a medium effect size ($r = .34$, $p < .01$). As such, when the perceptions of fairness are more favourable, there is likely to be higher levels of enjoyment. The coefficient of determination suggests that 11.56% of the variance is explained.

Anxiety, the second subscale of applicant reactions, did not significantly correlate with perceived organisational attractiveness ($r = -.04$, $p = .70$) or engagement ($r = -.13$, $p = .26$); however, it did have a significant and negative correlation with enjoyment ($r = -.27$, $p < .05$). Therefore, as levels of anxiety increase, applicants are less likely to enjoy the assessment.

The correlation coefficient between enjoyment and perceived organisational attractiveness suggests a large effect size ($r = .55$, $p < .01$), with an estimated 25% of the total variance explained by the effect size (Cohen, 1992). Applicants who enjoy the personnel selection assessment process are likely to have more favourable perceptions of the organisation. The coefficient of determination indicates that 3.25% of this relationship is explained. Enjoyment also had a positive correlation with engagement and suggested a medium effect size with $r = .45$, $p < .01$. The coefficient of determination indicates that 20.25% of the variance is explained. Therefore, when perceived enjoyment increases, applicants are likely to be more engaged.

The correlation coefficient between engagement and perceived organisational attractiveness suggests a medium effect size ($r = .34$, $p < .001$) since there are likely to be more favourable perceptions of the organisation if the respondents are more engaged in the assessment. The coefficient of determination suggests that 11.56% of the variance in perceived organisational attractiveness is explained by engagement.

Combined Data Correlation Analysis. For the combined data, the correlation coefficient results can be viewed in Table 10. The correlation coefficient between applicant reactions and perceived organisational attractiveness suggests a medium effect size ($r = .34$, $p < .01$). This correlation coefficient suggests that more favourable applicant reactions will result in more favourable perceptions of the organisation. The coefficient of determination suggests that 11.56% of the variance is explained. Similarly, there was a large effect ($r = .41$, $p < .01$) between applicant reactions and enjoyment. This relationship suggests that as applicant reactions become more favourable, their enjoyment levels are likely to rise. The coefficient of determination of 16.81% for the relationship between enjoyment and applicant reactions suggests

the existence of other factors that might influence the relationship. Finally, there was a medium effect relationship between applicant reactions and engagement ($r = .20$, $p < .05$). The coefficient of determination suggests that 4% of the variance is explained.

The correlation coefficient for the relationship between perception of fairness, a subscale of applicant reactions, and perceived organisational attractiveness suggests a medium effect size ($r = .43$, $p < .01$), with an estimated 9% of the total variance accounted for by the effect (Cohen, 1992). The coefficient of determination suggests that 18.49% of the variance in perceived organisational attractiveness is accounted for by perceived fairness. Perceived fairness had a positive correlation coefficient with enjoyment ($r = .44$, $p < .01$), suggesting a large effect size, and a positive correlation coefficient with engagement ($r = .22$, $p < .01$), suggesting a medium effect size. With more favourable perceptions of fairness, there are likely to be higher levels of enjoyment and engagement.

Anxiety, the second subscale of applicant reactions, did not significantly correlate with perceived organisational attractiveness ($r = -.07$, $p = .38$) but did have a significantly negative relationship with enjoyment ($r = -.19$, $p < .05$), demonstrating a medium effect. As anxiety levels increase, an applicant's level of enjoyment is likely to decrease.

The correlation coefficient between enjoyment and perceived organisational attractiveness suggests a large effect size ($r = .60$, $p < .01$), with an estimate of 25% of the total variance explained by the effect size (Cohen, 1992). Applicants who enjoy the personnel selection assessment process are likely to have more favourable perceptions of the organisation. The coefficient of determination indicates that 36% of the variance in perceived organisational attractiveness is explained by enjoyment. In addition, a large effect was indicated on the relationship between perceived organisational attractiveness and engagement ($r = .42$, $p < .01$). It

is thus likely that the higher the engagement of individuals, the more favourable will be their perceptions of the organisation.

Table 10

Pearson Correlations for the Variables under Investigation

Condition	Variable	*M*	*SD*	Applicant reactions	Perceived fairness	Anxiety	Perceived organisational attractiveness	Enjoyment	Engagement
Experimental group (*n* = 78)	1. Applicant reactions	3.17	.45	—					
	1.1 Perceived fairness	3.82	.69	—	—				
	1.2 Anxiety	2.52	.79	—	—	—			
	2. Perceived organisational attractiveness	3.85	.72	.40**	.46**	-.17	—		
	3. Enjoyment	4.13	.82	.43**	.40**	-.28*	.52**	—	
	4. Engagement	3.72	.89	.27*	.27*	-.16	.48**	.80**	-
Control group (*n* = 81)	1. Applicant reactions	2.78	.50	—					
	1.1 Perceived fairness	3.35	.72	—	—				
	1.2 Anxiety	2.22	.80	—	—	—			
	2. Perceived organisational attractiveness	3.54	.66	.29**	.40**	-.04	—	-	
	3. Enjoyment	3.53	.75	.40**	.34**	-.27*	.55**	-	-
	4. Engagement	3.47	.79	.17	.13	-.13	.34**	.45**	-

Condition	Variable	*M*	*SD*	Applicant reactions	Perceived fairness	Anxiety	Perceived organisational attractiveness	Enjoyment	Engagement
Combined (*N* = 159)	1. Applicant reactions	2.97	.52	—					
	1.1Perceived fairness	3.58	.74	—	—				
	1.2Anxiety	2.36	.81	—	—	—			
	2. Perceived organisational attractiveness	3.71	.67	.34***	.43**	-.07	—		
	3. Enjoyment	3.82	.84	.41**	.44**	-.19*	.60**	—	
	4. Engagement	3.48	.82	.20*	.22**	-.07	.42**	.67**	-

Note. *$p < .05$, **$p < .01$, ***$p < .001$; *N* = Number of respondents for the entire sample, *n* = Number of participants for each condition; *M* = mean, *SD* = standard deviation

Assumption Testing for Hypotheses Analysis

The measurement properties for each measure were assessed for the experimental group, the control group, and the combined data set. The present study tested the data for adherence to statistical assumptions, which included outliers, normality, and homoscedasticity prior to statistical analyses (Field, 2018; Tabachnick et al., 2007). Assumptions were reviewed prior to independent sample t-test analysis and the MANOVA.

Random Sampling

To conduct a MANOVA, the data representing the sample should have been randomly selected from the population of interest (Field, 2018; Tinsley & Brown, 2000). This assumption was met in the method that was followed in assigning respondents to conditions in this study. Respondents had been randomly assigned to either the control group or the experimental group using Microsoft Excel.

Outliers

To detect univariate outliers, the data were screened to determine if variable scores were standardised (z) and to reduce the possibility of biasing the statistics. The absolute value of z = +/-3.29 was used and values above or below this value were considered outliers (Field, 2018). Only one statistically significant outlier was found on the perceived organisational attractiveness scale (-3.82). The responses for this scale were, therefore, deleted from further analysis. Techniques used to manage outliers in research are varied and have been considered controversial (Aguinis et al., 2013). The present study applied best practice techniques to manage outliers by deleting values above or below the absolute value of z (Field, 2018). Furthermore, nonparametric analysis based on the outliers in the histograms shown in Appendix H were used to further investigate the variables in the present study (Aguinis et al., 2013). No other

statistically significant outliers were found across the respondent mean scores ($1.96 < z < 3.29$, $p = .01$).

Homogeneity of Covariance

Within a univariate model, it is assumed that the variances within each group are approximately equal (Field, 2018; Tinsley & Brown, 2000). To conduct a MANOVA, homogeneity of variance is assumed. It is also assumed that the correlation between any two outcome variables is equal in all conditions (Field, 2018). This assumption was tested using Box's test of equality of covariance. The test indicated that this assumption was not violated ($F(10) = 18.75$, $p = .05$) for applicant reactions, perceived organisational attractiveness, enjoyment and engagement. Similarly, the test indicated that this assumption was not violated ($F(3) = .36$, $p = .79$) for perceived fairness and anxiety.

Independent Errors

To conduct a MANOVA, the residuals used should be statistically independent. The independence assumption was tested using the Durbin-Watson test whereby the result varies between 0 and 4, with 2 indicating that the residuals are uncorrelated (Field, 2018). To meet this assumption, the residuals between observations should be uncorrelated. For applicant reactions, the result was 2.04, for perceived organisational attractiveness, the result was 1.75, for enjoyment, the result was 1.88, and for engagement, the result was 2.12. Based on the principle that issues may be present if values are below one or higher than three, the independence assumption was not violated (Field, 2018). Similarly, the assumption was not violated for perceived fairness with a result of 1.90 and anxiety with a score of 2.06.

Normality

To determine the viability of parametric statistical tests and MANOVA, distributions were analysed using the Shapiro-Wilk test (see Table11) and skewness and kurtosis were reviewed. Residuals in a MANOVA are assumed to be multivariate rather than univariate, and this assumption was tested (Field, 2018).

The Shapiro-Wilk Test. The Shapiro-Wilk test compares sample scores with normally distributed scores that have the same standard deviation and mean (Field, 2018). The Shapiro-Wilk test was selected because it is considered the preferred test due to its highly rated power properties (Mendes & Pala, 2003; Razali & Wah, 2011). This test is also known to produce acceptable power for smaller sample sizes (Razali & Wah, 2011).

A non-significant value ($p > .05$) indicates that the distribution is normal (Field, 2018). Table 11 contains the results of the Shapiro-Wilk test of normality. There were violations across various conditions as outlined in Table 11, indicating that the data were not normally distributed and, therefore, non-parametric statistics were used in these instances.

For the combined data set (gamified and traditional) and the gamified data set, the only variable that did not violate this assumption was applicant reactions. For the traditional data set, both the applicant reaction variable and the perceived fairness variable did not violate the assumption. Therefore, only the analysis with applicant reactions used parametric statistics. The analyses not involving applicant reactions used non-parametric statistics (Field, 2018).

Table 11

Distribution Analysis of Data Using Shapiro-Wilk Test of Normality

Condition	Variable	Shapiro-Wilk		
		W	*Degree of Freedom*	*p*
Experimental Group (Gamified)	Applicant Reactions	.98	78	.314*
	Perceived Fairness	.97	78	.042
	Anxiety	.97	78	.050
	Perceived Organisational Attractiveness	.94	78	.002
	Enjoyment	.89	78	.000
	Engagement	.96	78	.009
Control Group (Traditional)	Applicant Reactions	.98	81	.129*
	Perceived Fairness	.99	81	.506*
	Anxiety	.95	81	.003
	Perceived Organisational Attractiveness	.97	81	.034
	Enjoyment	.96	81	.022
	Engagement	.95	81	.004
Combined	Applicant Reactions	.99	158	.419*
	Perceived Fairness	.98	158	.036
	Anxiety	.97	158	.001
	Perceived Organisational Attractiveness	.97	158	.005
	Enjoyment	.95	158	.000
	Engagement	.98	158	.028

Note. *$p > .05$

Skewness and Kurtosis. To explain this distribution, a review of the skewness for the variables was considered, which refers to the symmetry of the data around the mean. Skewed data are not normally distributed since they are not symmetrically distributed around the mean (Field, 2018; Tabachnick et al., 2007). Skewness results must be interpreted based on the results' relation to zero. As such, a skewness value equal to zero indicates symmetry about the mean. Alternatively, a negative skewness score indicates left-skewed data whereby a large concentration of the values lays to the right of the mean and a positive skewness score indicates right-skewed data whereby a large concentration of the values lays to the left of the mean. Scores greater than +1 or lower than -1 indicate substantially skewed data (Field, 2018).

Kurtosis, which refers to the peakedness of data distribution and thus the values that cause high or low distribution about the mean (Tabachnick et al. 2007), was also considered. A kurtosis value of three indicates a normal distribution, a value greater than three indicates a sharper distribution where extreme values are likely, and a value less than three indicates a flatter distribution with a wider peak (Tabachnick et al., 2007).

Regarding the gamified assessment data, there were non-normally distributed data for perceived fairness, anxiety, perceived organisational attractiveness, enjoyment, and engagement; however, there were no substantial issues with skewedness. Only the applicant reaction variable showed right-skewed data, with most of the data points to the left of the mean. All other variables demonstrated left-skewed data, with a concentration of the data points to the right of the mean. See Table 12 and Appendix H. The kurtosis showed that none of the variables regarding perceived organisational attractiveness were normally distributed (3.79, $p < .001$) and indicated a sharper distribution.

For the traditional assessment data, there were non-normally distributed data for anxiety, perceived organisational attractiveness, enjoyment, and engagement. Results for perceived applicant reactions, organisational attractiveness, enjoyment, and engagement indicated left-skewed data with a large concentration of the values to the right of the mean. Perceived fairness and anxiety indicated right-skewed data with a large concentration of the values to the left of the mean. See Table 12 and Appendix H. The kurtosis showed that none of the variables were normally distributed; flatter distributions were indicated across the variables except for applicant reactions (2.06, $p < .05$) and engagement (2.47, $p < .05$) that indicated sharper distribution.

Regarding the combined data for perceived fairness, anxiety, perceived organisational attractiveness, enjoyment and engagement, the data were non-normally distributed. The data were skewed left and indicated a higher distribution of values to the right of the mean for the perceived fairness and engagement variables. See Table 12 and Appendix H. The kurtosis showed that none of the variables were normally distributed. All variables showed a flatter distribution, except for perceived organisation attractiveness (2.04, $p < .05$) where the kurtosis score indicated a sharper distribution.

Table 12

Skewness and Kurtosis Scores for All Variables

Condition	Variable	Skewness	Skewness *z*	Kurtosis	Kurtosis *z*
Experimental Group (*n* = 78)	Applicant reactions	.10	.37	-.65	-1.21
	Perceived fairness	-.26	-.96	.34	.63
	Anxiety	-.03	-.11	-.43	-.80
	Perceived organisational attractiveness	-.86	-3.16**	2.04	3.79***
	Enjoyment	-.81	-2.98**	.07	.13
	Engagement	-.36	-1.32	-.73	-1.36
Control Group (*n* = 81)	Applicant reactions	-.24	-.90	1.09	2.06*
	Perceived fairness	.05	.19	.05	.09
	Anxiety	.52	1.95	-.13	-.25
	Perceived organisational attractiveness	-.26	-.97	.14	.26
	Enjoyment	-.30	-1.12	.18	.34
	Engagement	-.48	-1.80	1.31	2.47*
Combined (*N* = 159)	Applicant reactions	-.06	-.31	.19	.50
	Perceived fairness	-.12	-.63	-.06	-.16
	Anxiety	.23	1.20	-.48	-1.25
	Perceived organisational attractiveness	-.49	-2.55*	.78	2.04*
	Enjoyment	.70	3.65***	-.35	-.91
	Engagement	-.22	-1.15	-.06	-.16

Note. *N* = Number of respondents for the entire sample, *n* = Number of respondents per condition; *$p < .05$, **$p < .01$, ***$p < .001$

Histograms for the non-normally distributed data can be viewed in Appendix H.

Homogeneity of Variance Matrices

For parametric statistics, equal variance across conditions should be assumed (Field, 2018). Levene's test of equality of variances was used to test this assumption. The results indicated that all outcome variables were non-significant and, therefore, this assumption was met (see Table 13).

Table 13

Levene's Test of Equality of Variances Across the Control Group (n = 81) and the Experimental Group (n = 78)

Condition	Variable	Levene Statistic	*df1*	*df2*	*Sig.*
Combined (*N* = 159)	Applicant reactions	1.14	1	157	.286
	Perceived fairness	1.57	1	157	.213
	Anxiety	.20	1	157	.643
	Perceived organisational attractiveness	.57	1	156	.418
	Enjoyment	.05	1	157	.830
	Engagement	1.55	1	157	.237

Note. *N* = Number of respondents for the entire sample; *n* = Number of respondents per condition

Tests of Hypotheses

The results for the hypotheses are reported in this section. A summary of the reviewed hypotheses is presented in Appendix G.

This section focuses on hypotheses 1, 2a, 2b, 3a, 4a, and 5b:

Hypothesis 1: Gamified assessments elicit more favourable applicant reactions (high perceived fairness and low anxiety) than their traditional assessment equivalents.

Hypothesis 2a: Gamified assessments elicit a lower level of perceived anxiety than their traditional assessment equivalents.

Hypothesis 2b: Gamified assessments elicit less favourable perceptions of fairness than their traditional assessment equivalents.

Hypothesis 3a: Gamified assessments elicit more favourable perceptions of organisational attractiveness than their traditional assessment equivalents.

Hypothesis 4a. Gamified assessments elicit a higher level of perceived engagement than their traditional assessment equivalents.

Hypothesis 5b. Gamified assessments elicit a higher level of perceived enjoyment than their traditional assessment equivalents.

Mean Comparison Analysis

Independent Samples T-Tests

Following the MANOVA analysis, an investigation of the differences between the control group and the experimental group regarding the levels of applicant reactions, perceived organisational attractiveness, enjoyment and engagement was conducted.

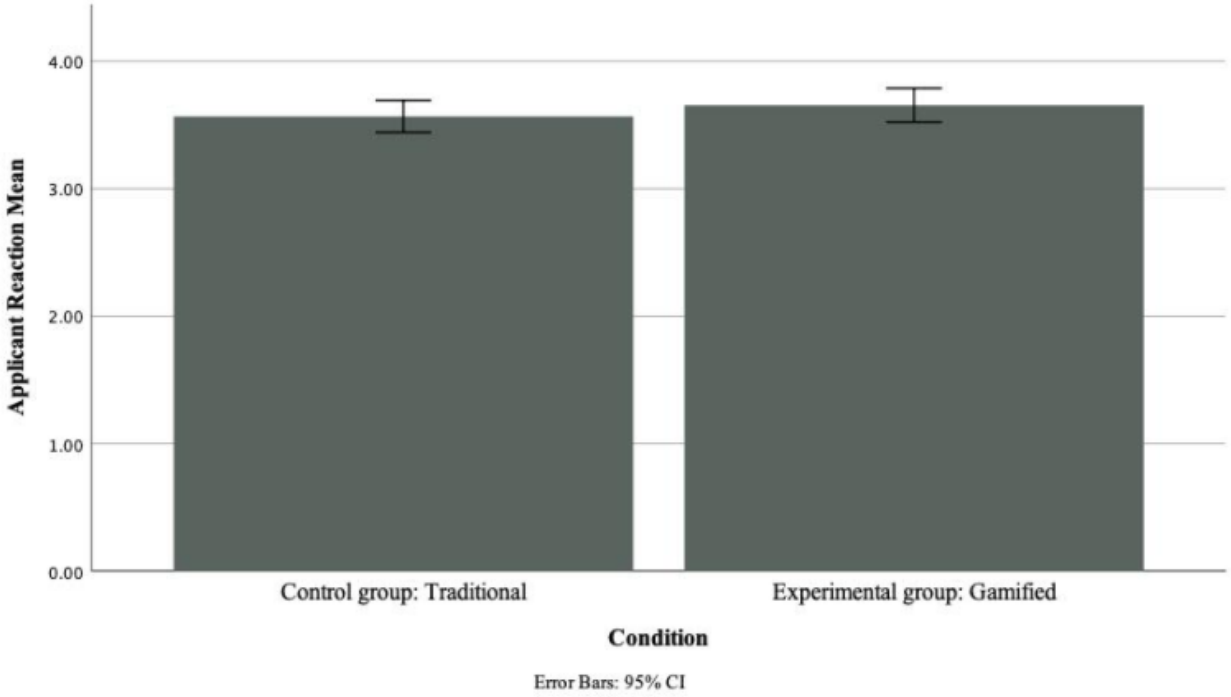
The investigation into the mean differences across variables was done in addition to the correlation analysis to determine if the presence of gamification resulted in a statistically

significant difference in mean scores across applicant reactions, perceived organisational attractiveness, enjoyment and engagement when compared with traditional assessments. The alpha level was adjusted using the Bonferroni correction to control for the inflation of the Type I error associated with multiple comparisons. Given that there were four tests conducted, the critical alpha value was adjusted from .05 to .017 (Armstrong, 2014). Bonferroni correction was chosen over Tukey tests as the former method has more statistical power when the number of comparisons is small (Field, 2018), as was the case for these tests in which three or more comparisons were made.

Hypothesis 1. Hypothesis 1 states that gamified assessments elicit more favourable applicant reactions than their traditional assessment equivalents. An independent sample t-test attempted to determine the statistically significant difference of applicant reactions between the two conditions: the gamified assessment (experimental) and the traditional assessment (control). There was no statistically significant difference ($t(157) = .95$, $p = .29$, two-tailed) in applicant reactions between the gamified assessment ($M = 3.65$, $SD = .59$) and the traditional assessment ($M = 3.57$, $SD = .57$) (see Table 14 and Figure 7). The difference of .08 scale points was insignificant (scale range: 1 to 5; $d = .14$), and a 95% confidence interval of the difference between the conditions means (-.26 to .09). Although the difference between test types was not statistically significant, the results show a small effect size ($r = -.11$) (Cohen, 1988). The effect size suggests a possible practical significance (Rosenthal & Rosnow, 2008). The null hypothesis is retained, and there is no significant difference between test type and applicant reactions.

