SELECTION OF INDUSTRIAL AND ORGANISATIONAL PSYCHOLOGY MASTER'S STUDENTS: EXPLORING THE VALIDITY OF APPLIED PSYCHOMETRIC MEASURES

by

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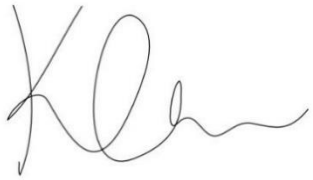

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TABLE OF CONTENTS

LIST OF TABLES

ABBREVIATIONS

APA	American Psychological Association
CBA	Competency-Based Approach
CBI	Competency Based Interview
CCMA	Commission of Conciliation, Mediation and Arbitration
CHE	Council of higher education and training
DHET	Department of Higher Education and Training
EEA	Employment Equity Act
HPCSA	Health Professions Council of South Africa
IO	Industrial and Organisational
IOP	Industrial and Organisational Psychologist
IoT	Internet of Things
NDP	National Development Plan
NMG3	Verify Graduate Numerical Ability Test
OPQ32r	Occupational Personality Questionnaire
PJM	Person Job Match
SIOP	Society of Industrial and Organisational Psychology in the United States of America
SIOPSA	Society of Industrial and Organisational Psychology in South Africa
SME	Subject matter experts
TIOP	Texas Industrial and Organisational Psychologists
VMG3	Verify Graduate Verbal Ability Test

SUMMARY

The objective of this study was to investigate how well the academic performance of the Industrial and Organisational Psychology master's students at a research institution can be predicted through psychometric measures. A non-experimental design was used in this empirical study. The sample consisted of one hundred and thirty-three IO Psychology master's students over a five-year period.

The secondary data for this research originated from the students completing the Graduate Verify Ability tests as well as the Occupational Personality Questionnaire, which are psychometric measures that form part of the selection. Both psychometric measures load onto the Person Job Match competencies. A theoretical relationship could be found between the Ability tests and academic success as well as the PJM competencies that included weighted scores from both psychometric measures. The empirical relationships, therefore, proved that the ability tests have the strongest predictive ability for academic success.

KEYWORDS

World of work; Academic success; IO Psychology master's student; Graduate Verify Numerical Ability test; Graduate Verify Verbal Ability test; OPQ32r; Validity; Competency-based assessment; Competency; Person Job Match; Selection

CHAPTER 1. SCIENTIFIC ORIENTATION TO THE RESEARCH

1.1 INTRODUCTION

Continuous technological breakthroughs are moving our world of work towards new heights. These drive many companies towards radically changing the way in which they manage and organise their workforce and talent (Maitland, Thomson & Palgrave, 2011). Industrial and Organisational (IO) Psychology is defined as "the scientific study of people within their work environment" (Schreuder & Coetzee, 2010, p. 2) and is regarded to have a multidisciplinary charge within the world of work (Salas, Kozlowski & Chen, 2017; Van Vuuren, 2010). Research areas within IO Psychology focus mainly on generating new knowledge locally and internationally within the changing world of work (Schreuder & Coetzee, 2010). One of the duties of an IO Psychologist is to create an environment that enables required changes in the work context and to manage the workforce through talent management and talent retention strategies (Lawler, 2011). Competent IO Psychologists are therefore needed to meet industry demands.

Before someone takes up the role of an IO Psychologist within the South African context, strict educational, registration and ethical requirements have to be met as detailed in the Health Professions Act, No 56 (1974a). As part of the educational requirements, a student needs to successfully complete the IO Psychology Master's qualification at an accredited South African university.

To build the capacity of qualified IO Psychologists in the world of work, academic institutions need to select students who will complete their IO Psychology master's qualification effectively. The focus of this study was on the selection of IO Psychology master's students, and the aim was explicitly to validate the current psychometric measures used to select IO Psychology master's students at an accredited South African university.

The methodology followed to validate the psychometric measures which are outlined in this chapter following the presentation of the background and rationale of this study, as well as the problem statement, aims and paradigm perspectives. The research procedure and ethical considerations are provided as well as how the study results are presented in this dissertation of limited scope. The chapter is concluded with a chapter layout of the dissertation.

1.2 BACKGROUND AND RATIONALE OF THE STUDY

The current world of work brings with it a new set of challenges that include an ageing workforce, a slowly declining birth rate, a global lack of skilled employees and cultural diversity (Ganaie & Haque, 2017). In this context, organisations are now at war for talent and bringing talent management to the fore as a strategic requirement for many businesses to remain active (Ganaie & Haque, 2017; Wilcox, 2016). As part of managing talent, selecting the right talent is imperative to ensure this need of safeguarding competitiveness within the global and open market. Regardless of the organisation's size, the current and future market place and more specifically the employment market should be taken into careful consideration when selecting talent (Wilcox, 2016). Additionally, selecting a diverse applicant group whilst minimising adverse impact within the South African context remains challenging (Theron, 2009).