Figure 7

Applicant Reactions: Mean Difference between Conditions



Non-Parametric Independent Group Tests: Mann-Whitney U Test

When assumptions for the parametric t-test are not met, the Mann-Whitney U test is used (Field, 2018). The Mann-Whitney U test was used to test hypotheses 2a, 2c, 3a and 4b because the assumptions for parametric statistics were not met.

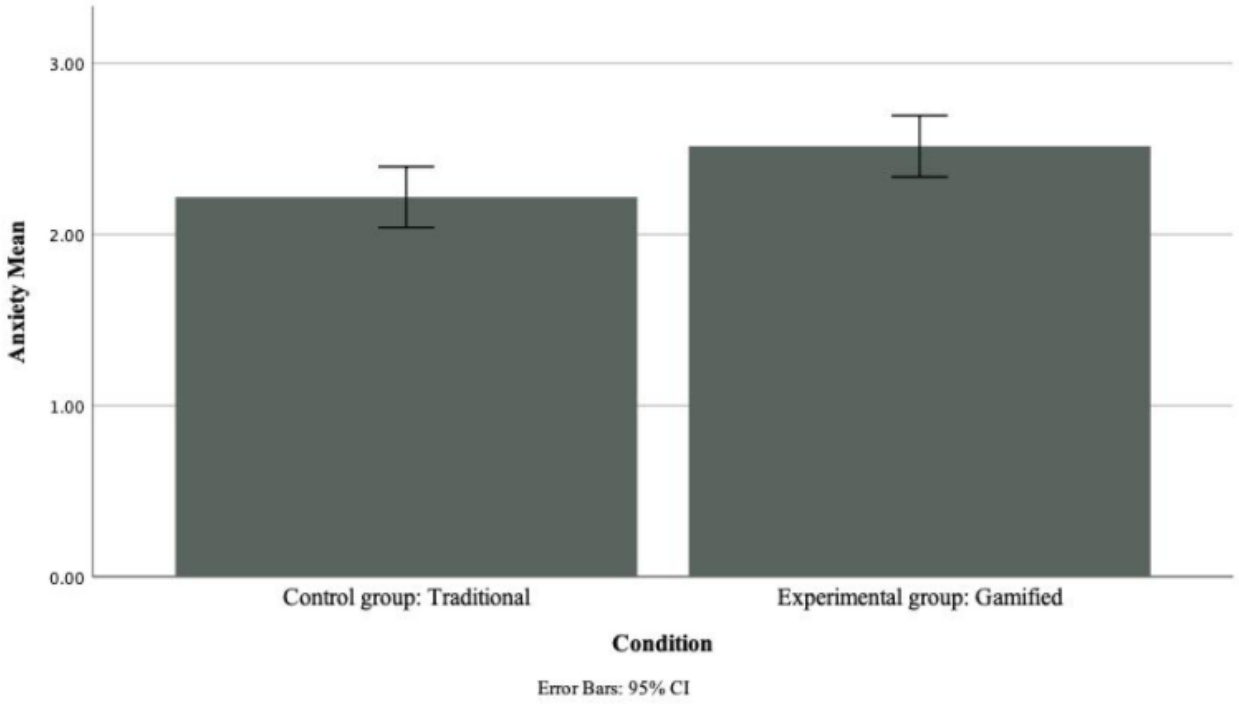
Hypothesis 2a. Hypothesis 2a states that gamified assessments elicit lower levels of perceived anxiety than their traditional assessment equivalents. Anxiety was tested separately as a subscale of applicant reactions.

A significant difference (U = 3917.50, z = .2.63, p < .01, r = -.21) was found in anxiety levels between the gamified assessment (Mean rank = 89.72) and the traditional assessment (Mean rank = 70.64) and thus, the null hypothesis is not supported (see Table 10 and Figure 8).

Since the null hypothesis is not supported, the hypothesis presented does not accurately reflect these results. There is a significant difference between test type and anxiety levels; completion of the gamified assessment indicated higher levels of anxiety than the traditional assessment.

Figure 8

Applicant Reaction Subscale of Anxiety: Mean Difference between Conditions



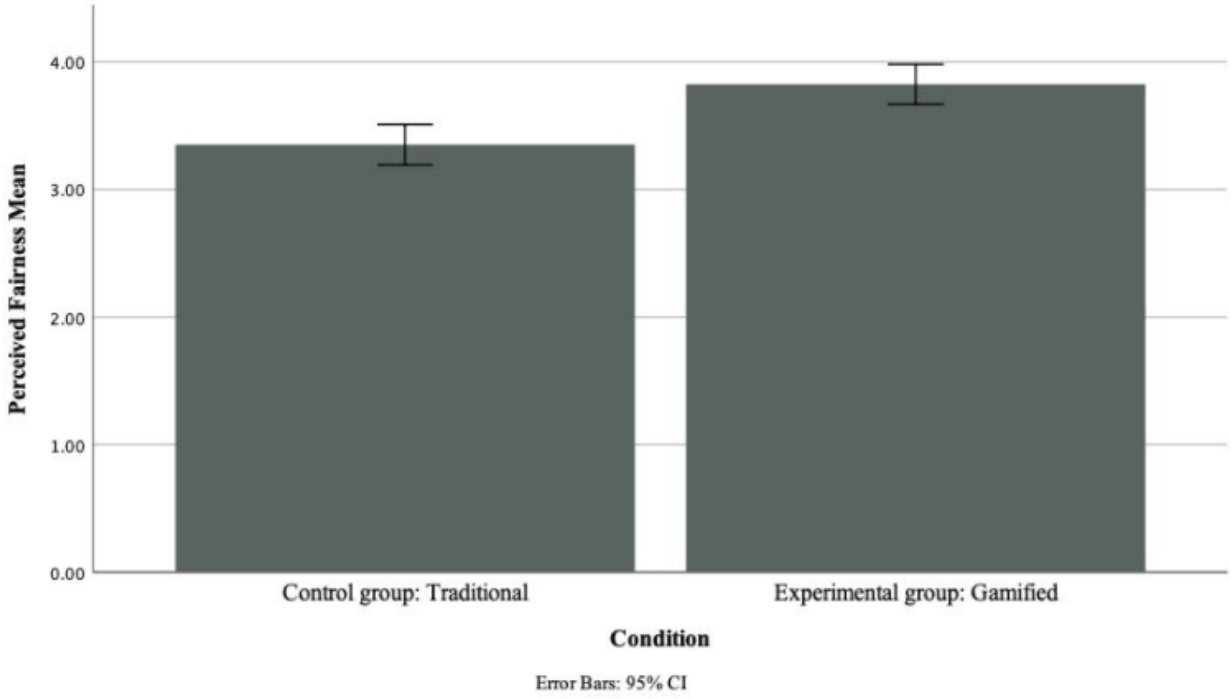
Hypothesis 2b. Hypothesis 2b states that gamified assessments elicit less favourable perceptions of fairness than their traditional assessment equivalents. Perceived fairness was tested separately as a subscale of applicant reactions.

A significant difference ($U = 4346.00$, $z = 4.12$, $p < .001$) was found in perceived fairness levels between the gamified assessment (Mean rank = 95.22) and the traditional assessment (Mean rank = 65.34) with a medium effect size reported as $r = .33$ (see Table 10 and Figure 9). The null hypothesis is not supported. Since the null hypothesis is not supported, the hypothesis

presented does not accurately reflect the results. There is a significant difference between test type and perceived fairness levels; completion of the gamified assessment indicated higher levels of perceived fairness.

Figure 9

Applicant Reaction Subscale of Perceived Fairness: Mean Difference between Conditions



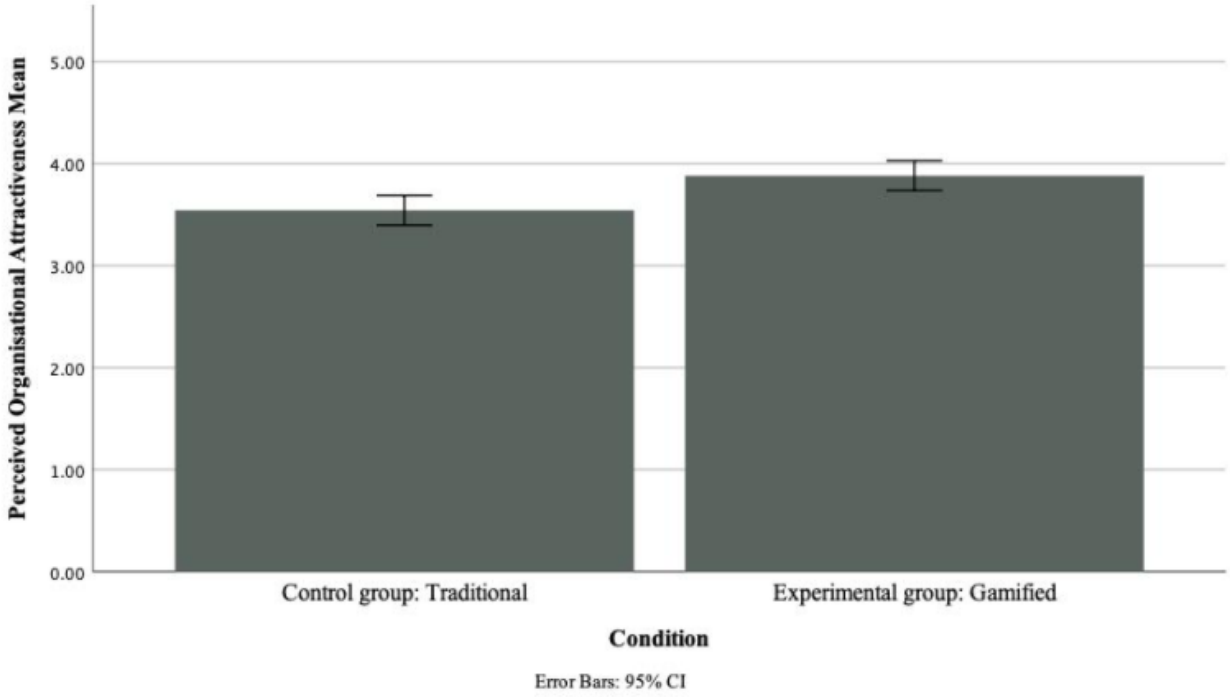
Hypothesis 3a. Hypothesis 3a states that a gamified assessment elicits more favourable perceptions of perceived organisational attractiveness.

A significant difference ($U = 4022.50$, $z = 3.17$, $p < .01$, $r = .25$) was found in perceived organisational attractiveness levels between the gamified assessment (Mean rank = 91.24) and the traditional assessment (Mean rank = 68.34) (see Table 10 and Figure 10). Based on these results, the null hypothesis is not supported, and there is a significant difference between test

type and perceived organisational attractiveness. Applicants who complete the gamified assessment were more likely to have favourable perceptions of the organisation's attractiveness.

Figure 10

Perceived Organisational Attractiveness: Mean Difference between Conditions



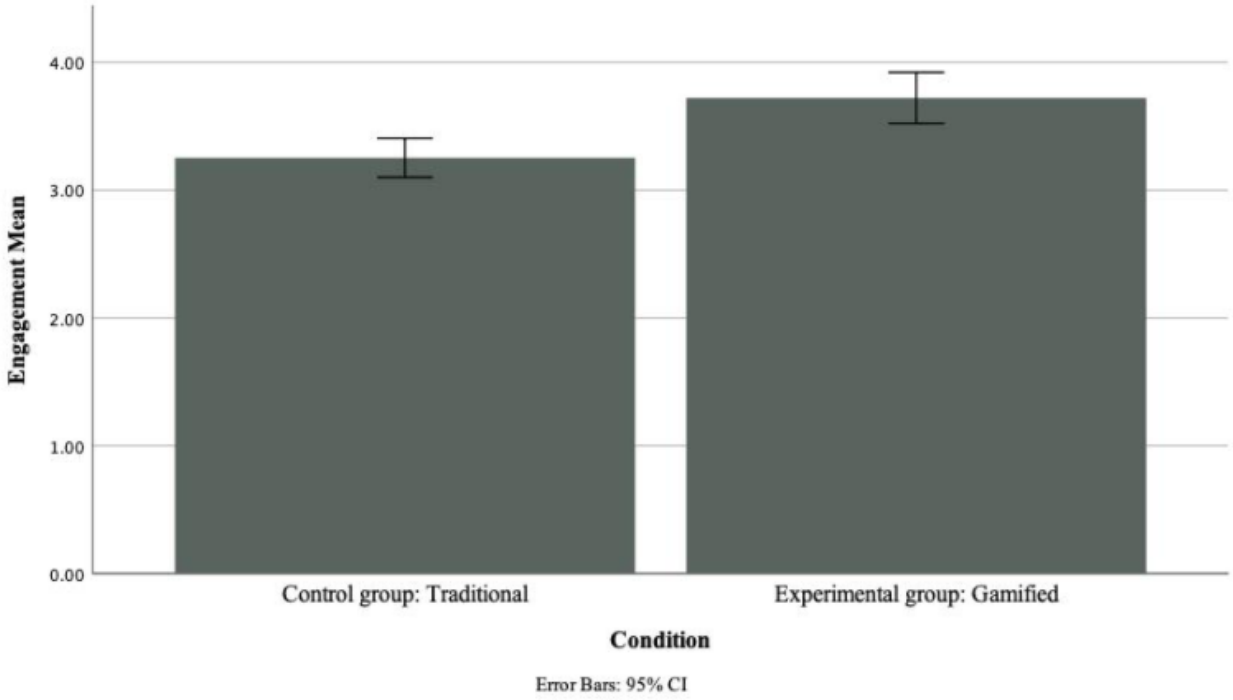
Hypothesis 4a. Hypothesis 4a states that gamified assessments elicit a higher level of engagement than their traditional assessment equivalents.

A significant difference (U = 4201.50, z = 3.60, p < .001, r = .29) was found in engagement levels between the gamified assessment (Mean rank = 93.37) and the traditional assessment (Mean rank = 67.13) (see Table 10 and Figure 11). Based on these results, the null hypothesis is not supported, and there is a significant difference between test type and

engagement. Applicants who complete the gamified assessment are likely to be more engaged during the assessment than those who complete the traditional assessment.

Figure 11

Engagement: Mean Difference between Conditions

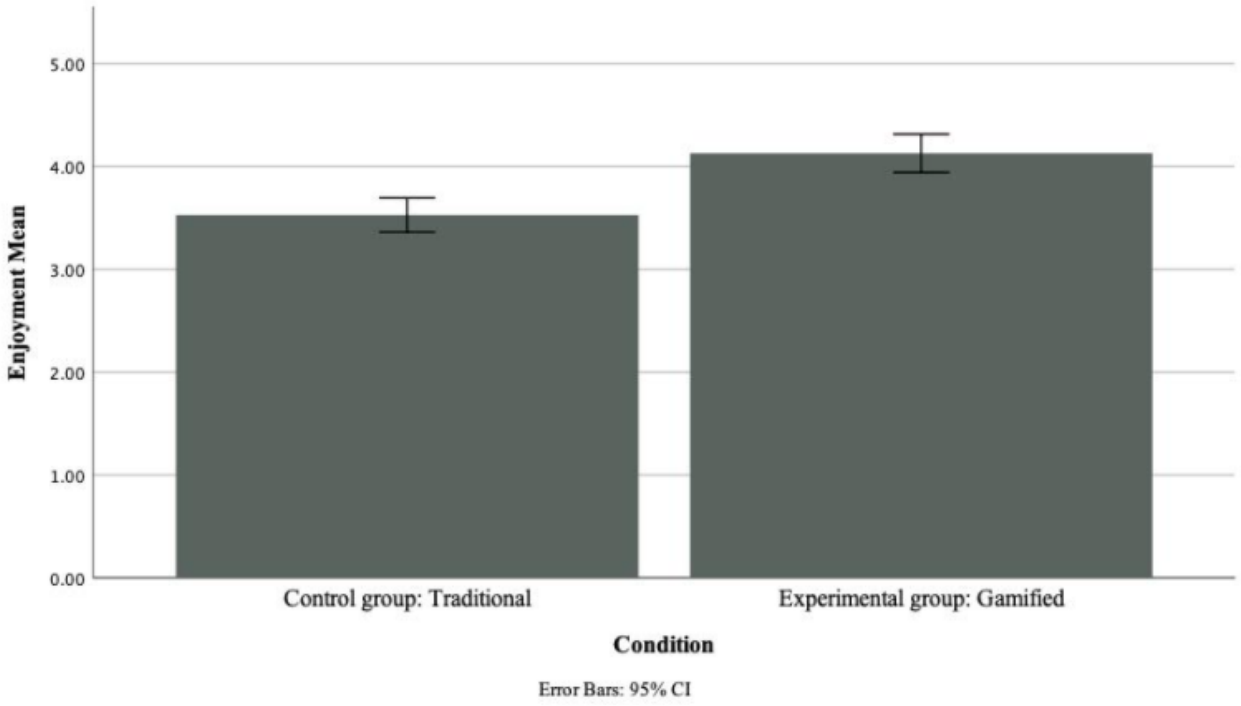


Hypothesis 5b. Hypothesis 5b states that gamified assessments elicit a higher level of perceived enjoyment than their traditional assessment equivalents.

A significant difference ($U = 4514.50$, $z = 4.70$, $p < .001$, $r = .37$) was found in enjoyment levels between the gamified assessment (Mean rank = 97.38) and the traditional assessment (Mean rank = 63.27) (see Table 10 and Figure 12). Based on these results, the null hypothesis is not supported, and there is a significant difference between test type and enjoyment. Applicants who complete the gamified assessment are more likely to enjoy the assessment than those who complete the traditional assessment.

Figure 12

Enjoyment: Mean Difference between Conditions



Mediation Analysis

This section focuses on the following hypotheses relevant to proposed mediation effects:

Hypothesis 4b. The relationship between assessment type and perceived organisational attractiveness is mediated by engagement.

Hypothesis 4c. The relationship between applicant reactions (high perceived fairness and low anxiety) and perceived organisational attractiveness is mediated by engagement.

Hypothesis 5a. The relationship between assessment type and applicant reactions (high perceived fairness and low anxiety) is mediated by perceived enjoyment.

Hypothesis 5c. The relationship between assessment type and perceived organisational attractiveness is mediated by perceived enjoyment.

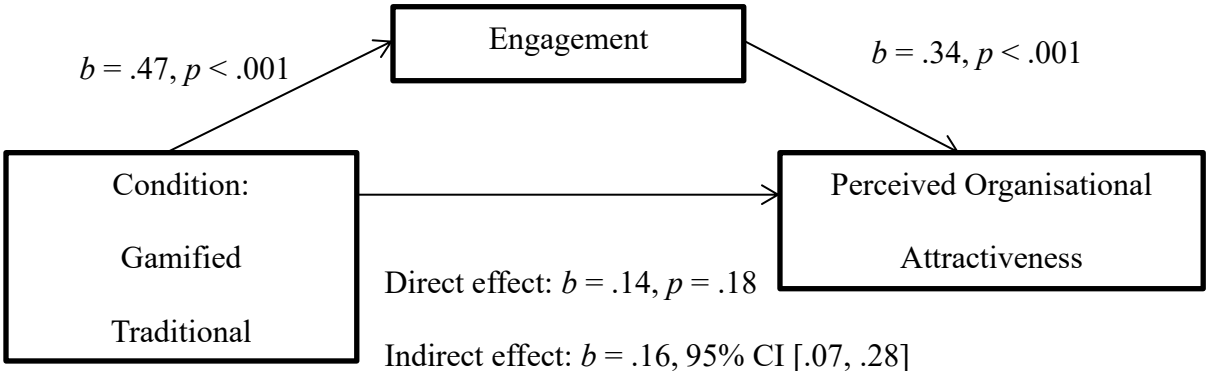
Hypothesis 4b, 4c, 5a and 5c refer to mediating relationships that were tested using Preacher and Hayes' (2014 PROCESS macro for SPSS. This approach to mediation was deemed appropriate because it estimates the indirect effects between variables through normal theory approach and bootstrapping. Bootstrapping is appropriate when the variables are not normally distributed since bootstrapping makes no assumptions about data distribution and is more powerful than the Sobel test when considering statistical significance of mediating relationships (Field, 2018). When interpreting statistical significance, Cohen's guideline for varying effect sizes was used: .01 is a small effect size, .09 is medium, and .25 is large (Cohen, 1988).

Engagement

Engagement and perceived organisational attractiveness. Hypothesis 4b considered test type as the independent variable (X), engagement as the mediator variable (M), and perceived organisational attractiveness as the outcome variable (Y). See Figure 13 for a depiction of the relationship. The results suggest that test type does not predict perceived organisational attractiveness without engagement in the model (b = .14, 95% CI [-.07, .35], t = 1.34, p = .18). With engagement as a mediating variable, there is also a significant relationship (b = .47, 95% CI [.22, .72], t = 3.73, p < .001). The R^2 value indicates that the model explains 8.12% of the variance in applicant reactions. The indirect effect of test type on applicant reactions was calculated at a 95% confidence interval [.07, .28] with b = .16. This analysis suggests that engagement mediates the relationship between test type and perceived organisational attractiveness. Hypothesis 4c is, therefore, retained and the null hypothesis is not supported.