The following section aims at contextualising the need for IO Psychologists within the current and future world of work and at emphasising why an increase in the number IO Psychologists within the workplace is vital. This is followed by a closer look at which competencies an IO Psychologist would require to meet the world of work demands, which includes the professional scope of practice and educational requirements. Psychological assessment measures are used to assess these competencies that need to adhere to legislative requirements in the South African context. These legislative requirements are discussed to explain what psychological assessment measures should adhere to in order to be considered fair and credible. Thereafter, an explanation of competency-based assessment as an assessment approach commonly followed to ensure fair assessment in a selection context is discussed. Lastly, the selection approach followed by the research institution relevant to this study is described to contextualise the study.

1.2.1 The need for Industrial and Organisational Psychologists in the new world of work

In The Economist – The World in 2017 magazine, the section called the 'generation prophet', deals with opinion pieces from young entrepreneurs, artists and young people around the world who are shaping the future world of work in new ways. Predictions for the year 2017 and onwards were made by this group of individuals and included the following themes: machine intelligence will start exceeding human capability (Altman, 2017); online driven political movements such as the #feesmustfall movement in South Africa will increase within the African continent (Mohutsiwa, 2017); virtual reality will be on the rise (Al-Moulia, 2017); artificial intelligence will influence how research is conducted in academia, in business (Gasca,

2017) and in solving complex tasks (Zilis, 2017); and technology will become the most potent agent for change to enable new ways to solve global problems (Slat, 2017).

The future world of work and how it will be structured through these new ways of approaching and solving problems appear to be uncertain (Omarjee, 2015). Additional predictions on significant challenges include changes in automation replacing many professional jobs such as accountants and doctors. Freelance workers are poised to take over about a quarter of the workforce (Spreitzer, Cameron & Garrett, 2017); smart devices will connect us in a manner not yet imagined, and open access to learning for all is envisioned (Maitland et al., 2011; Omarjee, 2015). Gratton (2011) adds that the rapid increase of technological advances has contributed to the decline of computing equipment, which has reversely taken over some jobs through automation processes. A further rise in global connectivity, the oil prices and the depletion of resources have additionally contributed to upsetting the future world of work (Gratton, 2011; Maitland et al., 2011). The growing diversity of employees within the workplace is also escalating in levels and complexity, and the future world of work is called to embrace these (Lawler, 2011).

One discipline that is dedicated to providing evidence-based data for improving organisational effectiveness is the field of IO Psychology (Salas et al., 2017). The need for IO Psychologists within various industries emerged in response to having to accommodate individual differences of people within organisations (Lawler, 2011) and to create a work environment that promotes well-being and organisational health (Van Vuuren, 2010). This is affirmed in research about the profession's value, which includes how to build and manage a new workforce; managing differences within and between organisations as well as facilitate existing work developments (Salas et al., 2017). The work of an IO Psychologist also extends the workplace, as IO Psychologists are interested in how work impacts non-work relationships (Landy & Conte, 2016). The IO Psychologist is interested in challenges outside the workplace, which include cultural influences, family disputes and traumatic events in the lives of the employees (Barkhuizen, Jorgensen & Brink 2014). The Society of Industrial and Organisational Psychology (SIOP) in the United States of America defines IO Psychology as an understanding of the interdependence of individuals, organisations and society as a whole, based on psychological theory, as well as recognising the effects that political influences, consumers and skills shortages have on the changing world of work (Landy & Conte, 2016). The IO Psychologist therefore greatly assists companies that are currently changing the way they manage and organise their workforces and talents in the light of reacting to the future world of work demands. This brings into consideration the competency requirements of a competent IO Psychologist in these changing world of work developments.

1.2.2 An Industrial and Organisational Psychologist's competency and skill requirements

Due to the shifting world of work and the new forms it is assumed to take (Maitland et al., 2011), literature points to the IO Psychologist having an interdisciplinary character that includes bridging the gap between human and management sciences (Schreuder & Coetzee, 2010; Van Vuuren, 2010). This means that marketing, business, accounting, and/or economic sciences are indirectly involved within the daily working considerations of the IO Psychologist. When keeping the changing world of work in mind, commercial and strategic awareness as well as flexibility, resilience, creativity and innovation may become critical competencies for the IO Psychologist in order to brace the change that is expected (Van Vuuren, 2010; SIOPSA, 2014). The future IO Psychologist is therefore challenged to find new solutions to the currently evolving work environment (Gratton, 2011; Lawler, 2011; Maitland et al., 2011; Omarjee, 2015; Van Vuuren, 2010). Proposed future applications of IO Psychologists include managing work environments, human rights of employees, unemployment and technological change amongst others (Blustein, Kenny, Fabio & Guichard, 2019). The field of IO Psychology continues to experience rapid growth in both membership and related job opportunities that aim to improve employees' lives, the organisation's effectiveness and impacting society as a whole in a meaningful way (Grand et al., 2018). The IO Psychologist thus requires unique competencies in order to operationalise these current and future IO Psychology applications expertly.