Figure 13

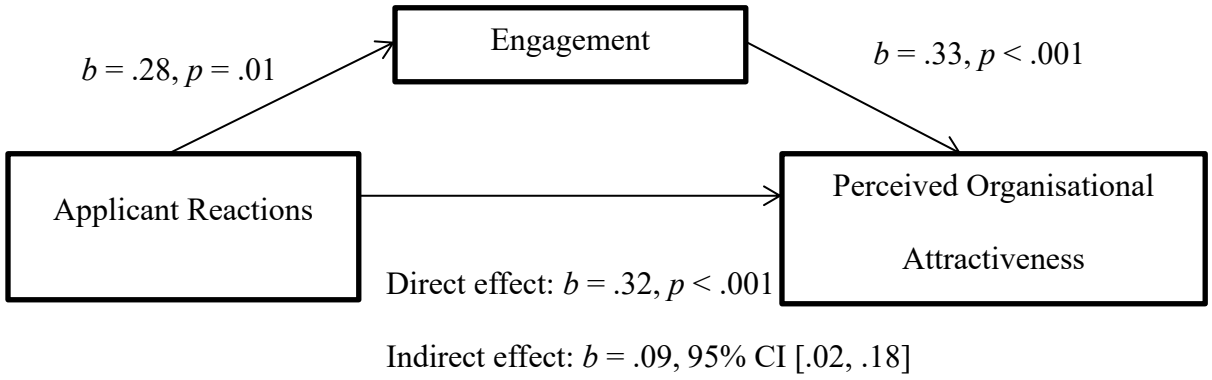
Results of the PROCESS Analysis Showing the Mediation of Engagement on Test Type and Perceived Organisational Attractiveness



Engagement and Applicant Reactions. Hypothesis 4c considered applicant reactions as the independent variable (X), engagement as the mediator variable (M), and perceived organisational attractiveness as the outcome variable (Y). See Figure 14 for a depiction of the relationship. The results suggest that applicant reactions predict perceived organisational attractiveness even without engagement in the model (b = .32, 95% CI [.15, .49], t = 3.77, p < .001). With engagement as a mediating variable, there is a significant relationship (b = .28, 95% CI [.06, .50], t = 2.54, p = .01). The R^2 value indicates that the model explains 3.95% of the variance in applicant reactions. The indirect effect of test type on applicant reactions was calculated at a 95% confidence interval [.02, .18] with b = .09. This analysis suggests that the higher the applicant reactions for a test, the more likely the test will be perceived as engaging and thus elicit higher levels of perceived organisational attractiveness. Hypothesis 4c is, therefore, retained and the null hypothesis is not supported.

Figure 14

Results of the PROCESS Analysis Showing the Mediation of Engagement on Applicant Reactions and Perceived Organisational Attractiveness

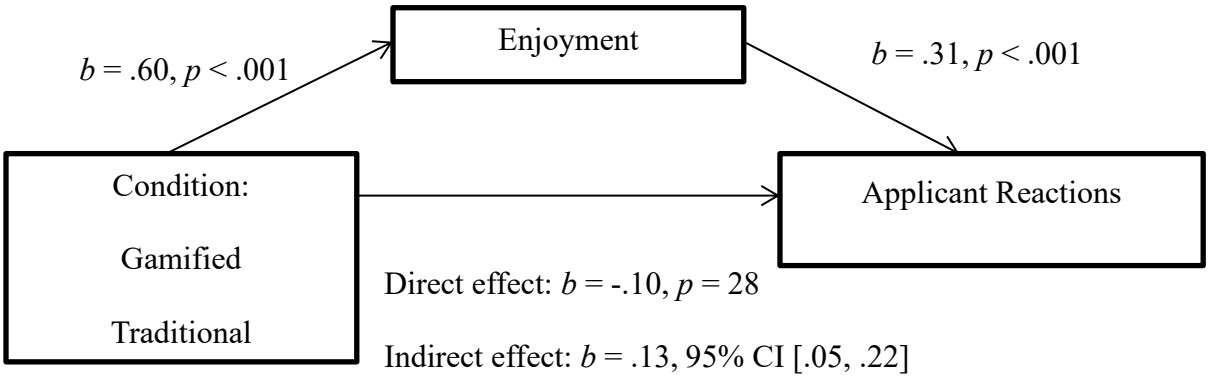


Enjoyment

Enjoyment and Applicant Reactions. Hypothesis 5a considered assessment type (gamified versus traditional) as the independent variable (X), enjoyment as the mediator variable (M), and applicant reactions as the outcome variable (Y). See Figure 15 for a depiction of the relationship. The results suggest that test type does not predict applicant reactions without enjoyment in the model (b = -.10, 95% CI [-.28, .08], t = -1.08, p = .28). With enjoyment as a mediating variable, there is, however, a significant relationship (b = .31, 95% CI [.20, .41], t = 5.70, p < .001). The R^2 value indicates that the model explains 12.85% of the variance in applicant reactions. The indirect effect of test type on applicant reactions was calculated at a 95% confidence interval [.09, .30] with b = .18. This analysis suggests that the more enjoyable a test is perceived, the more positive the applicant reactions will be. Hypothesis 5a is, therefore, retained and the null hypothesis is not supported.

Figure 15

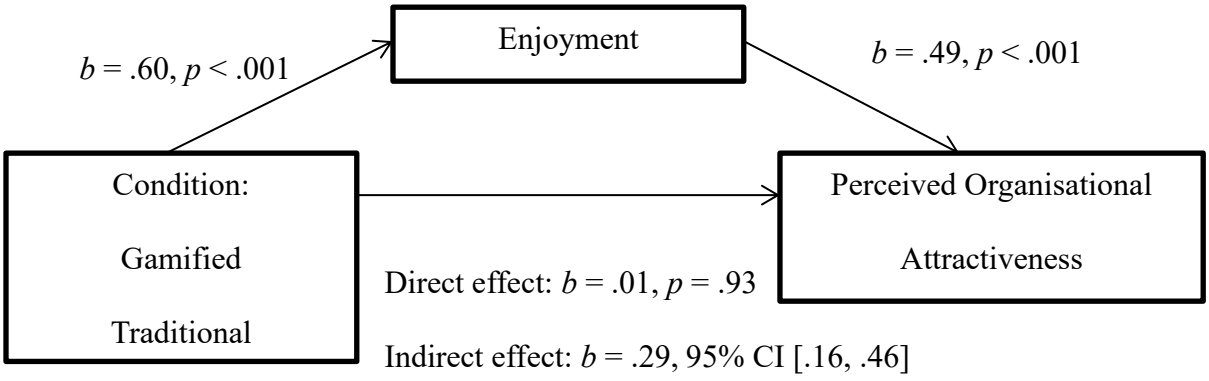
Results of the PROCESS Analysis Showing the Mediation of Enjoyment on Test Type and Applicant Reactions



Enjoyment and Perceived Organisational Attractiveness. Hypothesis 5c considered enjoyment as the mediating variable (M) between test type (X) and perceived organisational attractiveness (Y). See Figure 16 for a depiction of the relationship. The results indicate that test type does not significantly predict perceived organisational attractiveness without enjoyment in the model (b = .01, 95% CI [-.18, .20], t = .09, p = .93). With enjoyment as a mediating variable there is, however, a significant relationship (b = .49, 95% CI [.38 .61], t = 7.21, p < .001). The R^2 value indicates that the model explains 35.85% of the variance in perceived organisational attractiveness. The indirect effect of test type on perceived organisational attractiveness was calculated at a 95% confidence interval [.16, .46] with b = .29. This analysis suggests that the more enjoyable a test is perceived, the higher the perceptions of organisational attractiveness. Hypothesis 5c is, therefore, retained and the null hypothesis is not supported.

Figure 16

Results of the PROCESS Analysis Showing the Mediation of Enjoyment on Test Type and Perceived Organisational Attractiveness



Statistical Power

Statistical power analysis was conducted on all the parametric and non-parametric tests used in the present study. Compared with parametric tests, non-parametric tests have less statistical power and with a smaller sample size, the power could be further affected (Corder & Foreman, 2009). Post-hoc power analysis was, therefore, conducted to determine if the null hypotheses were correctly not supported. The post-hoc analysis was conducted using G*Power (Faul et al., 2009). The relevant effect size, the sample size, and a significance level of .05 were used for the t-tests and Mann-Whitney U tests. Against a statistical power criterion of .80 (Cohen, 1988), low statistical power was calculated for the independent sample t-test for Hypothesis 1 (power = .95) with acceptable power. Acceptable statistical power was found for the Mann-Whitney U tests (Hypothesis 3a power = .79; Hypothesis 2a power = .69; Hypothesis 2b power = .99; Hypothesis 4d = .95; and Hypothesis 5a = .95). Tables 14 and 15 summarise the results.

Table 17

Summary of Results for Parametric Statistical Analysis and Power

Hypothesis Tested	Experimental group (Gamified)		Control group (Traditional)		*t*(157)	*p*	Cohen's *d*	Power
	M	*SD*	*M*	*SD*				
Hypothesis 1: Applicant Reactions	3.63	.62	3.56	.58	-.74	.19	.12	.95

Table 14

Summary of Results for Non-Parametric Statistical Analysis and Power

	Mann-Whitney U Test				
Hypothesis Tested	*U*	*z*	*p*	*r*	Power
Hypothesis 3a: Perceived Organisational Attractiveness	4022.00	3.00	.003	.24	.79
Hypothesis 2a: Anxiety (Applicant reaction subscale)	2400.50	-2.62	.009	-.21	.65
Hypothesis 2b: Perceived Fairness (Applicant reaction subscale)	4372.00	4.21	.000	.33	.99
Hypothesis 4a: Engagement	4201.50	3.60	.000	.29	.95
Hypothesis 5b: Enjoyment	4514.50	4.70	.000	.37	.95

Table 16 summarises the main findings of the current study based on the analyses of the results in this chapter. The findings are presented with reference to the propositions set out in the literature review and effect sizes.

Table 15

Summary of the Study Hypotheses and Findings

Hypotheses	Finding	Effect Size	Cohen's *d*
Hypothesis 1: Gamified assessments elicit more favourable applicant reactions (high perceived fairness and low anxiety) than traditional assessments.	Not supported	r = -.11	.14
Hypothesis 2a: Gamified assessments elicit a lower level of perceived anxiety than traditional assessments.	Significant inverse relationship	r = -.21	-
Hypothesis 2b: Gamified assessments elicit a lower level of perceived fairness than traditional assessments.	Significant inverse relationship	r = .33	-
Hypothesis 3a: Assessment type, gamified versus traditional, is related to perceived organisational attractiveness.	Supported	r = .25	-
Hypothesis 4a. Gamified assessments elicit a higher level of perceived engagement than traditional assessments.	Supported	r = .29	-
Hypothesis 4b. The relationship between assessment type and perceived organisational attractiveness is mediated by engagement.	Supported	p < .001	-
Hypothesis 4c. The relationship between applicant reactions (high perceived fairness and low anxiety) and perceived organisational attractiveness is mediated by engagement.	Supported	p < .001	-
Hypothesis 5a. The relationship between assessment type and applicant reactions (high perceived fairness and low anxiety) is mediated by perceived enjoyment.	Supported	p < .001	--
Hypothesis 5b. Gamified assessments elicit a higher level of perceived enjoyment than traditional assessments.	Supported	r = .80	.77
Hypothesis 5c. The relationship between assessment type and perceived organisational attractiveness is mediated by perceived enjoyment.	Supported	p < .001	-

Further Analysis

Further analysis, in the form of a MANOVA and additional mediation analysis, was undertaken in the present study to understand further relationships between the variables in the study. Further analysis can be found in Appendix I.

Chapter 6: Discussion

Chapter 6 discusses the research findings relating to the study's hypotheses. The chapter includes a discussion of the key findings relevant to current literature on applicant reaction and gamification and covers the theoretical and practical contributions of the research. Thereafter, the study's limitations and recommendations for future research are discussed, and finally, concluding notes on the overall study's findings are presented.

This experimental study was undertaken in response to the call for empirical research investigating technology-based changes in the I/O Psychology field (Morelli et al., 2017). The pace of research into technological advancements is not matching the pace of implementation of these changes and therefore, the need for additional research was established. The present study aimed to address the gap in research that considers applicant reactions towards gamified assessments. While theoretical frameworks investigating applicant reactions exist (McCarthy, Bauer, Truxillo, Anderson et al., 2017), these are lacking for applicant reactions in the context of gamified assessments in personnel selection. Hence, theoretically salient antecedents of applicant reactions were examined for an under-researched and relatively novel assessment practice, namely gamification in a personnel selection context. The model that was developed and tested in the present study emerged from a review of existing literature. Rather than exploring potential antecedents, a theoretical framework was deemed necessary to provide direction regarding which variables would be useful to test given the theory of gamification.

In addition to the development and testing of a theoretical framework, the present study makes a specific contribution to business and HR practitioners. The present study provides insight into the potential effects on test-takers when replacing traditional assessments with

gamified assessments. The findings of the present study allow for more informed business decisions regarding personnel selection tools.

With technology continuing to change business processes, innovation and trends are constantly being generated. Gamification is one of the trends inspired by technological advancements. However, although the rate of applying gamification in business is growing, little is known about the benefits of its inception into business (Dale, 2014; Cardador et al., 2017). To address the rapid technology-based changes being introduced, the present study developed a framework that provided insight into the expected relationship between type of assessment (traditional versus gamified) and applicant reactions (see Figure 1). This was done bridge the knowledge gap in this area and to provide novel insights into the body of gamified personnel selection literature.

The framework in the present study employed a modular approach to distinguish the differences between a gamified assessment and a traditional assessment using seven predictor method factors (Lievens & Sackett, 2017). The aim of using the modular approach was to compartmentalise the elements of gamification so that the gamified assessment could be easily differentiated from the traditional assessment. In the present study, the use of a modular approach to make an experimental comparison (a gamified versus a traditional assessment) was undertaken to enhance gamification in a behavioural assessment context. To the researcher's knowledge, the modular approach has not been used previously to analyse the design features of a gamified assessment and to determine the benefits of such an assessment. The modular approach helps with enhancing the documentation and description of selection procedures (Lievens & Sackett, 2017). Considering a novel selection procedure such as the gamified assessment in this manner helps with accumulating more knowledge within the I/O Psychology

field. Furthermore, using the modular framework helps with explaining different findings across studies and with an experimental comparison across groups (Lievens & Sackett, 2017). Having the differences and similarities across certain stimuli documented, for example, helps to differentiate which factors explain divergences in results.

The present study developed a testable framework that focuses on the outcomes elicited from the use of a gamified assessment. To develop the framework in the present study, the researcher drew on the existing theories of applicant reactions (McCarthy, Bauer, Truxillo, Anderson et al., 2017) and the theory of work gamification (Cardador et al., 2017. The aim of the framework in the present study was to provide novel insight into the behavioural outcomes of implementing new assessment types into personnel selection processes by specifically considering applicant reactions.

While perceived organisational attractiveness can result in the loss of key talent or reputational damage (McCarthy, Bauer, Truxillo, Anderson et al., 2017), gamification offers new elements such as enjoyment and engagement (Weidner & Short, 2019), which can affect behavioural outcomes and applicant reactions. Thus, the framework built in the present study included engagement and enjoyment, mediating elements supported by gamification scholars (Fetzer et al., 2017; Seaborn & Fels, 2015). Perceived organisational attractiveness to potential employees was investigated as the behavioural outcome of the change in assessment type.

Consideration of user reactions to gamification was deemed important and appropriate since the pace of application of modern assessments is rapid while a thorough understanding of the implication of their use is lagging (Dale, 2014), thus leaving the behavioural outcomes unknown. Negative word of mouth, customer behaviour, and organisational reputation remain significant consequences of poor applicant reactions invoked from personnel selection processes

(Ryan & Ployhart, 2000). Furthermore, scarcity of available human potential is becoming widespread in the market, and organisations cannot afford negative consequences such as applicants rejecting positions based on poor selection experiences. Therefore, the present study aimed to clarify an under-researched area of gamification. The central purpose behind the development and testing of the framework in the present study was to ensure that businesses adapt their processes based on empirical evidence.

Key Findings

Do Game Elements Enhance Applicant Reactions?

Hypothesis 1 considered if gamified assessments elicited more favourable applicant reactions than traditional assessments. The present study found that applicant reactions are positively related to favourable perceptions of an organisation, increased enjoyment, and enhanced engagement. However, applicant reaction analysis for both assessment types (gamified and traditional) showed that there was no difference in how users of these personnel selection tools experienced the assessments. The respondents who completed the gamified values assessment did not have different perceptions of the tool from the respondents who completed the traditional values assessment. A small effect size for applicant reactions across assessment types was shown in the results. In relation to the theoretical framework, the results of the present study pertaining to applicant reactions (an aggregated score of perceived fairness and anxiety) do not support the presented model; respondents' perceptions of the gamified values assessment and the traditional values assessment did not vary.

Hypothesis 3a considered if assessment type (gamified versus traditional) is related to perceived organisational attractiveness. The present study found that with applicant reactions removed from the model, experimental conditions (gamified or traditional) related to perceived

organisational attractiveness. The gamified assessment was found to elicit higher levels of perceived organisational attractiveness than the traditional assessment. In essence, applicants who completed the gamified assessment were more willing to recommend the company, to accept a position with the company and to participate in an interview with the company for a job. The present study did not consider specifics of the game that might explain the result other than applicant reactions. Some studies have considered how the use of technology in general creates a more favourable view among potential applicants (Nikolaou et al., 2019). For example, an organisation that is using more technologically driven processes (online, computerised or internet-based for example) are perceived more favourably than organisations using paper-and-pencil based processes). Candidates are attracted to the technological advancements displayed by organisations because they indicate relevance and competitiveness in the current market. Therefore, future research could explore if the use of more technologically focused personnel selection methods elicits more favourable results.

Applicant perspective theory suggests that an environmental characteristic such as type of test influences applicant reactions (McCarthy, Bauer, Truxillo, Anderson et al., 2017). It is notable that the results of the present study do not support prior research; no difference was shown in applicant reactions despite variation in test type. Hence, further investigation into the subscales of applicant reactions remains relevant (McCarthy, Bauer, Truxillo, Anderson et al., 2017).

Applicant reactions in the present study was the aggregate of two subscales, namely perceived fairness, and anxiety. While overall applicant reactions (aggregated results from the perceived fairness and anxiety scales) did not differ between the assessment types, to understand

thoroughly the impact on users, the subscales used in the present study are considered separately and in more detail.

Applicant Reaction Subscales: Perceived Fairness and Anxiety. It was theorised that more favourable applicant reactions would be elicited from gamified assessments since gamification is likely to reduce test-taker anxiety, enhance user engagement, and improve overall test validity (Weidner & Short, 2019). For the purpose of the present study and consistent with applicant perspective theory, applicant reactions comprised two subscales: anxiety and perceived fairness.

Hypothesis 2a considered if gamified assessments would elicit lower levels of perceived anxiety than traditional assessments. Contrary to the theory outlined above, the present study found that the gamified values assessment elicited higher levels of anxiety among respondents than the traditional values assessment. Theory suggests that the game-design features are likely to distract users from the fact that they are completing an assessment (Weidner & Short, 2019). Gamification uses game design to transform traditional non-game activities and make the experience more enjoyable. Therefore, the game-elements act as a mechanism that prevents users from worrying about their performance in relation to others or dwelling on the consequences of not doing well on the assessment. The removal of feelings of anxiety is theorised to be an advantage of gamification (Cassady & Johnson, 2002; Weidner & Short, 2019); users are of a gaming mindset rather than the mindset for a traditional business-related activity (Deterding et al., 2011; Lieberoth, 2015).

It is noteworthy that the respondents in the present study felt anxious about their performance on the gamified assessment and concerned about not performing as well as others when completing the assessment ($U = 3917.50$, $z = .2.63$, $p < .01$, $r = -.21$). The higher levels of

anxiety associated with the gamified assessment do not support the theory behind the use of game-elements and therefore, the relationship found in the present study is novel. It is suggested that further investigation is needed to determine if it is an illusion that the gamelike association makes completing the task less stressful.

Previous research has investigated the effects of *cognitive load* elicited from gamified assessments and how this might influence anxiety. Cognitive load is defined as the effort placed on the cognitive system when performing a task (Chu, 2014). A study conducted in the learning context considered the relationships that exist between gamification, anxiety, and cognitive load (Su, 2016). The elements that are incorporated within gamified activities increase cognitive load (Chu, 2014). As reviewed using the modular framework, gamification uses multiple design stimuli such as fantasy, pictorial, and audio mechanics. Furthermore, gamification uses dynamic audio-visual stimuli and motivational affordance mechanisms such as levels, stories, themes, leaderboards, point systems and rewards. Incorporation of game elements thus implies the level of cognitive load is significantly higher when using gamified assessments (Turan et al., 2016). According to previous studies such as the study of Su (2016), a positive relationship between cognitive load and anxiety exists, and this may have been the case with the gamified assessment used in the present study. The more dynamic nature of the gamified assessment may have increased the cognitive load of applicants and, therefore, increased the anxiety levels. Cognitive load was not, however, included in the present study and hence needs to be investigated in the context of gamification used in personnel selection in future research.