For organisations to thrive in the new world of work, the valuable role of the IO Psychologist is needed to manage talent and capacity as part of their business objectives. To determine which competencies will empower an IO Psychologist to function effectively in the new world of work, the following directives are considered in the South African context, namely, the scope of practice and educational guidelines stipulated by the HPCSA, as well as the future-fit competencies determined by the Society for Industrial and Organisational Psychology of South Africa (SIOPSA) and the Texas Industrial and Organisational Psychologists (TIOP).

The Health Professions Council of South Africa (HPCSA, 2018) provides two directives relevant to the competency requirements of an IO Psychologist. The scope of practice of an IO Psychologist as set out by the HPCSA, which is currently under comment before it can be ratified into legislation (HPCSA, 2018), can be regarded as a legislative job profile of the IO Psychologist. The registered IO Psychologist (HPCSA, 2018), should be allowed to work within recruitment and selection, training, performance appraisal and review, industrial relations, planning technological and organisational change, consumer behaviour, job re-

design and ergonomics, occupational health and safety and career guidance and development (Health Professions Act, No 56, 1974c; Schreuder & Coetzee, 2010). Strong competence within these fields are therefore crucial for the IO Psychologist within various sectors of the organisation. The HPCSA also stipulates specific educational requirements that are to be met before one can attain the IO Psychologist registration with the HPCSA (Viviers & Van Niekerk, 2012). These include the IO Psychology master's student successfully completing the coursework for the master's degree, completing a one-year supervised internship as well as passing the HPCSA Board exam for IO Psychologists. Additionally, universities should select high-potential students who will successfully complete their professional master's qualification that is needed for HPCSA registration as well as consider competencies to deliver IO Psychologists who display applied competencies to meet the current and future marketplace demands (SIOPSA, 2014; Viviers & Van Niekerk, 2012).

In the South African context, the 'future-fit' competencies published by SIOPSA (2014) are regarded as an essential guideline indicating which competencies are critical for the future South African IO Psychologists. SIOPSA is a professional body that was established as a non-profit organisation with the aim to enhance the IO Psychology profession in South Africa. The Society for Industrial and Organisational Psychology of South Africa has brainstormed the 'future-fit' competencies required of an IO Psychologist (SIOPSA, 2014) as depicted in Table 1.1. These competencies cluster under the four general themes of problem-solving, adapting approaches, delivering results and influencing people.

TABLE 1.1 SIOPSA's future-fit competencies for an IO Psychologist (SIOPSA, 2014):

Problem solving	Adapting approaches	Delivering results	Influencing people
Analysing Writing and reporting Learning and researching Creating and innovating	Adhering to principles and values Adapting and responding to change Coping with pressures and setbacks	Entrepreneurial and commercial thinking Planning and organising Meeting clients and stakeholders' expectations	Presenting and communicating information Relating and networking Persuading and influencing

The critical competencies that have been researched and proposed by IO Psychology's professional societies around the world also needs to be taken into consideration. A qualitative study (Chairman, 1938) outlined the main competencies necessary for an IO Psychologist to be considered successful when selecting and training future IO Psychologists. The successful IO Psychologist was described as being extroverted, emotionally stable and tactful, assertive, influential and highly intellectual in order to work and be valid within the global business environment (Chairman, 1938). This led the American Psychological Association (APA) to

consider both personality and cognitive factors when selecting students to be trained as IO Psychologists (Chairman, 1938). The Texas Industrial and Organisational Psychologists have identified their own eight critical competencies for the role of a successful IO Psychologist as seen in Table 1.2. This competency profile is mentioned because it was used as a global benchmark in developing the IO Psychology master's student competency profile in the context of this research.

TABLE 1.2 TIOP's competency profile of an IO Psychologist (Blakeney et al., 2002)

COMPETENCIES
Professional judgement & problem solving
Managerial judgement
Interpersonal skills
Work habits
Integrity and ethics
Industrial and Organisational Psychology knowledge
Professionalism
Personal maturity

When regarding these imperatives above, it becomes clear that the scope within which the IO Psychologist is set to work, is vast and reaches into different areas within organisations, including ethics, research, assessment, performance, people development, problem-solving, change management and others on top of needing to meet legislative and educational requirements set out by the HPCSA. Research that is used for assessment purposes to facilitate decision making should be comprehensive throughout (APA, 2003; Health Professions Act, No 56, 1974a; International Test Commission, 2013; Kanjee, 2006). Therefore, IO Psychology master's students should be selected along competencies that meet the proposed IO Psychology Scope of Practice (HPCSA; 2018), the profession's educational requirements as well as future-fit competencies proposed by SIOPSA (2014) and competencies they need to face the vast applications and add value within the global work context (APA, 2018; Gibson et al., 2018).