Perceived fairness was the second subscale of applicant reactions in the present study. Hypothesis 2b considered if gamified assessments elicited a lower level of perceived fairness than traditional assessments. Gamified assessments draw on game elements to transform

traditionally non-game activities (Deterding et al., 2011) and thus, the face validity and relevance of these assessments in the work context is controversial (Dale, 2014). The present study theorised that the contextualisation of the traditional assessment, the less opaque nature of the traditional values assessment, made its relevance to the work context clearer. The decontextualised space theme of the gamified values assessment was, however, assumed to be less clear to users in terms of workplace relevance.

Clear and obvious relevance to the workplace suggests that the perceptions of fairness should be higher, as found in previous research (Gilliland, 1993; Van Vianen et al., 2004). In the present study, however, the opaque nature of the assessment and the decontextualised theme did not hinder perceptions of fairness. Respondents completing the gamified measure found it to be more relevant to the workplace than the traditional assessment.

The higher level of fairness perception indicated on the gamified measure may have been the result of the storyline and the scenarios in which the items were presented. Both assessments measured personal values but whereas the traditional assessment simply presented the item as a standalone question, the gamified assessment presented the items using scenarios. These scenarios may have helped to create a clearer link to the workplace if respondents had viewed them as metaphoric or symbolic of the workplace. The items may have been more easily interpreted in a scenario than in a situation with no context, as in the traditional assessment. Furthermore, the use of a story in the gamified assessment perhaps made the assessment easier to follow than if the assessment had used a completely abstract format, as in cognitive assessments (Gilliland, 1993). Some respondents may have been able to link some of the scenarios within the gamified assessments to the workplace despite the opaque nature of the assessment.

A recent study investigated perceived fairness across a gamified SJT and a traditional SJT (Georgiou & Nikolaou, 2020). Noteworthy is that the gamified SJT only elicited higher levels of perceived fairness with satisfaction as a mediating variable. In essence, game features created a more pleasing assessment appearance and, therefore, the gamified assessment was perceived as fairer (Georgiou & Nikolaou, 2020). The present study found a significant direct relationship between the perceived relevance of the assessment to the workplace and assessment type.

In summary, the results obtained on the perceived fairness subscale are novel and suggest that further investigation into the perceptions of gamified measures and their relevance is needed. Game elements may have more relevance to the workplace among job seekers than previously theorised. Additionally, the present study investigated a behavioural assessment whereas a cognitive gamified measure may have had different results regarding perceived fairness.

Understanding Whether Gamification Works or Not

Gamification is theorised to elicit behavioural outcomes such as higher levels of enjoyment and engagement (Fetzer et al., 2017; Seaborn & Fels, 2015). The model developed in the present study considered if a gamified assessment elicited higher levels of engagement (Hypothesis 4a) and enjoyment (Hypothesis 5a) than a traditional assessment and, therefore, if the gamification was effective in eliciting the desired behavioural outcomes.

Enjoyment. Testing of the model found that the values-based gamified assessment was more enjoyable than the values-based traditional assessment. A growing string of gamification theory exists through which research considers if games in a work context enhance the levels of user enjoyment (Dale, 2014; Cardador et al., 2017; Fetzer et al., 2017; Seaborn & Fels, 2015). As

with the theory of work gamification (Cardador et al., 2017), much of the research regarding user enjoyment for gamification is untested.

The theoretical model of work gamification outlined how game elements used in gamified work are likely to enhance enjoyment levels (Cardador et al., 2017). The design of gamification is based on gaming principles and, therefore, user-centric factors such as level of enjoyment are considered a fundamental component in the construction of gamified activities (Hamari et al., 2014). The findings in the present study support the theory that gamification, the application of gaming elements to traditionally non-gaming scenarios (Deterding et al., 2011), provides more enjoyment than its non-game equivalent. The difference in level of enjoyment between assessment types is a novel finding; research to date has not considered enjoyment when comparing a gamified assessment with a traditional personnel selection assessment.

There is, however, criticism of gamification and how it differs from games, which in their true form are volitional and often played for leisure (Koivisto & Hamari, 2014). The results in the present study align with the theory that gamification of activities makes the activities more enjoyable. In essence, the underlying theory is that when the elements that make a game more enjoyable are applied to a work context, they can elicit the same intrinsically positive reaction. While the gamified assessment was not undertaken for leisure purposes, it still generated high levels of enjoyment.

It should be noted, however, that the theory of work gamification asserts that the novelty of gamification may diminish over time (Cardador et al., 2017). Users may enjoy the experience at first but with time, may become bored with the game. However, in a personnel selection process, the assessment used is likely to be a one-off and, therefore, the concern for repeated use reducing enjoyment levels may not be valid.

Future work on gamified assessments in the personnel selection process should delve deeper into enjoyment levels over time, for example, the use of different gamified assessments at different stages of the selection process. Enjoyment levels may vary depending on the number of gamified measures used and the frequency of their use during a process. Further research on enjoyment levels over time of gamified assessments in the personnel selection context is suggested.

Furthermore, hypothesis 5c considered the relationship between test type (gamified versus traditional) and perceived organisational attractiveness being mediated by perceived enjoyment. The present study found that in addition to having higher levels of enjoyment, the respondents who completed the gamified measure had more favourable applicant reactions and perceptions of the organisation. The study found that enjoyment also mediated the relationship between type of assessment and applicant reactions. The gamified assessment invoked more favourable applicant reactions and perceptions of the organisation by presenting a more enjoyable experience. A previous study found a similar relationship whereby a gamified SJT elicited more favourable perceptions of fairness and organisational attractiveness by appearing more pleasingly to users (Georgiou & Nikolaou, 2020). The present study thus makes the novel contribution that even without enjoyment, more positive perceptions of the organisation are elicited from a gamified assessment.

Engagement. The present study found that gamification of an assessment appears to play an important role in enhancing test-taker engagement. As such, respondents completing the gamified values assessment were found to be more engaged than the respondents completing the traditional values assessment.

The findings in the present study align with applicant perspective theory (McCarthy, Bauer, Truxillo, Anderson et al., 2017). The model for applicant perspective theory outlines how cognitive processing can mediate intentions, behaviours, and attitudes towards a company with applicant reactions. Engagement is a type of cognitive process in which users of a tool maintain focus on the tool (McCarthy, Bauer, Truxillo, Anderson et al., 2017). Investigation into the differences in engagement levels between assessments (gamified and traditional) in the personnel selection space is novel. Previous gamification research has not focused on engagement in the personnel selection space across various assessment types.

Earlier research conducted in the learning context that examined the relationship between engagement and gamification indicated similar results in that gamification enhances engagement levels (Hamari et al., 2014; Looyestyn et al., 2017). Within the learning context, improved engagement strongly correlated with higher performance on tests and retention of knowledge. Having been conducted in the personnel selection space, the present study differed in the beneficial outcomes. Higher engagement resulted in applicants being more willing to accept employment with the company using the gamified assessment or to recommend the company to others.

The present study collected data from a behavioural assessment and as such, performance was not considered a measurement variable. Future research should consider the outcomes of improved engagement on test performance when using non-behavioural assessments such as cognitive assessments. In the study of Looyestyn et al. (2017), engagement in the learning context correlated with improved performance. Hence, improved engagement in gamified assessments in the personnel selection context might improve user performance in the

assessment. As such, future research should delve deeper into the potential outcomes associated with improved engagement in personnel selection assessments.

Contributions to Theory

The present study made a few notable contributions to theory. The study centred on two key areas to build a testable model and to contribute towards the field of I/O Psychology. The key areas comprised enhancing the understanding of traditional assessments versus gamified assessments through a modular approach (Lievens & Sackett, 2017) and investigating a theoretical model that considers applicant reactions and user behaviours across these assessment types.

There is a large amount of research presenting various definitions of terms relating to games in non-game contexts (Attali & Arieli-Attali, 2015; Deterding et al., 2011; Huotari & Hamari, 2012) but without considering the differences between traditional and gamified assessment types. The present study reviewed existing definitions of the concepts using a modular approach to compartmentalise the terms (Lievens & Sackett, 2017). Identifying similarities and defining key differences between traditional and gamified assessments can help in understanding the assessments more.

Assessments are complex and can measure the same construct using multiple approaches and techniques (Heneman & Judge 2009; Tippins, 2015). The versatility and the uniqueness of assessments make compartmentalising assessment components challenging. The present study focused on a specific gamified assessment based on personal values and provides a broad view of the differences between traditional and gamified assessments. Future research could use the modular approach to review a range of gamified assessments that measure different constructs to build stronger arguments and differentiate assessments easily.

The present study contributed to gamification theory further by developing a model that can be used to investigate differences in applicant reactions and the subsequent behavioural outcomes between modern tests and traditional tests. The model in the present study was built using the applicant perspective theory (McCarthy, Bauer, Truxillo, Anderson et al., 2017) and the theory of work gamification (Cardador et al., 2017) to construct relationships logically between test types, applicant reactions, and behavioural outcomes. This model provides a basic framework for measuring applicant reactions towards new assessment tools that can be developed further in future studies. The model can be expanded to include investigation of other terms that are significant to the field of gamification such as cognitive load, ATIC, social desirability responding and additional aspects that may make up applicant reactions.

Contributions to Practice

The rate of application of technology in businesses has overtaken the pace of research (Arthur et al., 2017). Because of their impact on perceived organisational attractiveness, applicant reactions remain prominent in research (McCarthy, Bauer, Truxillo, Anderson et al., 2017). However, there is minimal published research investigating applicant reactions to gamified assessments (Georgiou & Nikolaou, 2020). As such, businesses are using gamified assessments with little insight into the implications of employing these assessments for personnel selection.

The present study provides empirical evidence regarding the applicant reactions and the subsequent behavioural outcomes of a traditional and gamified values assessment. Insight into how a gamified assessment can increase test-taker enjoyment, enhance engagement, and create more favourable perceptions allows organisations to make more informed decisions regarding the assessments used to select personnel. The results from the present study provide

organisations with motivation to update their assessment practices from traditional assessments to gamified assessments to attract scarce talent better.

Organisations can use gamified assessments as a means of displaying technologically advanced processes and hence increase their level of attractiveness in the market. Furthermore, the present study has shown that a gamified values assessment can enhance applicant reactions more than traditional values assessment. This is a key criterion for an acceptable assessment instrument other than standard psychometric criteria such as reliability and validity (SIOP, 2020).

Limitations and Directions for Future Research

A few limitations of the present study should be considered when interpreting the research findings and in future research. These limitations are discussed next.

Key Assessment Differentiators

The present study used the modular framework of Lievens and Sackett (2017) to compartmentalise the differences between gamified assessments and traditional assessments. Seven predictor factors (stimulus format, contextualisation, stimulus presentation consistency, response format, response evaluation consistency, information source, and instructions) were reviewed to identify specific difference between a gamified assessment and a traditional assessment. While differences were identified, the specific applicant reactions towards the differences were not examined. Applicant reactions towards specific game features such as music, avatars, use of fantasy and storyline were not reviewed.

Stimulus format such as the use of audio or pictures has significant impact on personnel selection outcomes such as criterion-related validity and applicant perceptions (Lievens & Sackett, 2017). Respondents in the present study were not asked to compare specific differences

between the assessments used. As such, some of the variations in applicant reactions (perceived fairness and anxiety), enjoyment levels, engagement and perceived organisational attractiveness may be attributed to some game features more than others. Future research should consider investigating which specific elements of a gamified assessment create more favourable experiences.

Cognitive Load

As mentioned, cognitive load refers to the effort placed on the cognitive system when performing a task (Chu, 2014; Stodel, 2015). Gamification adds gaming elements to traditional tools, and this can increase cognitive load. For example, gaming elements add audio-visual dimensions and stimuli that enhance the number of elements that an individual needs to process (Turan et al., 2016). The use of multiple design stimuli such as pictorial, audio, and dynamic audio-visual stimuli and motivational affordance mechanisms such as levels, stories, themes, leaderboards, point systems and rewards are all elements that comprise the concept of a gamified assessment (Landers, 2020). The level of cognitive load regarding what is processed is significantly higher when using gamified assessments (Turan et al., 2016).

Aspects of extraneous cognitive load decrease with non-goal-orientated tasks (Sweller et al., 2019). However, with gamified assessments, there are often goals that need to be achieved and thus are likely to create a higher load (Turan et al., 2016). Cognitive load and how the level of cognitive load associated with the assessment moderates the level of enjoyment or anxiety experienced by users could be important considerations for future research.

It should be noted that additional data were collected in the perception questionnaire, which included social desirability, ATIC and cognitive load. To delineate the present study, these

variables were not included in the analysis. The variables will, however, be used for further analysis in future research.

Sampling

The present study had a few limitations relating to the sampling procedure that was followed. Convenience sampling was used to gather respondents for the present study, and the study was only administered at one academic institution within South Africa. In terms of efforts to increase the sample size, the e-mail inviting students to participate was sent out on two occasions to the entire student body. However, the generalisability of the study findings from this particular sample to the broader population of job seekers in the field is, therefore, not clear. The research should thus be replicated in future studies in other samples which contain actual jobseekers in the field.

While the present study was distributed across an entire body of students, the response rate was low, which may have affected the results of the study, particularly the statistical power (Cohen, 1988). In addition, there were three more completions of the traditional assessment than the gamified assessment and thus, true comparability of the conditions was affected. While lower response rates are not uncommon in survey method research, particularly online surveys (Anseel, Lievens, Schollaert & Choragwicka, 2010; Gabriel, Podsakoff, Beal, Scott, Sonnentag Trougakos & Butts, 2019). Future research could seek to employ a larger sample of real-life job applicants.

To address other generalisability issues, the sample could also be made more diverse in terms of culture and age groups. Only having taken place at one institution in South Africa, the cultural diversity of the study is not extensive. Regarding age, the mean age in this study was

22.86 years. Future studies should attempt to collect data across a wider age range and in a multicultural or multinational context.

Generational issues were not addressed in the present study. There is a digital divide between those with technological experience and those without, which can relate to socio-economic and demographic factors, one of which is age. There is speculation that perceptions of gamification may differ across generations (Hwang & Nam, 2017; Weidner & Short, 2019), which is likely to influence constructs such as enjoyment, engagement, applicant reactions and perceived organisational attractiveness. The younger generations are considered more accustomed to electronic games and, therefore, gamified assessments are likely to be more attractive to these generations (Nikolaou et al., 2019). The unintentional yet adverse impact that may be caused by lack of consideration in this area needs to be considered in order to mitigate the effect of certain groups (Weidner & Short, 2019). Future research regarding applicant reactions and subsequent behavioural outcomes of gamified assessments in the personnel selection process is advised.

Differences across gender groups were also not considered in the present study. Regarding games in general, there is the belief that women and girls are less able to succeed in video games than men and boys (Ratan et al., 2020). Previous research has found that gender differences exist in *spatial reasoning*, a skill commonly required for high performance in gaming (Lauer et al., 2019). Research findings such as these have seemingly validated the view regarding a gender-performance gap (Ratan et al., 2020). To some degree, the existence of this stereotype has been found to support the detraction of performance among females (Fordham et al., 2020). Considering the importance of fairness across gender groups within personnel selection contexts whereby all applicants should have an equal opportunity to perform (Heneman

& Judge, 2009), it is advised that future research considers the implications of gender differences across gamified assessments.

Furthermore, game features have been found to elicit differences in preferences across gender groups. Males are more likely to prefer competitive, action-filled, and achievement-orientated games whereas females prefer games that are more socially orientated, assistive, and cooperative (Ratan et al., 2020). The present study did not focus on reactions to the features of the assessments and for organisations to understand which gamified measures and features offer equal opportunity to all potential hires, investigation into applicant reactions to different games across gender groups would be beneficial.

Assessments Used

The present study did not consider the individual scores obtained from the values assessments that were used thus the result of each participant's personal value alignments. Therefore, measurement characteristics such as validity and reliability of the assessments were not considered. When applying the modular framework, ensuring that these characteristics are met is considered a key aspect (Lievens & Sackett, 2017). The suggestion for future research is to review the test characteristics of the assessments.

Furthermore, the present study only considered one assessment construct, personal values. Many gamified assessments that have been developed have traditional versions available that measure constructs such as cognitive ability, numerical reasoning, abstract reasoning, and verbal conceptualisation (Weidner & Short, 2019). In order to assess the behavioural outcomes elicited from different test types thoroughly, multiple assessment constructs should be reviewed in future studies.

Finally, the present study did not consider whether different elements of gamification such as leaderboards as a feature versus levels has an impact on more favourable perceptions. Gamified assessments can incubus many varying features (like leaderboards, levels and avatars) (Akoodie, 2020) and there are likely to be differences on which of these features are more appealing given difference context of use. studies could probe *what* it is about the gamified assessment that makes it appealing and promotes more favourable perceptions of the organisation. The present study's gamified values assessment did not include a leaderboard or increasing levels of difficulty or the necessary collection of badges, all of which would likely elicit varying perceptions of favourability. Future research could investigate perceptions regarding the use of or combinations of game features used such as music, fantasy and / or avatars. Applicants may prefer certain game elements to others, and this may affect their perceptions of the organisation. Further investigation into gamified assessments and perceived organisational attractiveness is recommended.

Conclusion

Applicant reactions remain an important construct in the field of management science because they are linked to perceived organisational attractiveness (McCarthy, Bauer, Truxillo, Anderson et al., 2017). Understanding the perceptions and behavioural outcomes of new assessment types such as the gamified assessment in the personnel selection space may have implications for how effectively organisations can attract and place talent in a competitive market. The findings of the present study indicate that when used in personnel selection, assessment type (gamified versus traditional) can significantly affect how candidates perceive the level of organisational attractiveness. Given the scarce market for talent and the level of market competition, organisations' understanding of these behaviours and the possible

consequences or benefits of new assessment methods, namely gamified assessments, is essential. Aspects of applicant reactions can influence applicant perceptions of the organisation but only when considered as separate constructs. Level of enjoyment and engagement associated with the assessment type (gamified or traditional) is also a significant indicator of perceived organisational attractiveness.

The limitations associated with the present study may have affected the results that were obtained, and further research is advised to determine applicant reactions across various assessment types and demographics. To date, significant areas associated with gamification remain unknown and untested such as cognitive load and social desirability in addition to applicant reactions across gamified assessment constructs other than values. Future research should continue to build on the model presented in the current study and devise novel methods to determine outcomes elicited from the use of gamification. The results of the current study suggest that gamified assessments are likely to heighten perceived organisational attractiveness through being a more enjoyable and engaging experience, but further research is needed to support the outcomes of the present study.

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Appendices

Appendix A: Ethical Clearance for Quantitative Exploration

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08th March 2019

Ms Megan Blandin de Chalain
School of Management Studies
University of Cape Town

Dear Ms Blandin de Chalain

REF: REC 2019/000/013

IS IT ALL 'FUN AND GAMES'? COMPARING APPLICANT REACTIONS OF A GAME-BASED VS. TRADITIONAL WORK VALUES ASSESSMENT

We are pleased to inform you that your ethics application has been approved. Unless otherwise specified this ethical clearance is valid for 1 year and may be renewed upon application.

Please be aware that you need to notify the Ethics Committee immediately should any aspect of your study regarding the engagement with participants as approved in this application, change. This may include aspects such as changes to the research design, questionnaires, or choice of participants.

The ongoing ethical conduct throughout the duration of the study remains the responsibility of the principal investigator.

We wish you well for your research.

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Appendix B: Example of Cover Letter Intended to Obtain Consent from Participants

Organisational Psychology PhD Programme
2019 Research Project

Dear participant

Thank you for being part of this exciting study!

My PhD research is about how individuals experience new assessments used in recruitment. I would require you to complete an assessment followed by a survey about your experience.

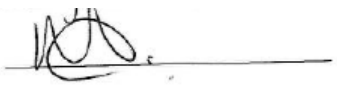
The attached questionnaire contains **50 questions and should not take longer than 15 minutes to complete**. Demographic details are also requested. It will not be possible to identify who you are from this data. Your identity will therefore remain anonymous and all data will be kept confidential and secure. There are no risks that have been identified as part of the study should you decide to participate. Your participation is voluntary and you are free to withdraw from the study at any time. By completing and submitting this questionnaire you are acknowledging that your participation in this study has been of your own free will.

Should you wish to enter the draw to stand a chance of winning 1 of 5 R300.00 gift vouchers then please provide your email address below. Please note that capturing your email will be for entering the draw only and will be anonymised at the end of the study.

Your participation in this study is voluntary and confidential. This study has UCT ethics clearance for psychological research (REC 2019/000/013). Enquiries: Megan de Chalain: BLNMEG004@myuct.ac.za.

Thank you again for your assistance in my research.

Kind regards
Megan de Chalain

Signed: 

Appendix C: The Gamified Assessment Question and Scenario Choices

The image shared below does not have permission to share or use.

This questionnaire contains items which are intended to relate to one of six values orientation factions. For each question, please refer to the graphics provided alongside the item and rate how the two relate in relation to the greater construct. There are no right or wrong answers.

---

1 You agree with Mazer (your leader) and play it safe.

2 Everyone votes.

3 Sir, we should activate our energy shield immediately. We're outnumbered. The team is in danger. You activate the energy shield.

4 The team sets off alone. I don't trust 'em. Only raiders would lurk on a place like this. We still have Mazer's (previous leader) map, we don't need their shortcut. Besides, our team needs our supplies more.

5 Supplies are down and the ship was damaged on entry. I recommend the team returns to HQ for repairs and supplies. You return to command center to resupply.

6 You escape to the planet to avoid risking your team's safety. We are outnumbered! We should deploy countermeasures.

7 You don't trust the wardens with your weapons. Your team needs to be able to protect themselves.

8 The information is too precious to share with outsiders. Especially a notorious criminal. You find another way.

9 Your team's safety is most important. You free your ship first, then try help Dr Bishop.

10 I say we scan the planet before we follow the coordinates, make sure it's safe. You scan the planet first.

11 You agree with Thrace (team member) and make a run for it

12 You face the challenge and give the order to attack the Dread Marauders. Oooh that sounds like a challenge.

13 Attack? Let's teach these guys a lesson once and for all.

14 You're confident in your ability to lose them. Just try and catch us!

15 You try defy the odds in a daring solo attack.

16 You fight to the bitter end. C'mon we're almost there! There's so many of them!

17 Run? Pfft we can totally take these scumbags. You stay and fight.

18 Help from these guys is good 'n all but we should go with, make sure they do it right. You insist on joining Serano and his team.

19 Quick, let's fry this driftwood! You attack the tree.

20 You follow Mazer's (your leaders) path.

21 You follow orders and head for the beacon. We have strict orders to avoid conflict, finding the beacon is our only objective.

22 You obey the warden's rules and hand over your weapons.

23 Come on! We don't want to get lost in here. You follow the warden.

24 It's forbidden to give prisoners any technology. They will only use it to harm us and themselves. You reject the prisoner's offer. One must obey the rules of this world.

25 You let the warden pass judgement, clearing a way to the beacon.

26 The wardens construct a way across the chasm and you successfully activate the third beacon.

27 This is against protocol. I say we check with high command before we tell him anything more. You check out Serano's (member of the galactic council) credentials.

28 Our mission is to activate the beacon. We can't waste time and resources on this. You mission take priority. You head for the beacon.

29 We should proceed with caution. Rather get the alien to tell us what he knows. You refuse the telepathic link. It will only complicate matters.

30 Wait a second, let's find out what they want before we waste our shield for nothing. You try communicating with strangers.

31 You try barter with security forces. How about a trade? We get rid of those pesky Marauders attacking your operation and what do you want in return?

32 Ah c'mon. That shortcut is gonna save us a lot of time. Surely we can make this work for all of us? You make a deal.

33 Look I know our mission is classified but this is our only lead. You make a deal with Zarek (known criminal).

34 So tell me more of the details. I will do everything in my power to help you. You get Sereno's (member of the galactic council) help.

35 If it wasn't for us, none of the beacons would have been activated. I think we deserve a bit of a break. Let's enjoy the finer things in life for once. You accept Serano's offer and enjoy some luxuries for a change.

36 There's a better way to do this, Serano! Let's talk to the chancellor, make her see everyone can win here. You negotiate with Serano.

37 You accept the chancellor's deal and focus on activating the final two beacons.

38 We can use this to our advantage. We leave the seeds here to distract the killer plant while we activate the beacon. You decide to risk using the seeds as a decoy and collect them on the way back.

39 A few provisions for a local tour guide? That's a no brainer. And they look like they could really use our help. You make a deal with the Kainians.

40 You call for a peaceful meeting to find a common purpose.

41 You can't impose peace through violence. We don't have to hurt anyone. You stop the warden from firing the cannon, and sneak past the prisoners.

42 The chancellor has her reasons, the truth could throw the whole galaxy into panic and war! You arrest Serano.

43 The researcher needs your help! You abandon your ship and rush to her aid.

44 What good is going to a new galaxy, if there is no life in it? We have to get those seeds. You enter the lab to retrieve the seed samples.

45 Saving these seeds is just as important as activating the beacon. They will provide many worlds' food and oxygen for centuries. You agree to help the scientist by protecting the seeds.

46 This is a living thinking being, we can reason with it. You try explain your mission to the tree, hoping it will allow you to activate the beacon.

47 Hmm, I advise caution. This species completely dominated this world. It could pose a danger to other eco systems. You leave the tree creature on its home world.

48 I say we find the next beacon with what we have. I'm sure we'll pick up other supplies along the way. You keep going forward.

49 You use the ship to retreat, planning to return later.

50 You take a leap of faith. Risking your life for the fate of the galaxy.

51 The people deserve to know. You take matters into your own hands.

52 This little guy deserves to survive as much as any of us. New galaxy, new species, makes sense to me! You take the tree creature species with you.

53 The symbols in the transmission are the same as the ones on the beacons. They're telling us where to go! You enter the coordinates to see where they take you.

54 A telepathic link?! Just imagine the things he can teach us! You allow the alien being to enter your mind.

55 Traveling to the core of an alien planet? What an amazing experience! Doesn't hurt that we'd be saving the whole galaxy as well. You undertake the journey, willing to learn as you go along.

56 We'll restart the core, if you help us. How? How about some advanced alien tech? You negotiate with the ancient one.

57 You enter the core. The ancient one has done nothing but help us. He would have told us if it was dangerous to enter the core. You are willing to deal with whatever strange challenges await you.

58 As a team, you decide to do further testing before entering the core. We don't know what going in there will do to us. We may not even be human by the time we're done. You all need to understand it better before making a decision.

59 Well what are we waiting for? We're about to become part of something truly astounding. You join the circle.

60 We should each be able to decide if we want to do this, I am not sure that I signed up to become part of this. You let each team member decide for themselves.

Appendix D: The Traditional Assessment Questions

Instructions		Scale				
This questionnaire contains items which are intended to relate to specific values orientations. For each question please indicate the level of relevance that you believe the item has towards the value orientation that it belongs. There are no right or wrong answers.		**Strongly agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
1	Thinking up new ideas and being creative is important to me. I like to do things in my own original way	**5**	**4**	**3**	**2**	**1**
2	It is important to me to be rich. I want to have a lot of money and expensive things	**5**	**4**	**3**	**2**	**1**
3	I think it is important that every person in the world be treated equally. I believe everyone should have equal opportunities in life	**5**	**4**	**3**	**2**	**1**
4	It's very important to me to show my abilities. I want people to admire what I do	**5**	**4**	**3**	**2**	**1**
5	It is important to me to live in secure surroundings. I avoid anything that might endanger my safety	**5**	**4**	**3**	**2**	**1**
6	I like surprises and am always looking for new things to do. I think it is important to do lots of different things in life	**5**	**4**	**3**	**2**	**1**
7	I believe that people should do what they're told. I think people should follow rules at all times, even when no-one is watching	**5**	**4**	**3**	**2**	**1**
8	It is important to me to listen to people who are different from me. Even when I disagree with them, I still want to understand them	**5**	**4**	**3**	**2**	**1**
9	It is important to me to be humble and modest. I try not to draw attention to myself	**5**	**4**	**3**	**2**	**1**
10	Having a good time is important to me. I like to “spoil” myself	**5**	**4**	**3**	**2**	**1**

11	*It is important to me to make my own decisions about what I do. I like to be free and not depend on others	**5**	**4**	**3**	**2**	**1**
12	It's very important to me to help the people around me. I want to care for their well-being	**5**	**4**	**3**	**2**	**1**
13	*Being very successful is important to me. I hope people will recognize my achievements	**5**	**4**	**3**	**2**	**1**
14	*It is important to me that the government insure my safety against all threats. I want the state to be strong so it can defend its citizens	**5**	**4**	**3**	**2**	**1**
15	I look for adventures and like to take risks. I want to have an exciting life	**5**	**4**	**3**	**2**	**1**
16	It is important to me always to behave properly. I want to avoid doing anything people would say is wrong	**5**	**4**	**3**	**2**	**1**
17	*It is important to me to be in charge and tell others what to do. I want people to do what I says	**5**	**4**	**3**	**2**	**1**
18	It is important to me to be loyal to my friends. I want to devote myself to people close to me	**5**	**4**	**3**	**2**	**1**
19	I strongly believe that people should care for nature. Looking after the environment is important to me	**5**	**4**	**3**	**2**	**1**
20	*Tradition is important to me. I try to follow the customs handed down by my religion or my family	**5**	**4**	**3**	**2**	**1**
21	I seek every chance I can to have fun. It is important to me to do things that give me pleasure	**5**	**4**	**3**	**2**	**1**

Appendix E: The Applicant Reactions Survey

Instructions	Scale				
Please indicate your level of agreement based on your experience with the assessment. There are no right or wrong answers. Please answer as honestly as possible.	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly Agree**
Perceived fairness (Smither, Reilly, Millsap & Stoffey,1993)					
1. I did not understand what the assessment had to do with a work context	**1**	**2**	**3**	**4**	**5**
2. I could not see any relationship between the assessment and what is required in a work context	**1**	**2**	**3**	**4**	**5**
3. *It is obvious that the assessment is related to a work context	**1**	**2**	**3**	**4**	**5**
4. *The actual content of the assessment was clearly related to a work context	**1**	**2**	**3**	**4**	**5**
5. There is no real connection between the assessment that I went through and a work context	**1**	**2**	**3**	**4**	**5**
Flow (Barzilai & Blau, 2014)					
6. I lost track of time when I played the assessment	**1**	**2**	**3**	**4**	**5**
7. I really got into the assessment	**1**	**2**	**3**	**4**	**5**
8. I was very involved in the assessment	**1**	**2**	**3**	**4**	**5**
9. When I played the assessment, I did not think of anything else	**1**	**2**	**3**	**4**	**5**
10. I was totally immersed in the assessment	**1**	**2**	**3**	**4**	**5**
Enjoyment (Barzilai & Blau, 2014)					
11. I enjoyed the assessment	**1**	**2**	**3**	**4**	**5**
12. I had fun playing the assessment	**1**	**2**	**3**	**4**	**5**

13. Playing the assessment was fun	**1**	**2**	**3**	**4**	**5**
Affect (Smither, Reilly, Millsap & Stoffey, 1993)					
14. I enjoyed the assessment to a great degree	**1**	**2**	**3**	**4**	**5**
15. I would look forward to going through the same type of assessment in the future	**1**	**2**	**3**	**4**	**5**
16. I did not enjoy completing this assessment	**1**	**2**	**3**	**4**	**5**
Perceived Organisational Attractiveness (Smither, Reilly, Millsap & Stoffey, 1993; Schwoerer & Rosen, 1989)					
17. Based on my experience with the assessment I would encourage others to apply for employment with the company	**1**	**2**	**3**	**4**	**5**
18. I would request additional information about the organisation based on my experience with the assessment	**1**	**2**	**3**	**4**	**5**
19. I would sign up for an interview with the organisation based on my experience with the assessment	**1**	**2**	**3**	**4**	**5**
20. I would accept an employment offer with the organisation based on my experience with the assessment	**1**	**2**	**3**	**4**	**5**
Self-perceived stress (Cassady & Johnson, 2002)					
21. While taking the assessment, I felt confident and relaxed.	**1**	**2**	**3**	**4**	**5**
22. During the assessment, I had the feeling that I was not doing well.	**1**	**2**	**3**	**4**	**5**
23. During the assessment, I found myself thinking of the consequences of failing.	**1**	**2**	**3**	**4**	**5**
24. During the assessment I was anxious about how I would perform	**1**	**2**	**3**	**4**	**5**
25. During the assessment, I find myself wondering whether the other applicants are doing better than I am	**1**	**2**	**3**	**4**	**5**

Appendix F: The Survey Demographic Questions

What is your ethnicity? • Asian • Black • Coloured • White • Other • Prefer not to answer	What is your highest level of education? • High school • 1st year undergraduate • 2nd year undergraduate • 3rd year undergraduate • 4th year undergraduate • Postgraduate • Honours • Masters • Doctoral • Professional qualification / certificate • Other, please specify:
What is your programme of study? • Humanities • Science • Commerce • Other, please specify:	Do you foresee applying for jobs in the next 12 months? • Yes • No
What is your gender? • Male • Female • Prefer not to answer	What is your age?
Do you have work experience? • Yes • No	Please list the work experience you have had:
How many traditional* assessments have you completed before? • None • 1-3 • 3-6 • More than 6	How many gamified assessments have you completed before? • None • 1-3 • 3-6 • More than 6
If you remember, please list the names of either gamified or traditional assessments you've completed before: 1. 2. 3. 4. 5.	

*a traditional assessment is a paper and pen or a computerised text-based assessment

Appendix G: Hypotheses for the Study

Hypothesis 1: Gamified assessments elicit more favourable applicant reactions (high perceived fairness and low anxiety) than their traditional assessment equivalents

Hypothesis 2a: Gamified assessments elicit a lower level of perceived anxiety than their traditional assessment equivalents

Hypothesis 2b: Gamified assessments elicit less favourable perceptions of fairness than their traditional assessment equivalents

Hypothesis 3a: Gamified assessments elicit more favourable perceptions of organisational attractiveness than their traditional assessment equivalents

Hypothesis 4a. Gamified assessments elicit a higher level of perceived engagement their traditional assessment equivalents

Hypothesis 4b. The relationship between assessment type and perceived organisational attractiveness is mediated by engagement.

Hypothesis 4c. The relationship between applicant reactions (high perceived fairness and low anxiety) and perceived organisational attractiveness is mediated by engagement.

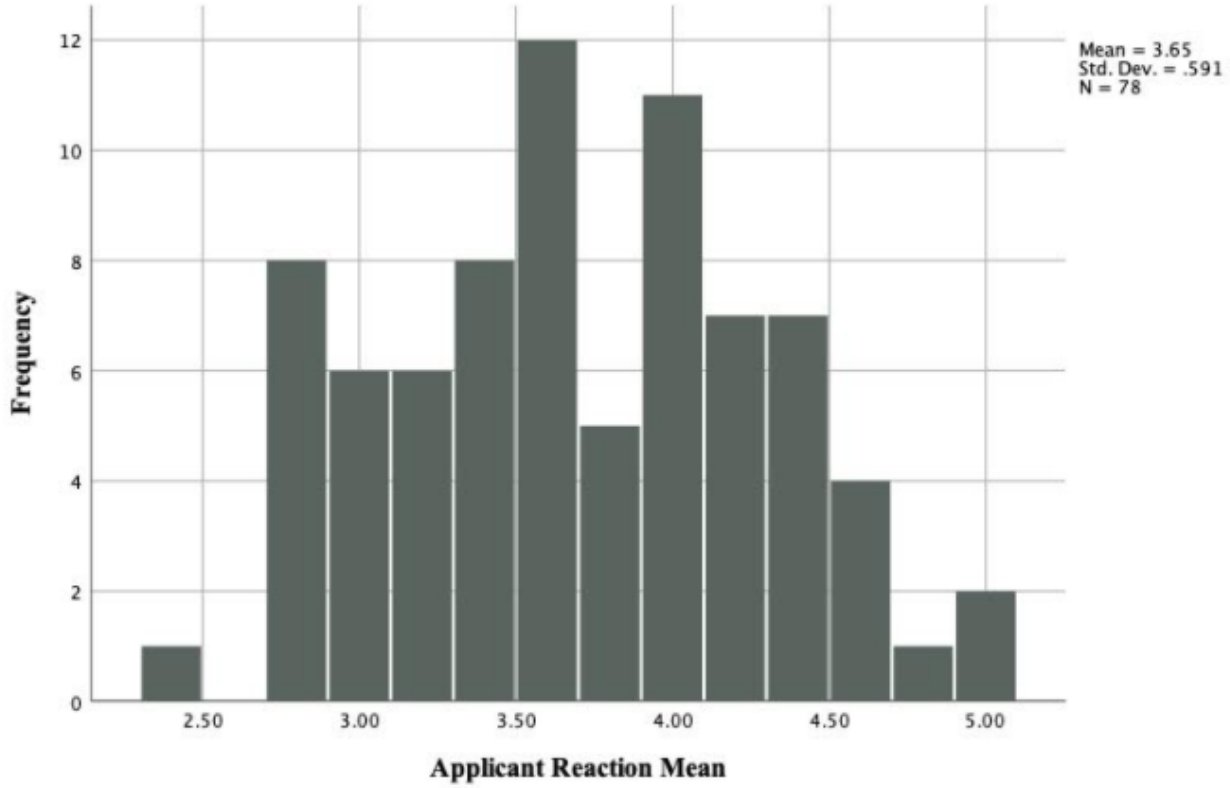
Hypothesis 5a. The relationship between assessment type and applicant reactions (high perceived fairness and low anxiety) is mediated by perceived enjoyment.

Hypothesis 5b. Gamified assessments will elicit a higher level of perceived enjoyment than their traditional assessment equivalents

Hypothesis 5c. The relationship between assessment type and perceived organisational attractiveness is mediated by perceived enjoyment.

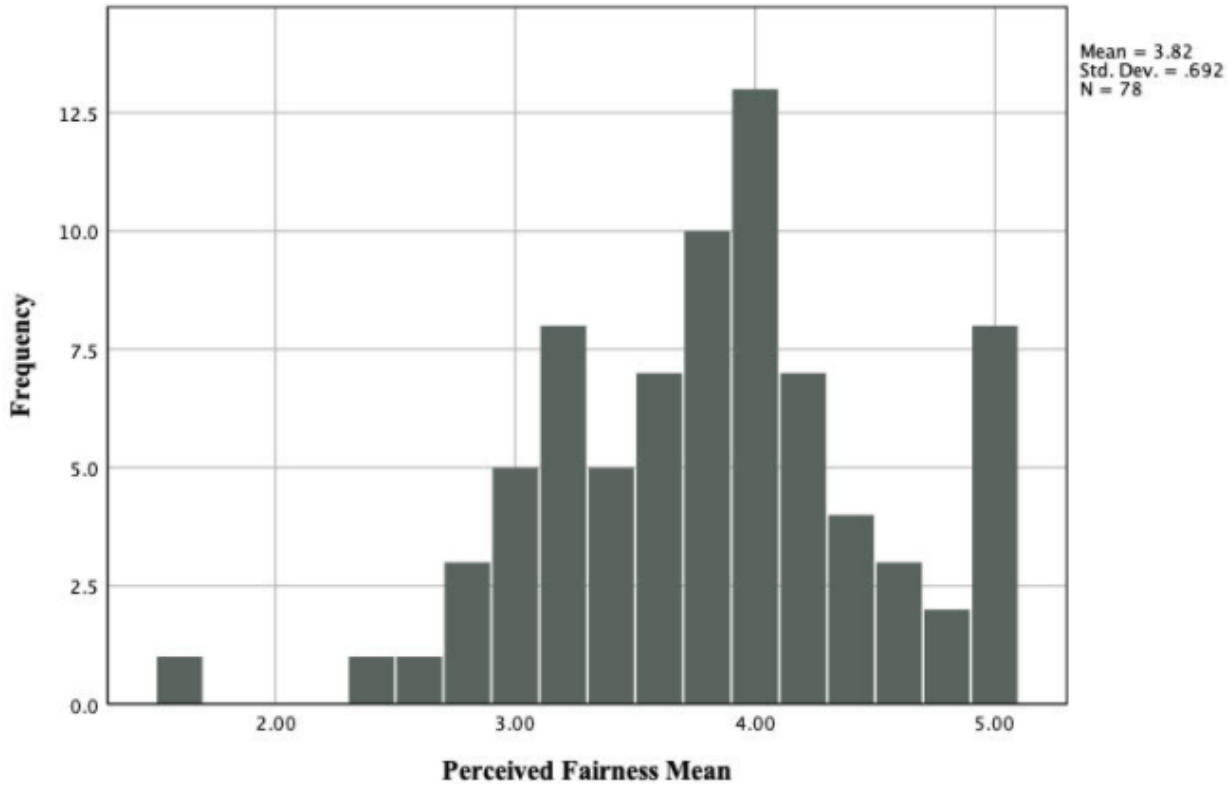
Appendix H: Histograms for the Study

Histogram: Applicant Reactions (Experimental Group, n = 78)