Apart from selecting against relevant competency requirements, in order to effectively select IO Psychology master's students, one should also consider the credibility of psychological assessments within the South African context. Credible psychological assessment is directed by legislative requirements within the South African context and are discussed next.

1.2.3 Legal requirements for selection assessment in the South African context

South Africa's apartheid era (1948-1994) set up psychological assessments as tools to be used to discriminate and were biased against certain test users. After the apartheid era had

ended in 1994, legislative criteria pertaining to psychological assessment were instituted by the new South African government to safeguard future assessment users against discrimination and bias (Claassen, 1997; Foxcroft & Roodt, 2009; Laher & Cockroft, 2014).

The primary South African legislation governing occupational assessment is the Employment Equity Act (EEA) No 55 (1998) that has the dual objective of ensuring that only valid and reliable assessments are used and that assessments are used in a fair manner and are free from bias. This pertains specifically to psychological assessments that is prohibited unless it has been shown to be valid, reliable, fair and non-biased against applicants (EEA, 1998).

The second crucial legislative body that oversees the implementation of psychological assessments is the HPCSA. The psychometric measures for the selection of IO Psychology master's students consist of cognitive measures and a personality measure. These measures assess psychological constructs and are therefore categorised as psychological acts according to the Health Profession Act, No 56 (1974a). Since the psychometric measures used fall within this category, only trained assessors may both administer the tests and interpret the data that are provided from the assessments as laid out in the Health Professions Act (1974c).

When using psychological assessments for selection, for which the psychometric measures for selecting IO Psychology master's students are used, it has to be proven that this is done in a valid manner (EEA, 1998). This means that it needs to measure what it intends to measure (Salkind, 2016). In this context, it needs to select the most suitable candidates to meet the academic and professional requirements of the IO Psychology master's programme that has at its aim to train the IO Psychologists for the future world of work (UNISA, 2017; Viviers & Van Niekerk, 2012).

The EEA further states that it is not unfair to discriminate against an applicant if the discrimination is based on the inherent requirements of the job (EEA, 1998; UNISA, 2017). To ensure that assessment for selection purposes is based on fair discrimination, the psychometric measures used should assess the candidates against the inherent requirements of the job, which in this study is the IO Psychologist's role as well as a master's student's role. One approach that has been successfully applied to ensure fair discrimination through psychological assessment is the competency-based assessment (CBA) approach (Potgieter & Van der Merwe, 2002).

1.2.4 Competency-based assessment

McClelland (1973) first introduced competencies that have been defined along with knowledge, skills, abilities, and/or behaviour (Campion et al., 2011), as valid predictors for job performance. SHL defined competencies as “a set of desirable behaviours” that are needed for optimum performance in the workplace (SHL, 2011b, p.5). A group of critical competencies required are typically taken from the job profile or job role that inform the candidate of what is required to be successful in that role (Gonczi, Hager & Athanasou, 1993; Kriek, 2009a).

A clear distinction needs to be made between the terms, competence and competencies, in order to understand what the psychometric measures measure in this study. Competence refers to the mastery of a specific skill. Thus, assessments, in this case, would revolve around the performance of these skills to determine the competence of the individuals in relation to the skills assessed (Le Deist & Winterton, 2005; SHL, 2011b). Reversely, competency refers to the behaviours that underpin the desired performance in a specific role (SHL, 2011b). These behaviours include the how, what and why people do what they do to achieve their desired goals.

Mostly, psychometric measures are instrumental in assessing behaviours that are needed to deliver the desired result (SHL, 2011b). The value of using psychometric measures is their ability to measure these predefined behaviours in order to select the best possible candidate for the position. The more competencies are in line with the role requirements, the more effective they will be in their roles (Potgieter & Van der Merwe, 2002). In this case, the IO Psychology master’s student is assessed along a prescribed standard of knowledge, skills, behaviour and values, in which the student needs to prove acceptable levels of competency, as part of the selection criteria of the IO Psychology master’s programme (Gonczi, Hager & Athanasou, 1993; UNISA, 2017).

Assessing competencies is argued to be a challenging endeavour due to a competency consisting of an integration of the knowledge and skills and behaviours of the individual. It is therefore advised that more than one assessment tool or method be used to assess competencies effectively by combining different assessment methods to reach this goal (Baartman, Bastiaens, Kirschner & Van der Vleuten, 2006). Such CBA’s usually include a combination of psychometric measures of personality and cognition, different types of simulation exercises and a structured interview (Baartman et al., 2006).

There is an additional argument to be made between context-specific competencies versus applying generic competencies to measure the behaviours that underlie successful performance in a role. Le Deist and Winterton (2005) point out that some organisations apply generic competencies as part of their selection profiles, where others use role-specific competencies. Generic competencies have been found to be highly transferable for different roles and organisations, where organisation-specific competencies can be used to ensure competitiveness and uniqueness (Le Deist & Winterton, 2005).