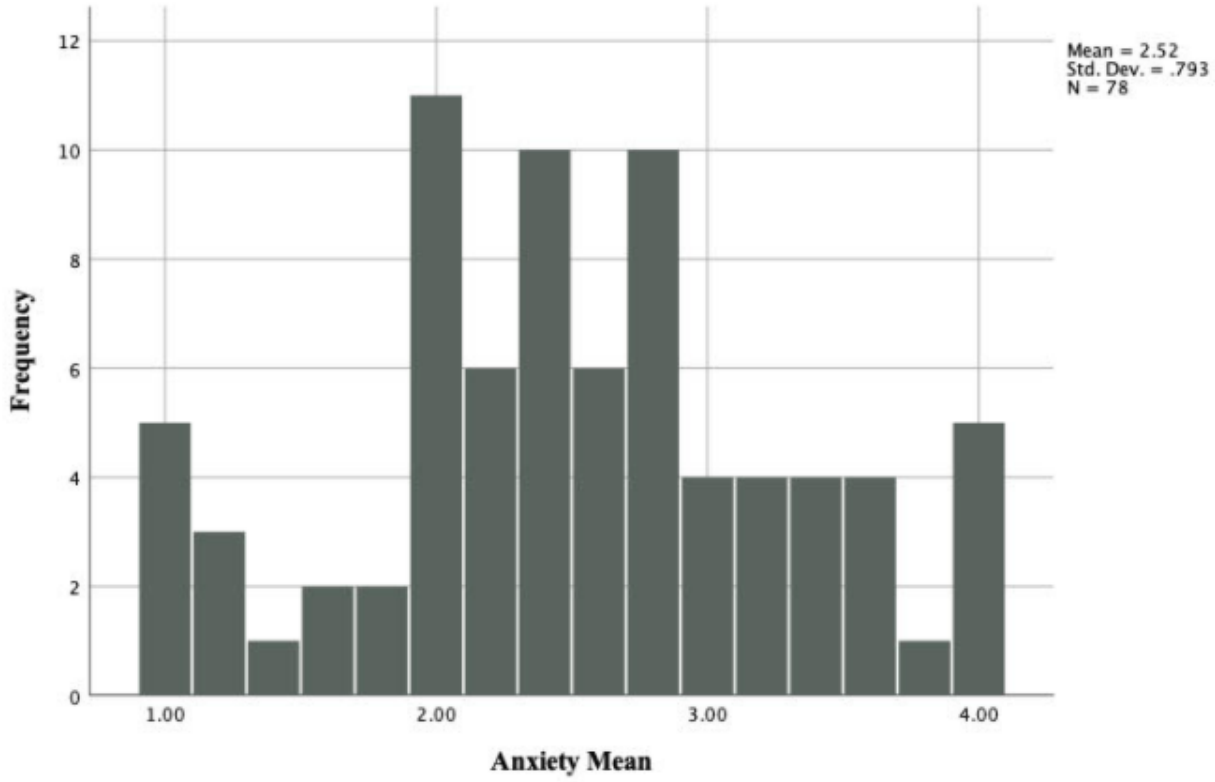
Appendix H: Histograms for the Study (continued)

Histogram: Perceived Fairness (Experimental Group, n = 78)



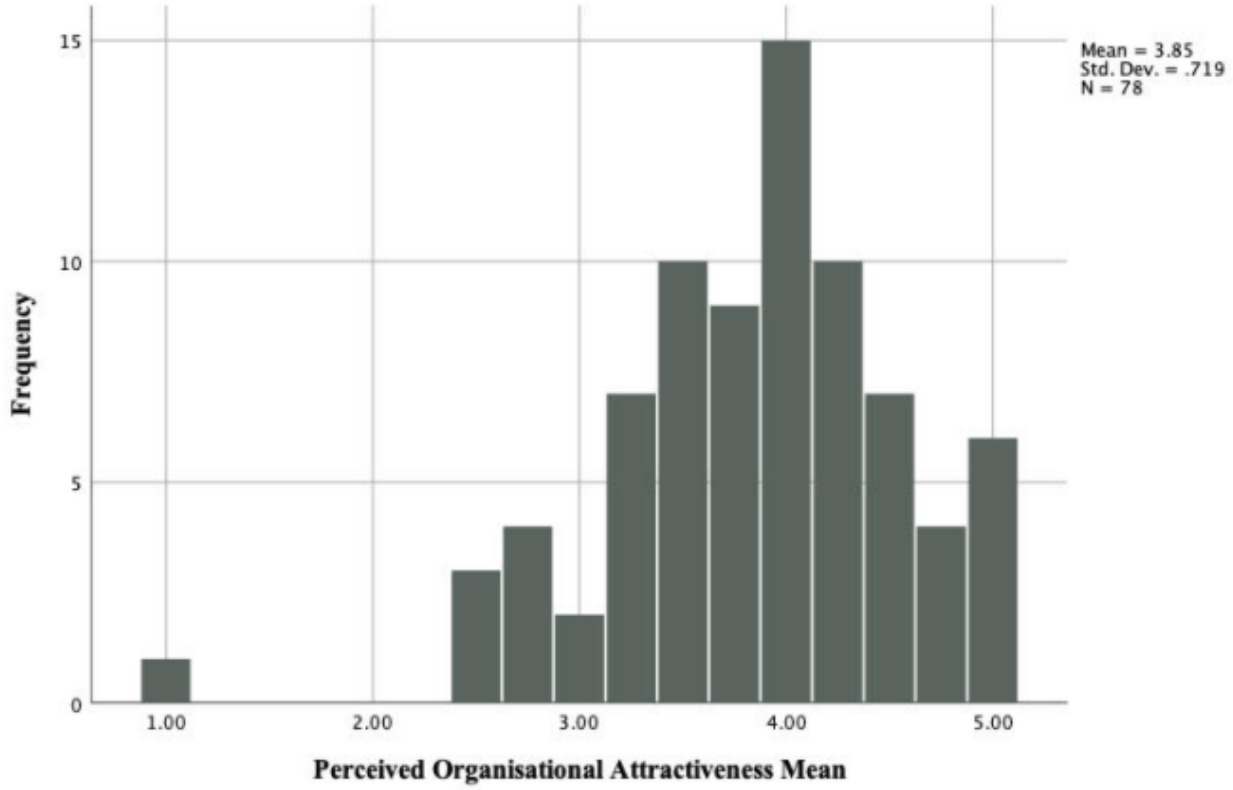
Appendix H: Histograms for the Study (continued)

Histogram: Anxiety (Experimental Group, n = 78)



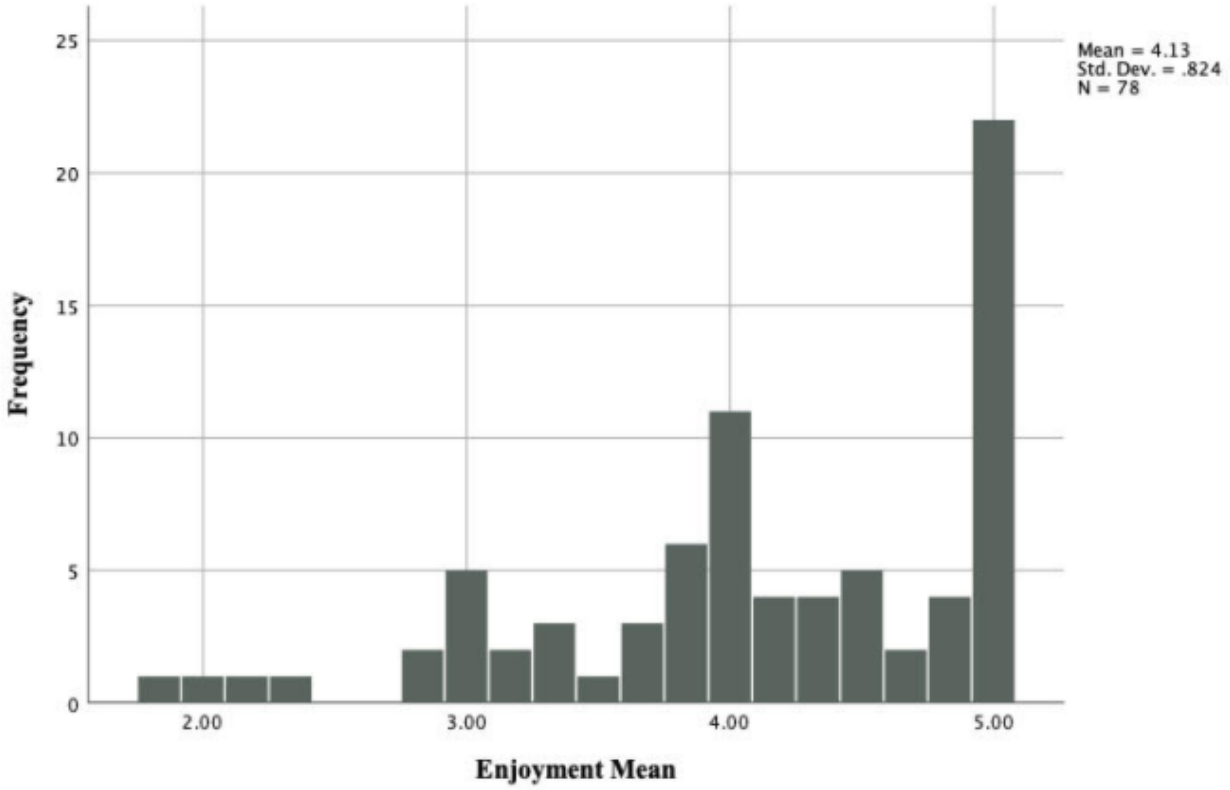
Appendix H: Histograms for the Study (continued)

Histogram: Perceived Organisational Attractiveness (Experimental Group, n = 78)



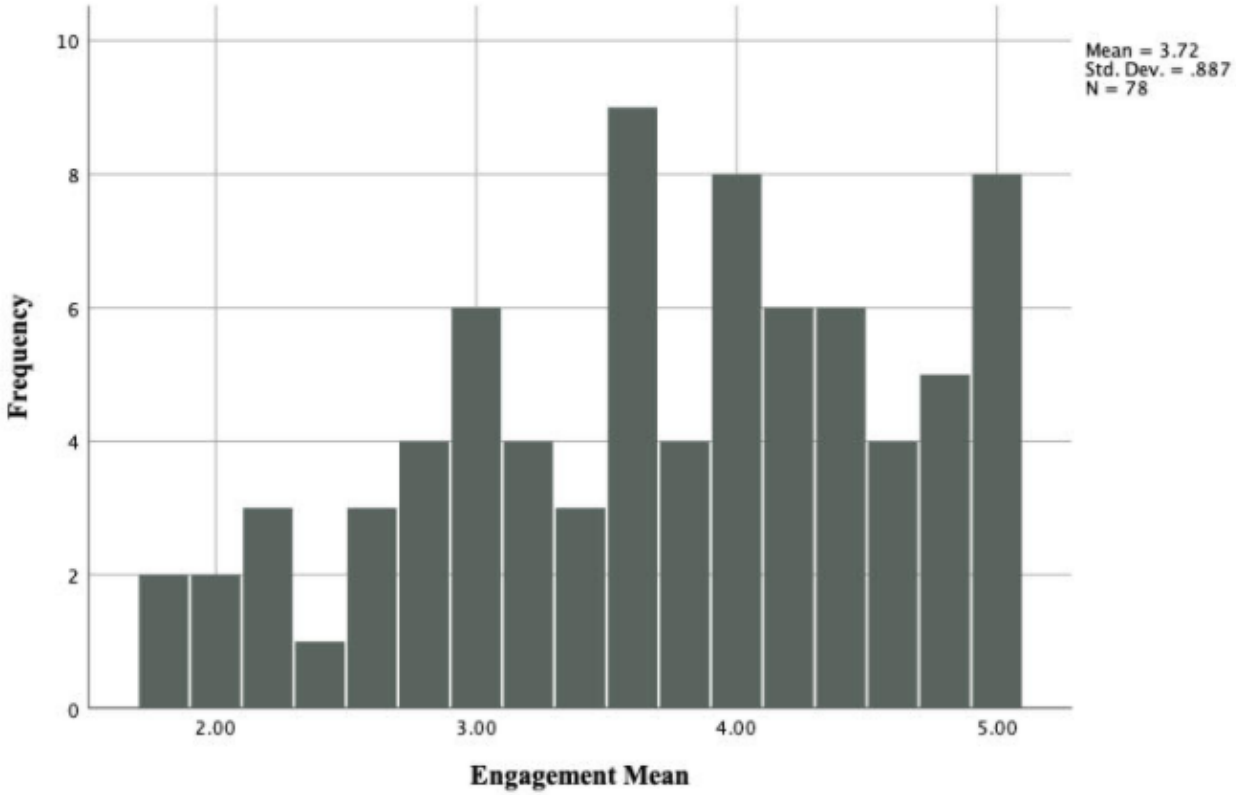
Appendix H: Histograms for the Study (continued)

Histogram: Enjoyment (Experimental Group, n = 78)



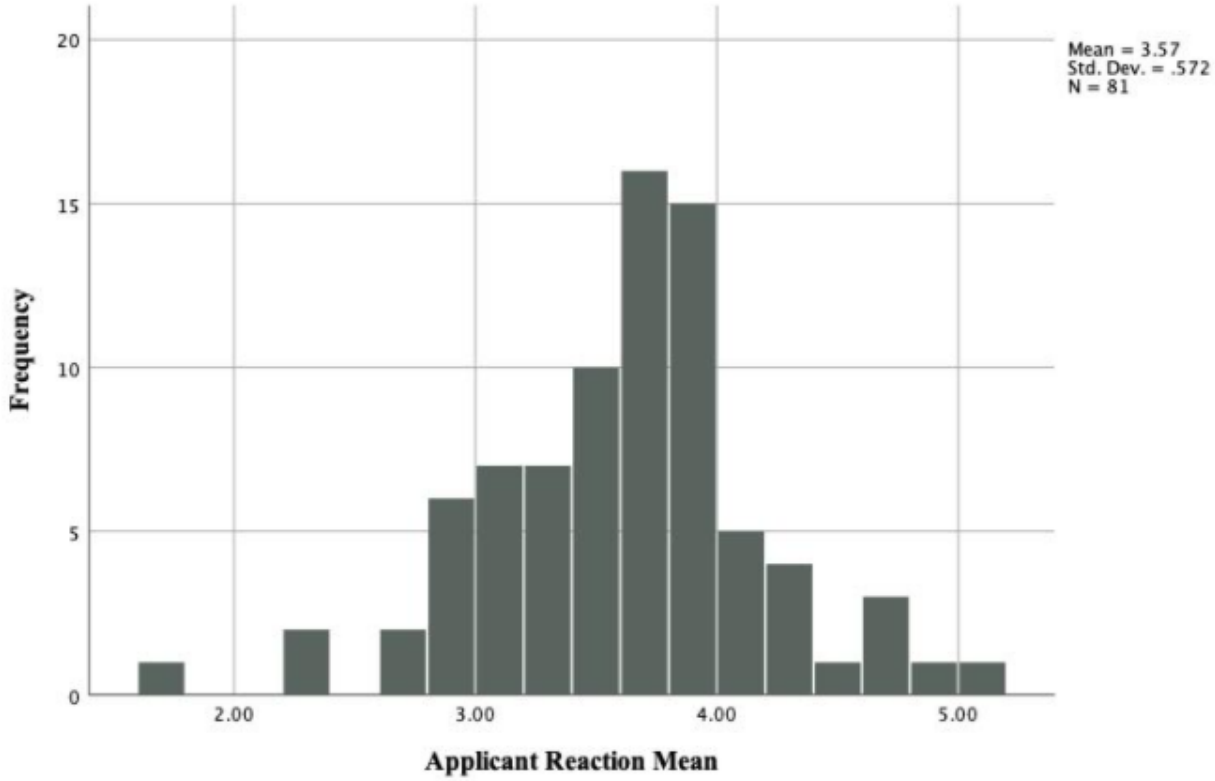
Appendix H: Histograms for the Study (continued)

Histogram: Engagement (Experimental Group, n = 78)



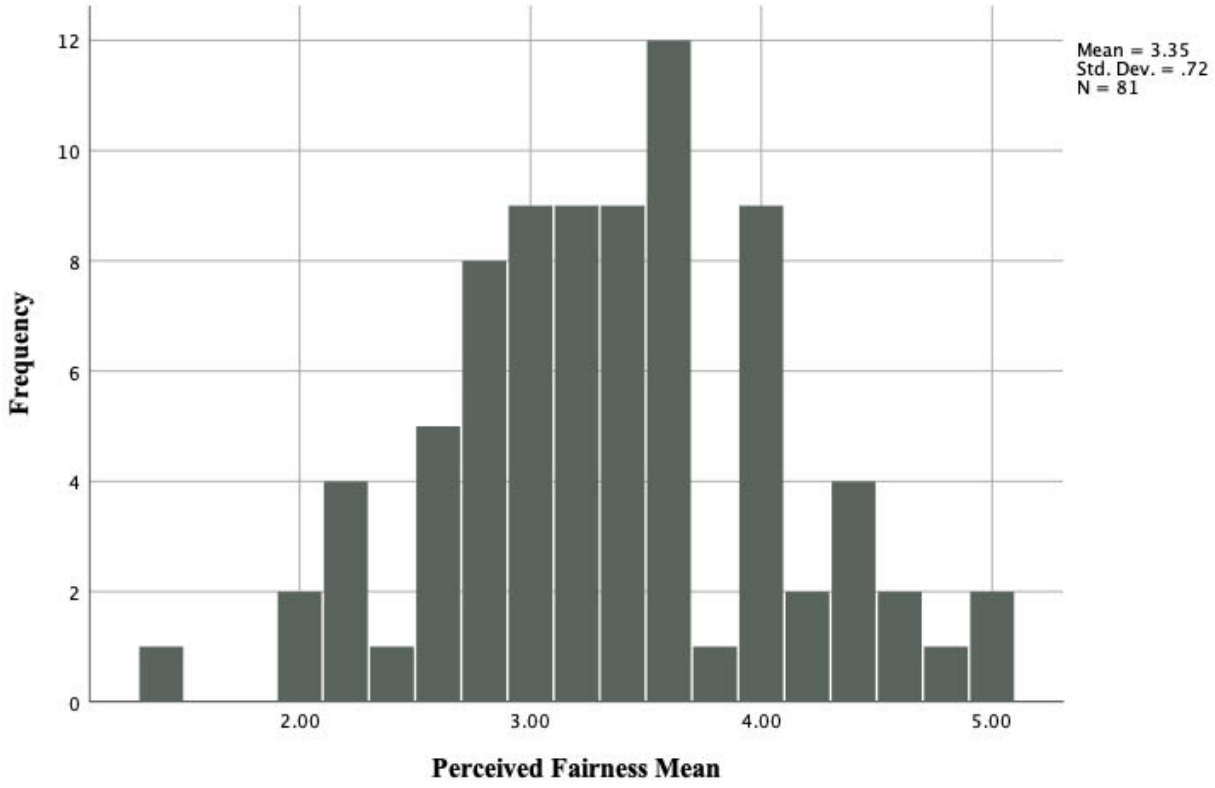
Appendix H: Histograms for the Study (continued)

Histogram: Applicant Reactions (Control Group, n = 81)



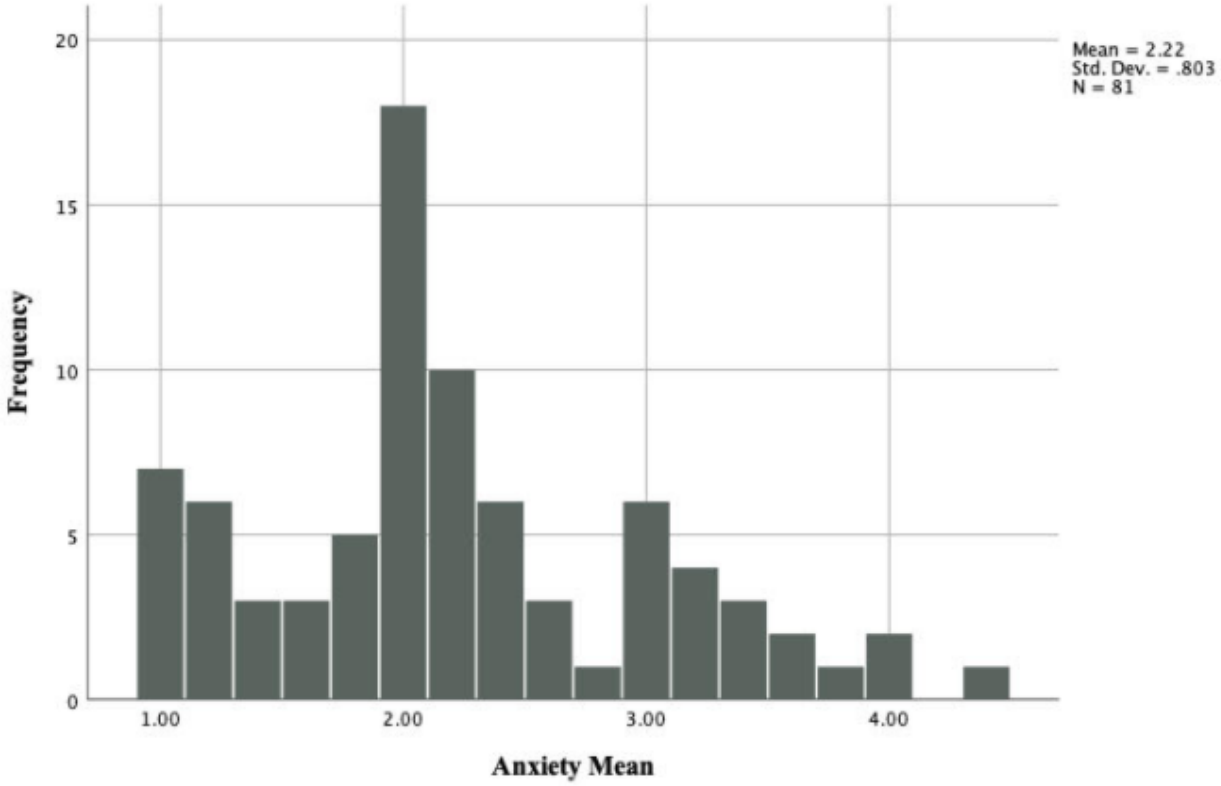
Appendix H: Histograms for the Study (continued)