There is a definite lack of empirical validation studies on competencies (Baczyńska, Rowiński & Cybis, 2016). The requirements stipulated for assessment in the EEA (1998) further highlight the need of completing a validity study that, in this case, would be to ensure that the psychometric measures used to select IO Psychology master's students at the research institution are valid for its intended purpose.

In the context of this study, psychometric measures have been applied as part of a competency-based assessment in which the IO Psychology master's students are assessed to ensure that they display the competencies that are needed to achieve academic success within this programme (cf. Foxcroft & Roodt, 2009). This CBA approach has been applied in selecting IO Psychology master's students with the dual purpose of ensuring that the applicants are assessed against the job requirements (as required by the EEA), as well as to ensure that the candidates meet the demands of the programme to be able to succeed in the future world of work (Viviers & Van Niekerk, 2012).

In order to demonstrate how fairness was pursued in the selection process followed by the relevant research institution, the process of establishing a CBA approach is discussed next. The discussion is specific on how individual competencies have been identified and applied in constructing the IO Psychology master's selection assessments. The competencies were taken from a generic job analysis of an IO Psychologist working within the South African industry through a competency profiling process involving Subject Matter Experts (SMEs). The aim of the competency profiling was to ensure that the psychometric selection assessments for the IO Psychology master's student is based on the inherent requirements of the programme as well as IO Psychologist competencies that are required for the future world of work (UNISA, 2017; Viviers & Van Niekerk, 2012). Including psychometric measures in a competency-based assessment battery is a common practice, yet, not without its challenges (Potgieter & Van der Merwe, 2002). Such challenges inform the need for validation studies of context-specific psychometric-based assessments as is done in this study. The said

competency profiling process is described following below, as part of the assessment approach applied by the research institution in order to establish the context of the study.

1.2.5 Contextualising the assessment approach applied in this research context

A leading South African university, the research institution in this study, applies a CBA approach to select IO Psychology master's students. This institution does this to ensure the graduateness of the IO Psychology master's students in order to identify and select the most promising candidates to be trained as future IO Psychologists (Viviers & Van Niekerk, 2012). The directed coursework degree that is offered at this training facility consists of both a theory and a dissertation component of limited scope to be completed over a two- to four-year period by the IO Psychology master's students (UNISA, 2017). The first year of study is referred to as the M1 year and the second year that can be completed in two to three years, is referred to as the M2 year. Both M1 and M2 components need to be completed by the IO Psychology master's student in order to satisfy the educational training requirements towards being able to register as an IO Psychologist with the HPCSA (Health Professions Act, No 56, 1974c; UNISA, 2017; Viviers & Van Niekerk, 2012;) as well as equip the student to be effective and innovative once entering the workplace as a registered IO Psychologist (Coetzee, 2010). Additional requirements by the HPCSA include a one-year supervised internship as well as successfully passing the Board exam in order to register with the Board of Psychology. Once registered, the IO Psychologist needs to adhere to the strict scope of work as well as the ethical guidelines as stipulated in the Health Professions Act, No 56 of 1974 (Health Professions Act, No 56, 1974b; UNISA, 2017).

The competency profiling process that leads to the IO Psychology master's competency profile will be discussed next as well as the assessment measures that have been applied to measure these competencies as part of the access requirements into the IO Psychology master's programme.

1.2.5.1 The competency profiling process

The competency profile of the IO Psychology masters' student was created by conducting a thorough job profile of the IO Psychologist. This competency profile was designed by subject matter experts (SME's) that consisted of IO Psychologists in practice and IO Psychology academic staff members (Barnard, 2015, Viviers & Van Niekerk, 2012). SHL's 20 generic competencies that have been found to contribute to superior performance in all roles and positions in the workplace (SHL, 2007), were used as a baseline in the competency profiling

process. These were ranked along the importance to the IO Psychologists as identified by the SME's as critical for the role of the IO Psychologists whilst meeting the HPCSA's scope of practice and educational requirements (Viviers & Van Niekerk, 2012). The future-fit competencies proposed by SIOPSA (2014) as well as the TIOP competencies were also used as reference points during the profiling session (Viviers & Van Niekerk, 2012).

The IO Psychology master's competency profile was organised along essential, desirable and less relevant competencies. Essential competencies are required for nearly all the role objectives of the IO Psychologist. Desirable competencies are included to be relatively crucial to most IO Psychologists' job requirements; relevant competencies are required in meeting at least some objectives, whereas less relevant competencies have very little relevance to the role of the IO Psychologist (Viviers & Van Niekerk, 2012). This means that generic competencies were used because of their relevance to the role of the IO Psychologist for selection purposes.