Histogram: Perceived Fairness (Control Group, n = 81)



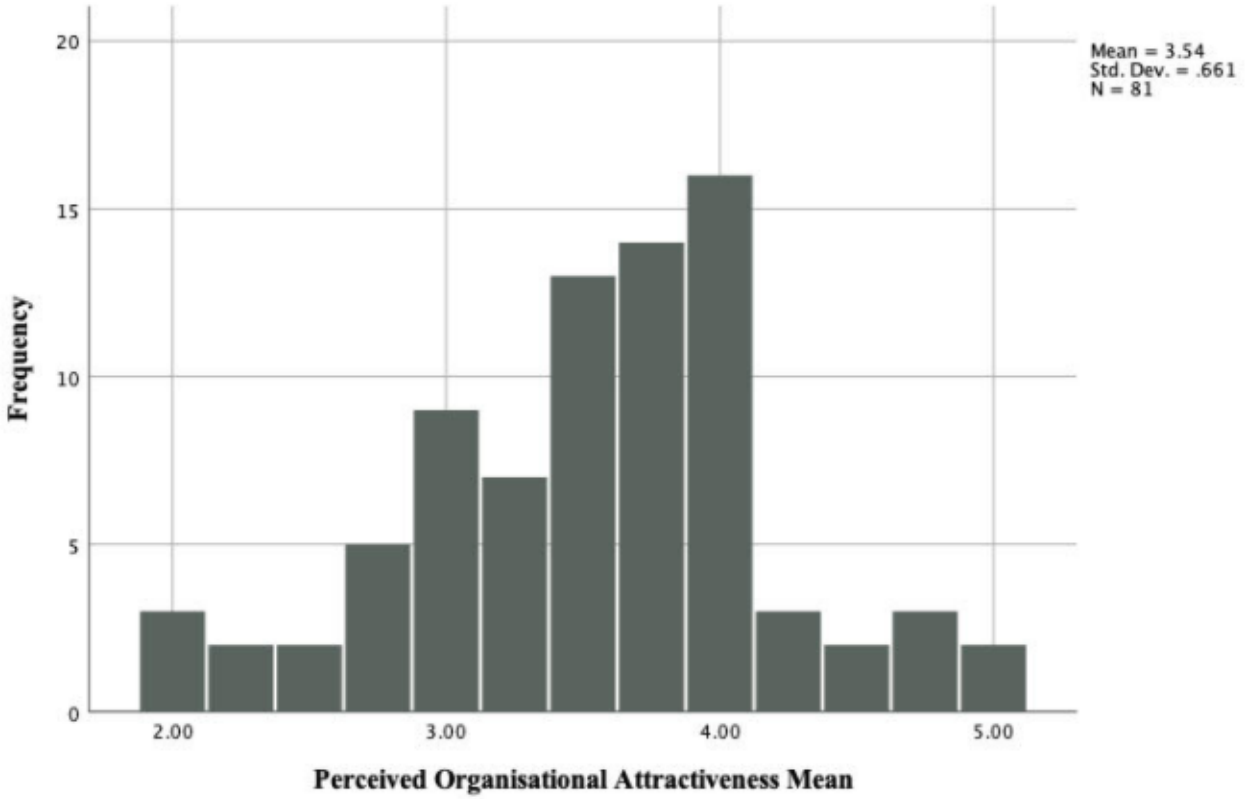
Appendix H: Histograms for the Study (continued)

Histogram: Anxiety (Control Group, n = 81)



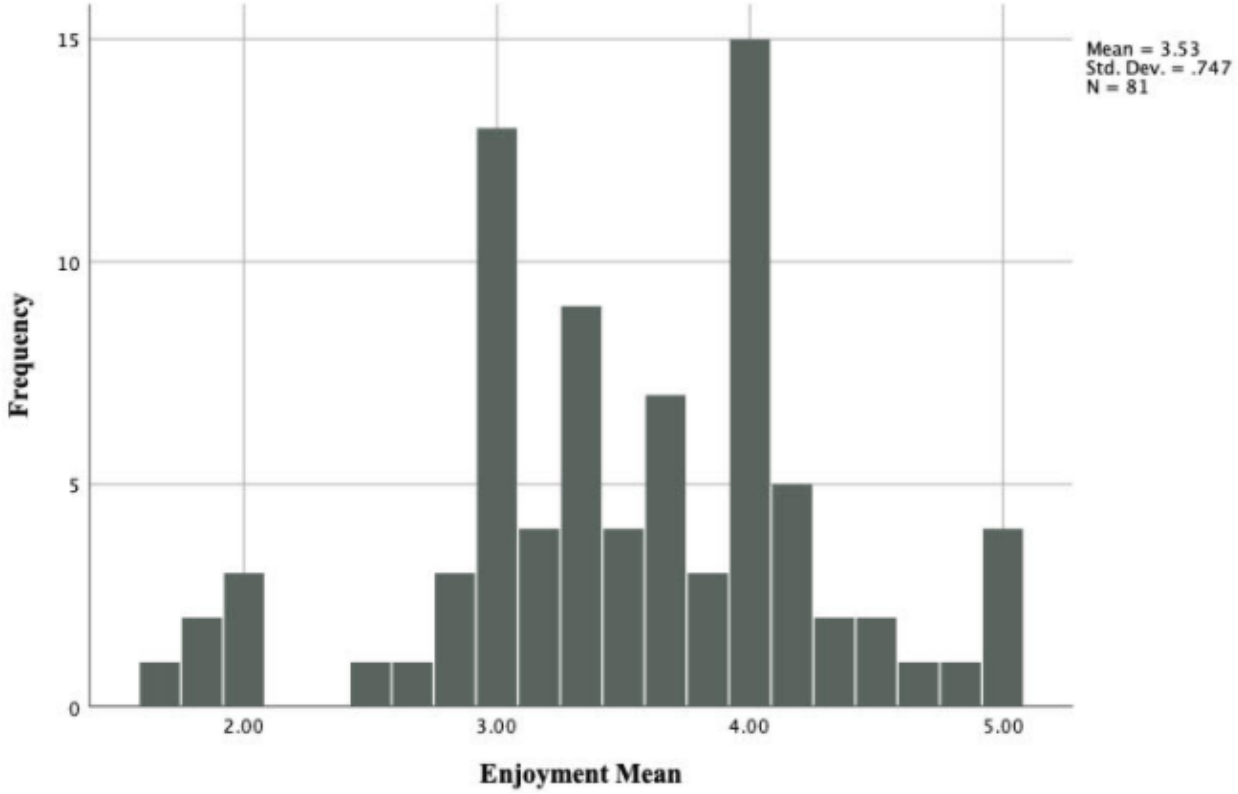
Appendix H: Histograms for the Study (continued)

Histogram: Perceived Organisational Attractiveness (Control Group, n = 81)



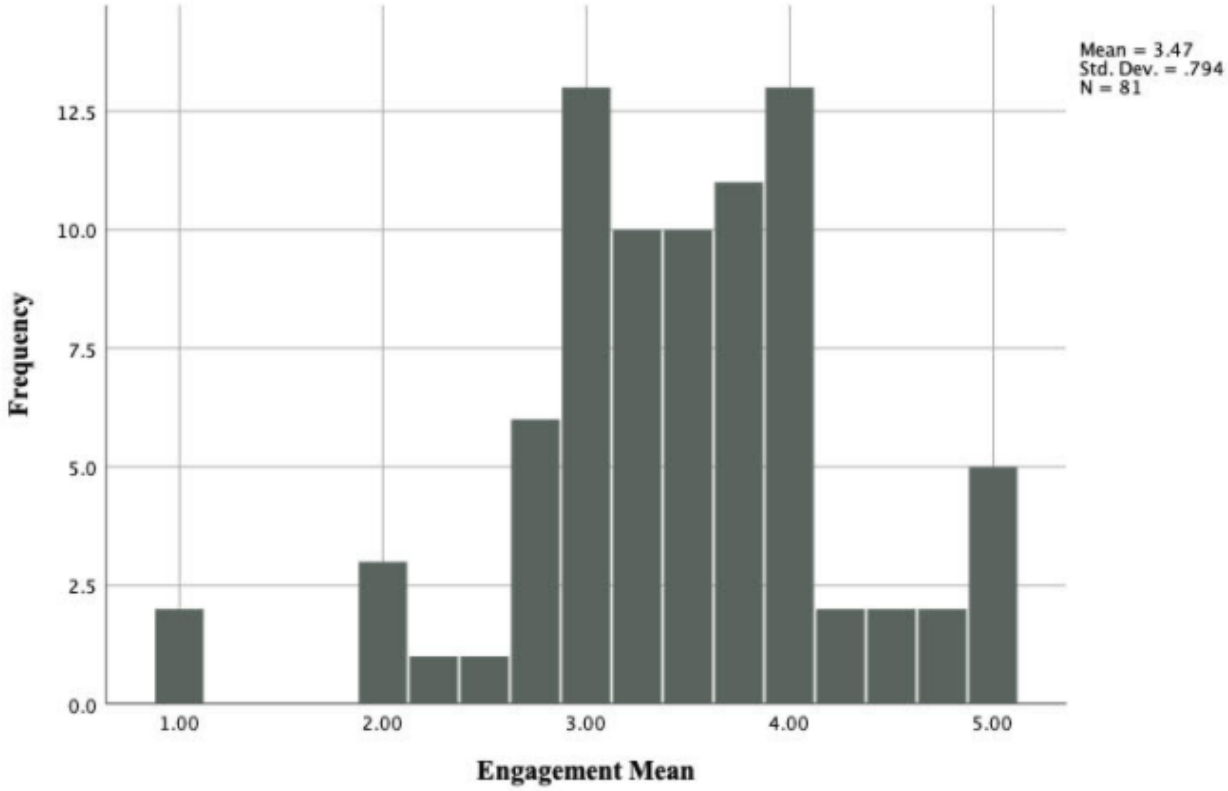
Appendix H: Histograms for the Study (continued)

Histogram: Enjoyment (Control Group, n = 81)



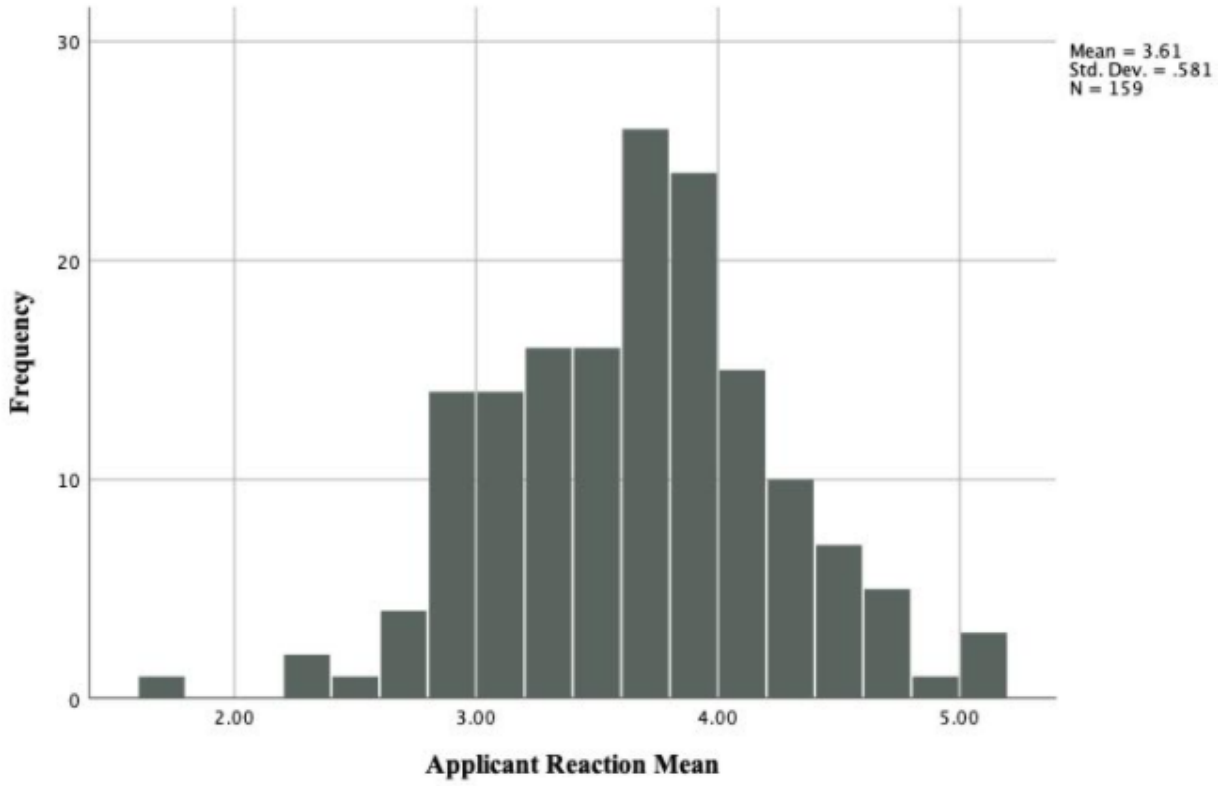
Appendix H: Histograms for the Study (continued)

Histogram: Engagement (Control Group, n = 81)



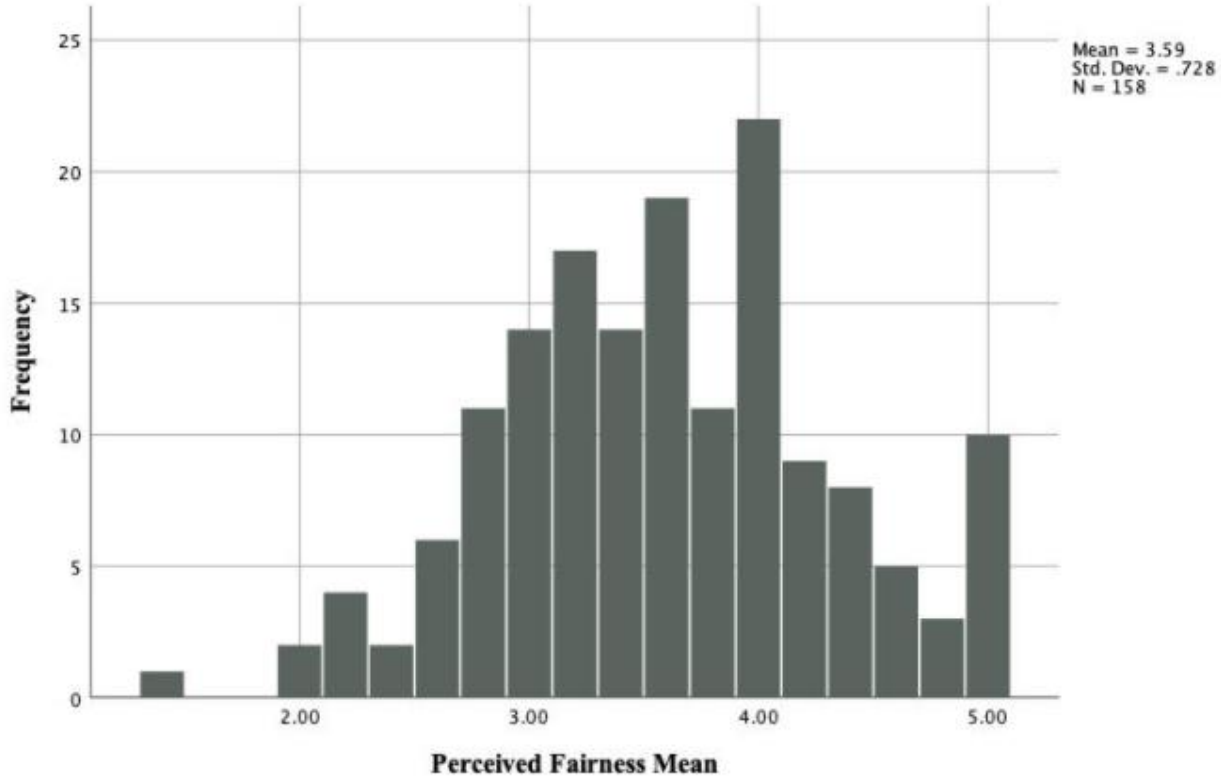
Appendix H: Histograms for the Study (continued)

Histogram: Applicant Reactions (Combined Sample, N = 158)



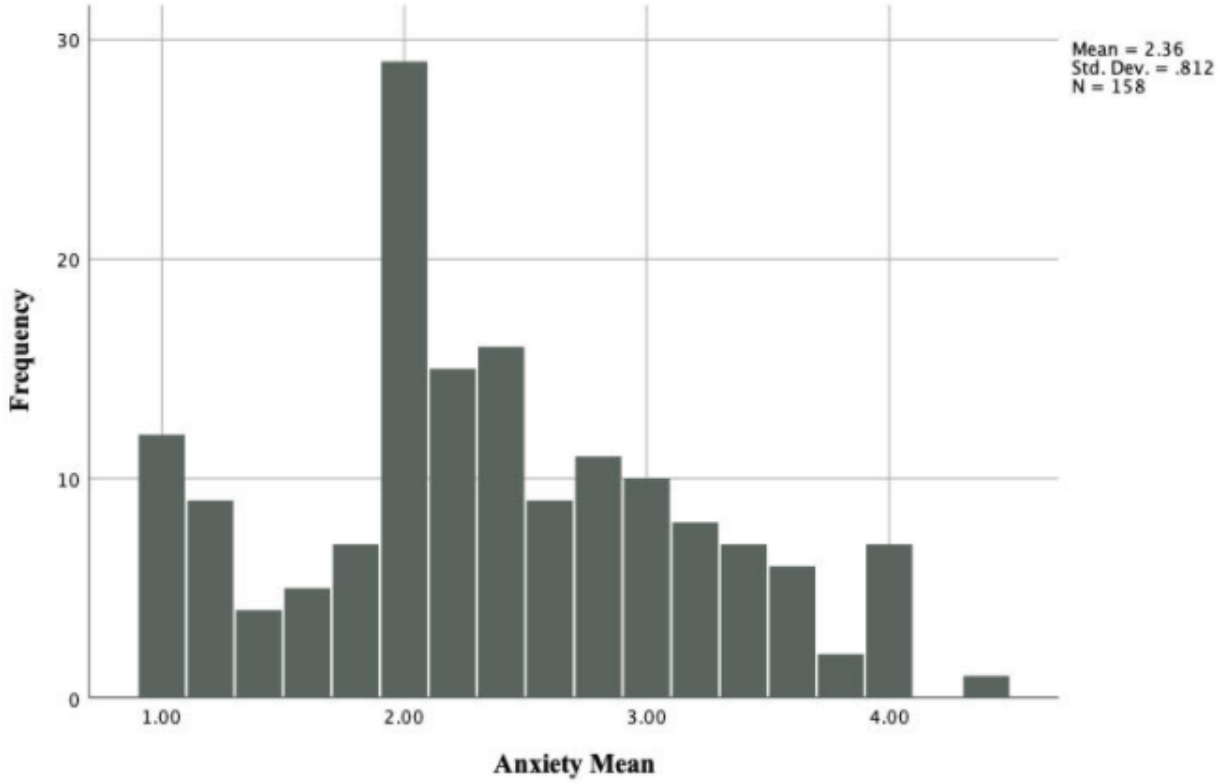
Appendix H: Histograms for the Study (continued)

Histogram: Perceived Fairness (Combined Sample, N = 158)



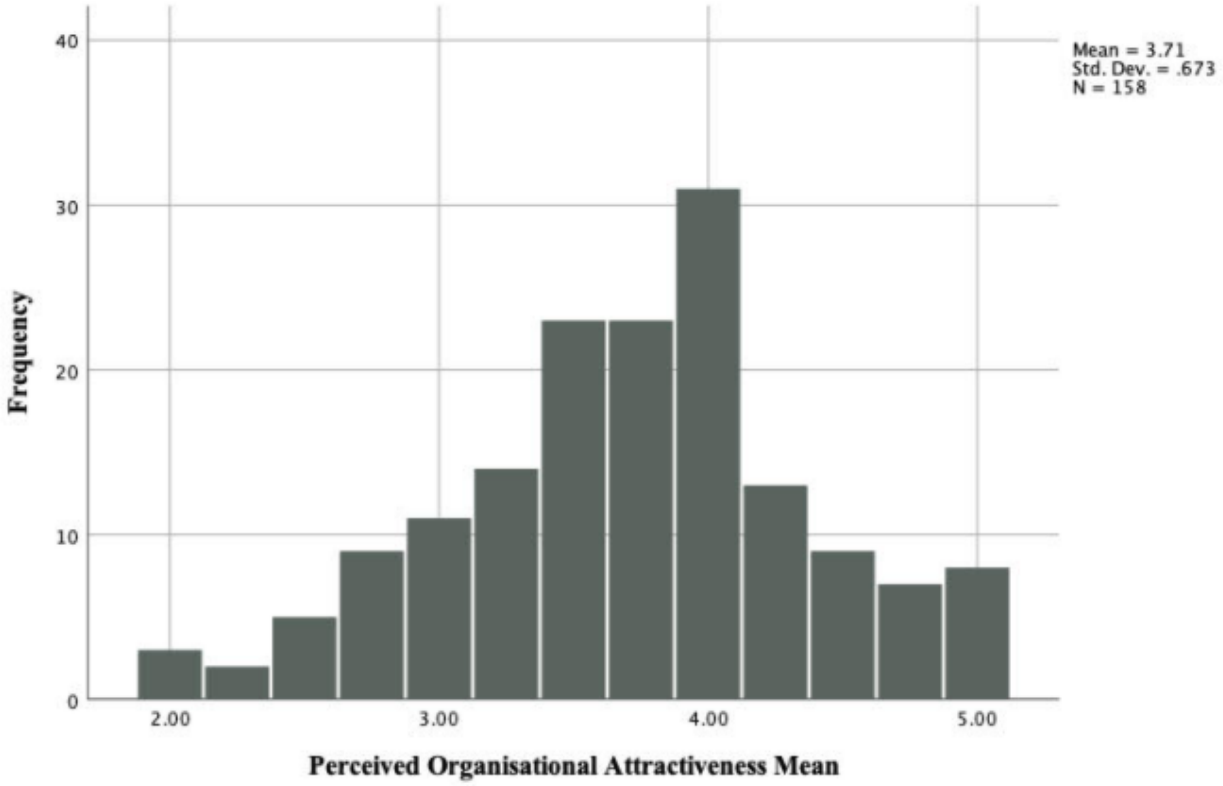
Appendix H: Histograms for the Study (continued)