In order to be considered for selection for the IO Psychologist-directed master's degree at the research institution, a candidate is required to follow a prescribed selection process (Kriek, 2014). Before being considered for the first pre-selection stage, the candidate is required to be the holder of a completed honours degree or postgraduate diploma in IO Psychology with a minimum average of 60% that covers all the relevant IO Psychology subfields. These subfields include psychological assessment, career psychology, employee wellness, personnel psychology, organisational psychology and research methodology (UNISA, 2017). When the candidates meet these minimum requirements, they are invited to complete two online administered psychometric measures offered by a private assessment provider.

These online psychometric measures assess specific competencies that are linked with the IO Psychology master's student competency profile.

1.2.5.2 The competency profile of the IO Psychology master's student

As noted above, the IO Psychology master's competency profile has been developed from SHL's 20 generic competencies ranked according to importance to the role of an IO Psychologist. Table 1.3 provides the competencies that have been selected to form part of the IO Psychologist's competency profile, indicating their significance (essential, desirable and less/not relevant), in order to inform the selection of IO Psychology master's students at the research institution. Ultimately only the essential and relevant competencies form part of the

final competency profile of the IO Psychology master's student (Viviers & Van Niekerk, 2012; SHL, 2011b), which was then used in the selection process.

TABLE 1.3 Competencies included in the IO Psychology master's competency profile (SHL, 2011b; Viviers & Van Niekerk, 2012)

Essential competencies	Included/Excluded in/from the IO Psychologist's master's student profile
Writing and reporting	Included
Learning and researching	
Working with people	
Analysing	
Adhering to principles and values	
Presenting and communicating information	
Desirable competencies	
Deciding and initiating action	Included
Planning and organising	
Adapting and responding to change	
Coping with pressures and setbacks	
Achieving personal work goals and objectives	
Relating and networking	
Less relevant competencies	
Applying expertise and technology	Excluded
Following instructions and procedures	
Creating and innovating	
Formulating strategies and concepts	
Delivering results and meeting customer expectations	
Non-relevant competencies	
Leading and supervising	Excluded
Persuading and influencing	
Entrepreneurial and commercial thinking	

To assess applicants' suitability for the master's programme, they are assessed against these competencies in the IO Psychology master's student profile. Various assessments have been included in an assessment battery for this purpose, and are discussed next.

1.2.5.3 Applied assessment matrix

The competency profile informed the assessments and measures to be included in the selection assessment battery that assessed the essential and desirable competencies in applicants, for successful performances as IO Psychologists (Viviers & Van Niekerk, 2012). Best practice along validity, reliability, fairness and bias were considered when the assessment tools were selected (Viviers & Van Niekerk, 2012).

Two psychometric measures are included in the assessment battery to measure cognition and personality. Two timed Verify Graduate Ability Tests (VMG3, NMG3) that sequentially measure verbal and numerical abilities needed to be completed by the candidates as well as the Occupational Personality Questionnaire (OPQ32r). The Verify Graduate Ability Tests and

the OPQ32r's results are collated into a Person Job Match (PJM) profile for each student, which is then used to measure the students' competency fit required for access into the master's. A PJM is a method that calculates the extent of fit between someone's competencies and the job competency requirements in order to select high potential candidates for the role (SHL, 2013). The PJM for the IO Psychology master's students reflects the IO Psychology master's student competency profile and is also based on the essential and desirable competencies as identified in the competency profiling process. Job match scores for each of the PJM competencies are thus calculated from ability scores and personality dimensions on the OPQ32r that are relevant to each competency.

The relevance of the ability test and the OPQ32r to each of the IO Psychology master's student competencies is indicated in Table 1.4. The alignment in Table 1.4 that indicates which psychometric measures are relevant to which competencies are also referred to as an assessment matrix. The candidates' scores achieved on the psychometric measures guide the ranking of the candidates according to the extent of personal fit with the required competencies. This then leads the research institution to select the top 40 candidates for the next round of selection. In the final round of selection, the candidates are required to complete a written assignment that is focussed on an article review. After completion of the written assignment, the candidate attends a structured competency-based interview (CBI) with a panel of IO Psychology academic staff members. The final number of students are then selected with regard to their psychometric assessment results, how well they did in their article review, their CBI scores as well as their averages as reflected by their honours degree (Kriek, 2014; Van Niekerk, 2018). Each of these selection categories used in the final decision has an equal weight (25%) towards the final decision for access into the IO Psychology master's programme (Van Niekerk, 2018).

This study focussed on validating the psychometric measures included in the selection battery and did not include a validation of the article review exercise or the CBI. The assessment matrix below does not include the article review or the CBI scores in relation to the competency profile, since the study only focused on the psychometric component of the competency-based selection assessment battery.