Histogram: Anxiety (Combined Sample, N = 158)



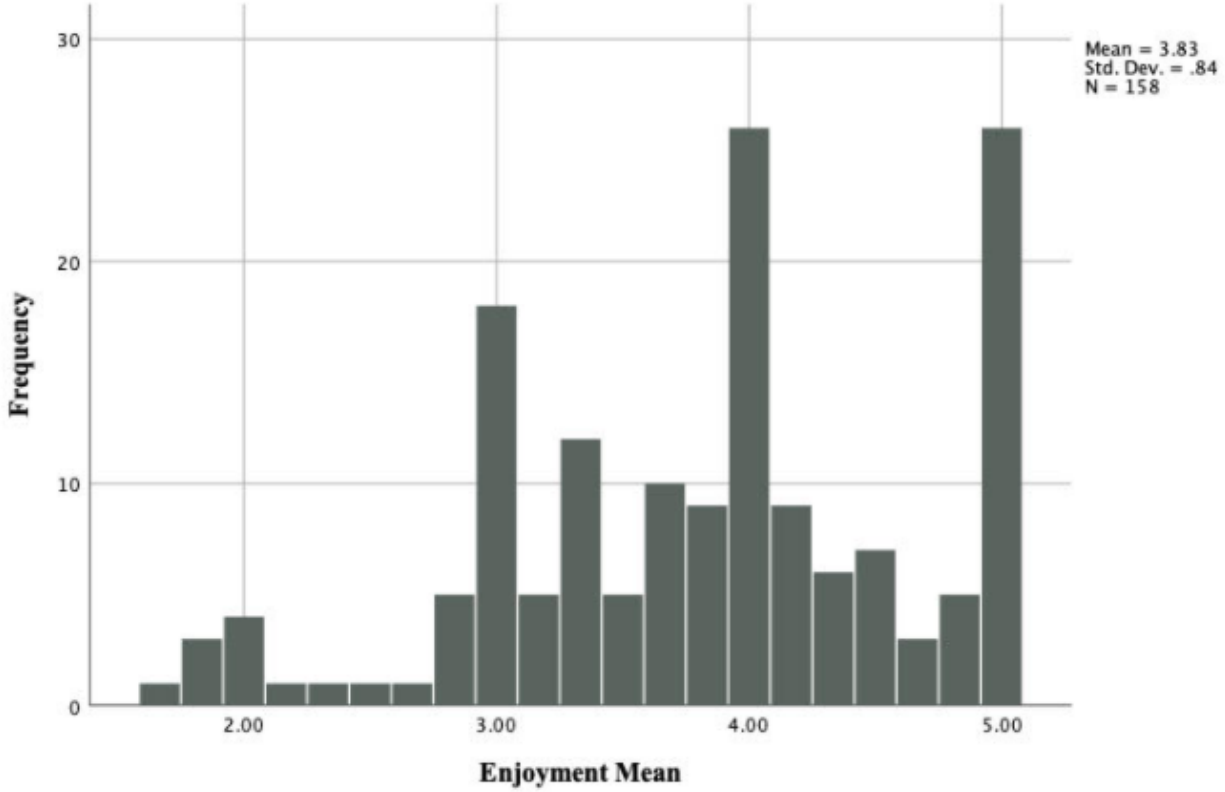
Appendix H: Histograms for the Study (continued)

Histogram: Perceived Organisational Attractiveness (Combined Sample, N = 158)



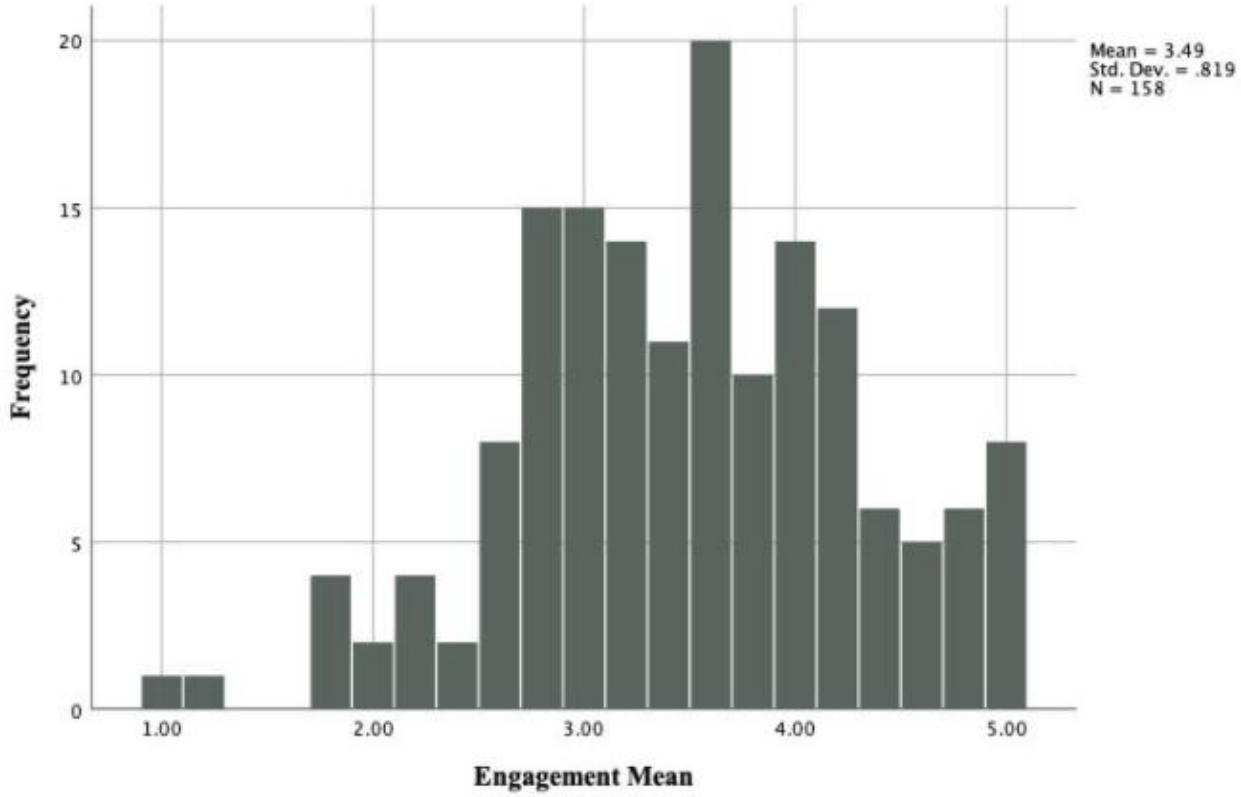
Appendix H: Histograms for the Study (continued)

Histogram: Enjoyment (Combined Sample, N = 158)



Appendix H: Histograms for the Study (continued)

Histogram: Engagement (Combined Sample, N = 158)



Appendix I: Further Analysis

A MANOVA was conducted as an additional analysis to investigate the relationship between all the variables in the present study. A MANOVA has the power to detect combinations of dimensions that may differ across groups (Field, 2018). Hence, a MANOVA was conducted to consider the interactions between the single independent variable (test type) and the outcome variables (applicant reactions, perceived organisational attractiveness and enjoyment).

Using Pillai's trace, there was a significant effect of test type (dependent variable) on applicant reactions, perceived organisational attractiveness, enjoyment and engagement (independent variables) (V = .14, $F(4, 154) = 6.14$, $p < .001$, $\eta^2 = .14$ and observed power of .99). The null hypothesis is, therefore, not supported and there are significant differences between groups.

Separate univariate tests on the outcome variables demonstrated significant effects on perceived organisational attractiveness, $F(1, 157) = 7.66$, $p < .01$, $\eta^2 = .05$; enjoyment, $F(1, 157) = 23.15$, $p < .001$, $\eta^2 = .13$; and engagement, $F(1, 157) = 13.88$, $p < .001$, $\eta^2 = .08$. There was, however, a non-significant effect found on applicant reactions, $F(1, 157) = .89$, $p = .35$, $\eta^2 = .01$. There were significant differences among test-takers in the levels of perceived organisational attractiveness, enjoyment and engagement between the gamified and the traditional conditions.

To investigate the non-significant relationship with applicant reactions further, an individual analysis was conducted on the subscales of the construct perceived fairness and anxiety. When considering the effect of test type on the subscales of applicant reactions, perceived fairness and anxiety, Pillai's trace indicated a significant result, V = .13, $F(2, 156) = 13.97$, $p < .001$, $\eta^2 = .15$, and an observed power of 1.00. Separate univariate tests on the

outcome variables demonstrated significant effects on anxiety, $F(1, 157)= 5.54$, $p < .05$, $\eta^2 =.03$, and perceived fairness, $F(1, 157) = 17.77$, $p < .001$, $\eta^2 = .10$. There were significant differences among test-takers in levels of anxiety and perceived fairness between the gamified and the traditional conditions.

Further Mediation Analysis

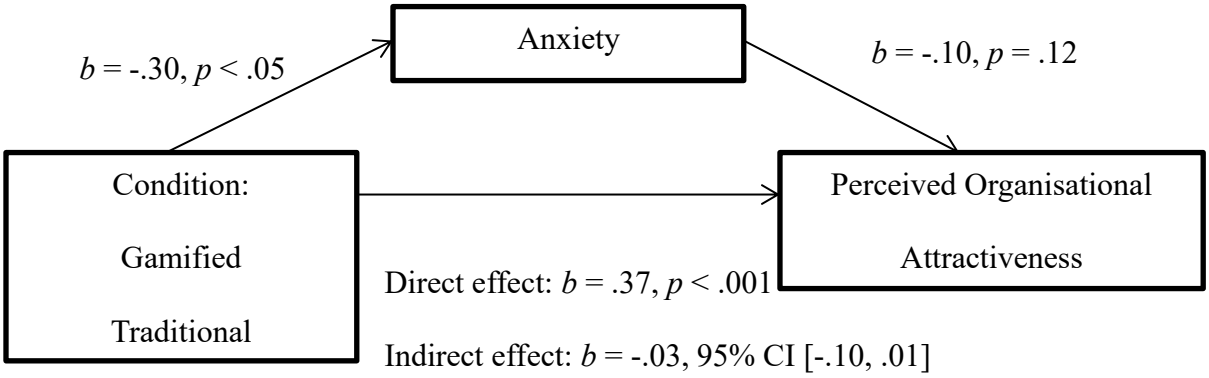
Further mediation analysis was conducted on the subscales for applicant reactions: perceived fairness and anxiety. While conducting the analysis, it became evident that perceived fairness and anxiety were working in opposition across the study's conditional groups. Working in opposition across the conditions meant that anxiety was high for the respondents in the experimental group, thus a less favourable reaction, but so was perceived fairness, a more favourable reaction. Similarly, for the respondents in the control group, anxiety was lower, thus a more favourable reaction, as was perceived fairness, a less favourable reaction. As such, a separate mediation analysis was conducted on the subscales of applicant reactions as outlined below.

Anxiety. Because the variable applicant reactions consisted of the aggregated scores from two subscales, the subscales were tested separately. Anxiety as the mediating variable (M) between test type (X) and perceived organisational attractiveness (Y) was considered. See Figure 17 for a depiction of the relationship. The results indicate that test type significantly predicts perceived organisational attractiveness even with anxiety in the model (b = .37, 95% CI [.16, .58], t = 3.51, $p < .001$). However, anxiety does not appear to have a significant relationship with perceived organisational attractiveness (b = .-.10, 95% CI [-.23, .03], t = -1.54, p = .12). The indirect effect of test type on perceived organisational attractiveness was calculated at a 95% confidence interval [-.10, .01] with b = -.03. The R^2 value indicates that the model explains

3.48% of the variance in perceived organisational attractiveness. Anxiety is, therefore, not a significant mediator between test type and perceived organisational attractiveness.

Figure 17

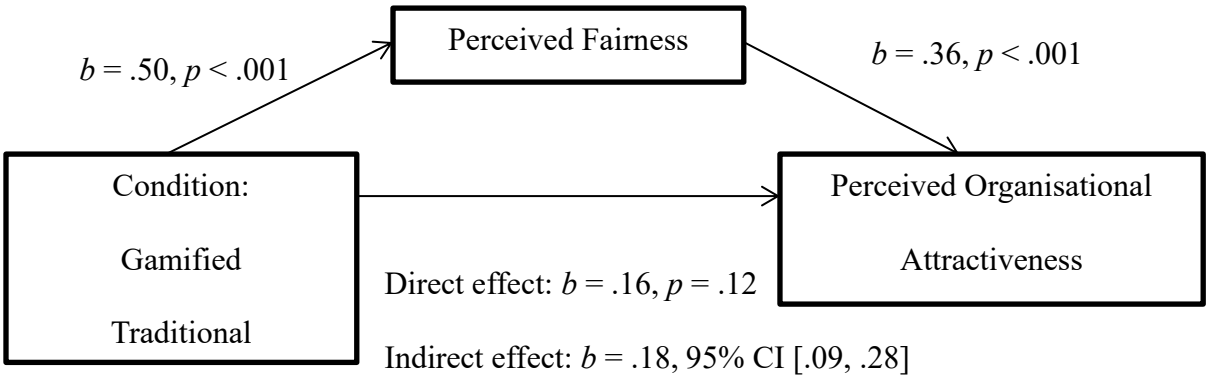
Results of the PROCESS Analysis Showing the Mediation of Anxiety on Test Type and Perceived Organisational Attractiveness



Perceived Fairness. Since the variable applicant reactions consisted of the aggregated scores from two subscales, the subscales were tested separately. An investigation considering perceived fairness as the mediating variable (M) between test type (X) and perceived organisational attractiveness (Y) was undertaken. See Figure 18 for a depiction of the relationship. The results indicate that test type does not significantly predict perceived organisational attractiveness without perceived fairness in the model (b = .16, 95% CI [-.04, .36], t = 1.55, p = .12); perceived fairness predicts perceived organisational attractiveness (b = .36, 95% CI [.22, .50], t = 5.10, p < .001). The indirect effect of test type on perceived organisational attractiveness was calculated at a 95% confidence interval [.09, .28] with b = .18. The R^2 value indicates that the model explains 11.91% of the variance in perceived organisational attractiveness. The positive b scores suggest that as perceived fairness increases so do perceptions of organisational attractiveness. The relationship is supported.

Figure 18

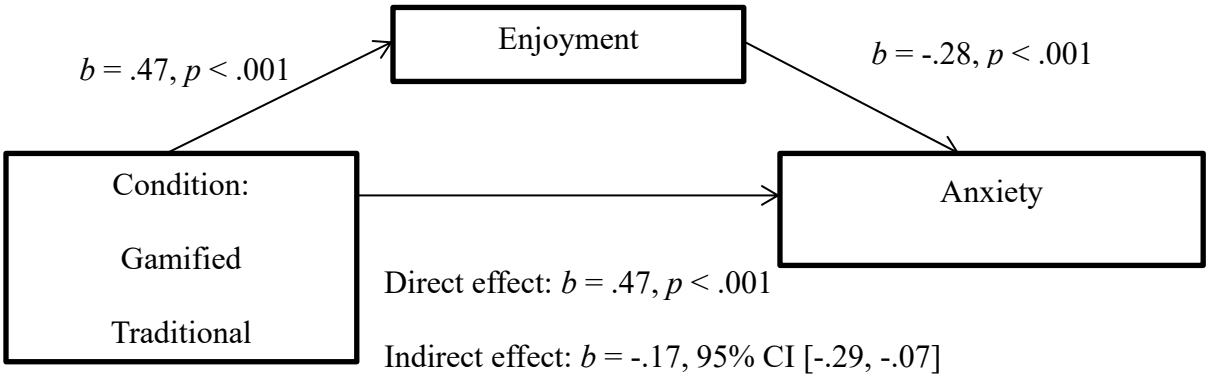
Results of the PROCESS Analysis Showing the Mediation of Perceived Fairness on Test Type and Perceived Organisational Attractiveness



Anxiety. Since the variable applicant reactions consisted of the aggregated scores from two subscales, the subscales were tested separately. Enjoyment as the mediating variable (M) between test type (X) and anxiety (Y) was investigated. See Figure 19 for a depiction of the relationship. The results indicate that test type significantly predicts anxiety even with enjoyment in the model (b = .47, 95% CI [-.21, .72], t = 3.56, p < .001); enjoyment also predicts anxiety (b = -.28, 95% CI [-.43, -.13], t = -3.58, p < .001). The indirect effect of test type on anxiety was calculated at a 95% confidence interval [-.29, -.07] with b = -.17. The R^2 value indicates that the model explains 10.75% of the variance in perceived fairness. The relationship is partially supported.

Figure 19

Results of the PROCESS Analysis Showing the Mediation of Enjoyment on Test Type and Anxiety



Perceived Fairness. Since the variable applicant reactions consisted of the aggregated scores from two subscales, the subscales were tested separately. Enjoyment as the mediating variable (M) between test type (X) and perceived fairness (Y) was investigated. See Figure 20 for a depiction of the relationship. The results indicate that test type significantly predicts perceived fairness even with enjoyment in the model (b = .27, 95% CI [.05, .49], t = 2.43, p < .05); enjoyment also predicts perceived fairness (b = .33, 95% CI [.20, .47], t = 5.00, p < .001). The indirect effect of test type on perceived fairness was calculated at a 95% confidence interval [.09, .34] with b = .20. The R^2 value indicates that the model explains 12.85% of the variance in perceived fairness.

Figure 20

Results of the PROCESS Analysis Showing the Mediation of Enjoyment on Test Type and Perceived Fairness

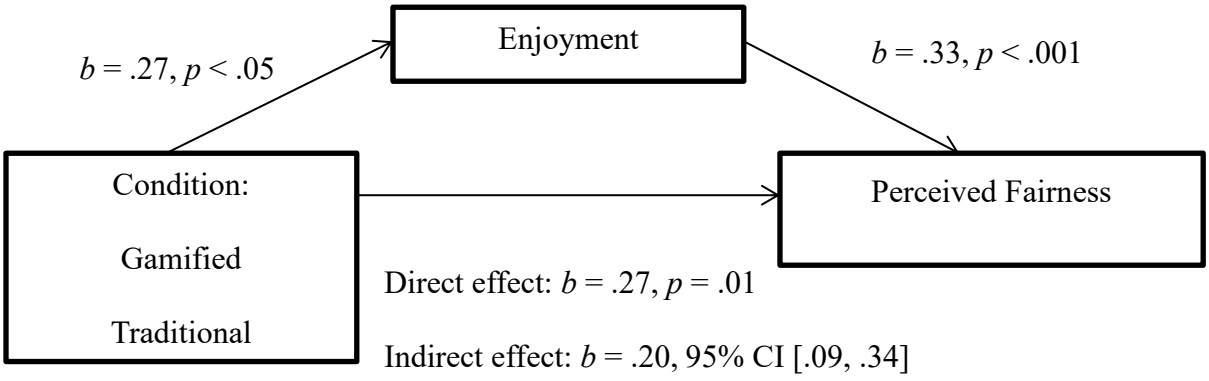


Table 17 summarises the results of the additional analysis run on the variables in the present study, particularly the subscales that were aggregated to make up applicant reactions.

Table 16

Summary of the Additional Analysis

Relationship under Investigation	Finding	Effect Size
The relationship between assessment type and perceived organisational attractiveness is mediated by perceived anxiety.	Not supported	$p = .12$
The relationship between assessment type and perceived organisational attractiveness is mediated by perceived fairness.	Supported	$p < .001$
The relationship between assessment type and perceived anxiety is mediated by perceived enjoyment.	Partially supported	$p < .001$
The relationship between assessment type and perceived fairness is mediated by perceived enjoyment.	Partially supported	$p < .01$