TABLE 1.4 Psychometric Assessment Matrix
(SHL, 2011b; SHL, 2007; Viviers & Van Niekerk, 2012)

IO Psychology Master's Student Competencies	Verify Graduate Ability Tests	OPQ32r
Writing and reporting	X	X
Learning and researching	X	X
Working with people		X
Analysing	X	X
Adhering to principles and values		X
Presenting and communicating information	X	X
Deciding and initiating action		X
Planning and organising		X
Adapting and responding to change		X
Coping with pressures and setbacks		X
Achieving personal work goals and objectives		X
Relating and networking		X

A validity study for the purpose of selection for a master's in business administration has been found for both the Verify Graduate Ability tests (VGM3, NGM3) that measure verbal and numerical reasoning and the OPQ32r that is an occupational personality assessment (Kotzé & Griessel, 2008). Yet, no validity studies have been completed for these psychometric measures used to correctly select IO Psychology master's students at the research institution.

This study set out to investigate the validity of the psychometric assessment of the IO Psychology master's students, which is made up of the Verify Graduate Ability Tests and the OPQ32r. In addition, the study investigated the validity of the PJM competency profile with regard to academic success in the IO Psychology master's programme. In the light of this, whilst bearing in mind further legislative regulations when using psychometric measures as seen in the EEA (1998), as well as the Health Professions Act, No 56 (1974a), it becomes imperative that this study should contribute statistically measurable data that can add value to 'future-fit' purposeful decision making for the future training of IO Psychologists.

1.3 PROBLEM STATEMENT

Industrial and Organisational Psychology is regarded as one discipline that is critical in its need to aid organisations to face and manage the challenging current and future world of work demands (Grand et al., 2018; Gratton, 2011; Lawler, 2011; Maitland et al., 2011). The competencies required of the IO Psychologist to meet the upcoming challenges have been found to include critical problem-solving behaviours, influencing and communication, remaining adaptive to change as well as focusing on delivering results and the associated behaviours that group under these themes (SIOPSA, 2014; Van Vuuren, 2010).

The research institution through which this study was conducted, makes use of psychometric measures as part of its selection assessment battery to select IO Psychology master's students for their academic programme (UNISA, 2017). In the South African context, specific legislative requirements are expected to be followed when applying psychological measures for selection purposes. The EEA (1998) and the Health Professions Act, No 56 (1997a) provide clear guidelines on the use of psychometric measures that measure psychological constructs. The psychometric measures used in the IO Psychology master's selection battery measure psychological constructs such as personality, cognition and aptitude, which is then applied to select IO Psychology master's students with regard to individual competencies (Health Professions Act, No 56 of 1997c). These competencies have been constructed from a thorough job analysis workshop at the research institution in collaboration with SMEs in order to select future IO Psychology master's students who can be trained towards meeting the challenging world of work demands once qualified (Viviers & Van Niekerk, 2012). The further use of PJM scores, indicating the level of fit between the applicant's competency and the required competencies in the role profile, aids in eliminating unfair discrimination by providing purposeful selection that is job (EEA, 1998), and in this case, also programme specific.

The article by Cilliers and Flotman (2016) shared findings that the IO Psychology master's students are meeting the cognitive demands of the M1 programme. This, they argued is due to the currently applied scientific selection process. Continuous research to validate the current IO Psychology master's students' psychometric measures is however still called for (Viviers & Van Niekerk, 2012), which further aligns with the EEA (1998) requirements that only valid and reliable assessments be used when selecting employees, or in this case, IO Psychology master's students. Having the selection assessments scientifically grounded only in theory and practice is not sufficient.

The general aim to have the IO Psychology master's students qualify as IO Psychologists, once having completed their studies, is evident in most universities' information booklets (Nelson Mandela Metropolitan University, 2015; University of Cape Town, 2015; University of the Witwatersrand, 2015; Viviers & Niekerk, 2012). This implies that educational institutions are interested in selecting the best-suited candidates to ensure throughput and competent registered IO Psychologists, whilst also meeting the legal stipulations as outlined by the HPCSA (1974). The Department of Higher Education and Training (DHET) also requires educational institutions to ensure a high throughput rate and an effective articulation system that ensures a transition pathway from, in this case, training to the workplace (DHET, 2017).

As part of the DHET's strategic plan (2015) an academic success rate of 78% for the 2018 academic year was envisioned.

A previous study on first-year IO Psychology master's students by Cilliers and Harry (2012) found a 60% throughput of the students who had been selected into the coursework programme for IO Psychology. This means that 40% of students do not complete the studies in their totality and that many have been found to take longer than the stipulated two to four years to complete this qualification. It appears that not only would one consider the future world of work of the IO Psychologist and the role required, but the stressors that are evident during the study period. Viviers and Van Niekerk (2012) further add that it would be valuable to identify competencies that predict the academic success of IO Psychology master's students to increase the throughput and to develop competent IO Psychologists who meet industry demands.

In light of the above recommendation, it is necessary to determine the extent to which the psychometric measures identify successful IO Psychology master's students correctly. This will enable educational institutions to select IO Psychology master's candidates to address the need for an increase in IO Psychology professionals in the world of work as well as meet legislative requirements of the EEA and to meet the strategic plan of the DHET for a higher throughput rate. In order to contribute towards meeting these needs, this research set out to investigate the validity of the psychometric measures that include the VMG3, NMG3 and the OPQ32r, and was designed to answer the following research questions:

1. Does the IO Psychology master's students' competency profile predict the academic success of the IO Psychology master's student?
2. Do verbal and numerical reasoning as measured by the Verify Graduate Ability Tests (VMG3, NMG3) predict academic success of IO Psychology master's students?
3. Does personality as measured by the OPQ32r predict academic success of IO Psychology master's students?
4. Are there other competencies that predict academic success of the IO Psychology master's students that are not part of the selection competency profile?

1.4 AIMS OF THE RESEARCH

In relation to the problem statement above as well as the research questions, the following aims were formulated: the general aim of the study, the specific theoretical aims of the literature review and the specific empirical aim.

1.4.1 General aim

The aim of this study was to validate the psychometric component of a competency-based assessment battery, applied to select IO Psychology master's students, with regard to academic success.

1.4.2 Specific theoretical aims of the literature review

The literature review aims of the study were as follows:

1 To analyse the concept of academic success along with recent trends in research and the throughput rate in South African higher educational institutions;
2 To conceptualise the importance of academic success of an IO Psychology master's student from a South African legislative requirement of skills development and the importance of IO Psychologists in the South African workplace;
3 To analyse the importance of validity in selection and measurement in South Africa and
4 To conceptualise psychological assessment, best practice from a psychometric approach and a psychometric theory perspective.

1.4.3 Specific aims of the empirical study

The empirical aims of the study were as follows:

1 To determine the predictive validity of the Verify Graduate Ability Tests (VMG3, NMG3) and the OPQ32r with regard to academic performance after each completed academic year and after the full degree had been completed;
2 To determine whether there is a correlation between the IO Psychology master's student's PJM competency profile and the academic success variables of IO Psychology master's students over a five-year period and
3 To determine additional critical competencies that may display a significant correlation with academic success.

1.4.4 Formulation of hypothesis

It has been found that no validation study has been conducted to assess the validity of the psychometric selection measures that are currently used to select IO Psychology master's students at the research institution (Barnard, 2015). The primary importance of having this validation study done is along the EEA (1998) requirements that require all psychological assessments that are used for selection to be valid, fair, free from bias and unfair discrimination and reliable for its intended use. Of further importance for this study is to add to the scientific competency profile of future IO Psychologist in order to aid in the future selection and training of the IO Psychologists (Viviers & Van Niekerk, 2012).

The following hypotheses were formulated:

H_0: The psychometric component of the IO Psychology master's competency profile is not a valid predictor of academic success

H_1: The psychometric component of the IO Psychology master's competency profile is a valid predictor of academic success

H_2: The Verify Graduate Ability Tests (VMG3, NMG3) are valid predictors of academic success

H_3: The OPQ32r is a valid predictor of academic success

H_4: The IO Psychology master's PJM competency profile is a valid predictor of academic success

1.5 THE PARADIGM PERSPECTIVE

Paradigms are central to research design and impact the nature of the research and the manner in which the research question(s) will be studied (Durrheim, 2006b). The non-experimental research design which falls under the positivist paradigm perspective, does not enable the researcher to manipulate any variables gathered (Kerlinger & Lee, 2000).

The disciplinary and meta-theoretical concepts and theories inform this quantitative research study. Through this, a meta-context is born from which informed decisions on appropriate selection criteria of the future IO Psychology master's students. Following this, the disciplinary relationships, appropriate psychological paradigms, meta-theories and models as well as concepts and constructs are discussed.

1.5.1 The disciplinary relationship

This research is located within the discipline of IO Psychology that is regulated by the Health Professions Act, No 56 (1974a). Within this Act, the scope of practice of the IO Psychologist includes: planning; developing and organising behaviour at the workplace; conducting psychometric tests; facilitating individual and group processes; advising and designing policies; training and supervising other psychology practitioners; conducting psychological research and providing expert advice. One of the core IO Psychologist tasks includes conducting psychometric tests as well as conducting psychological research and providing expert advice as seen in the scope of practice above. This study finds its importance in IO Psychology since a predictive validity study is psychological research aimed at informing the selection assessments user to enhance knowledge on best practice and quality control (Foxcroft & Roodt, 2009).

The sub-disciplines include psychological assessment and psychometrics. Psychological assessment represents a broader field that includes the use of both qualitative and quantitative assessments that aim to identify a person's resources that can be accessed through using psychological assessment strategies that help the person to access these resources. Counsellors, clinical researchers, educational and IO Psychologists make up the psychology profession in South Africa, and all make use of some form of psychological assessment (Ferreira, Maree & Stanz, 2016). On the other hand, the discipline of psychometrics includes performing a quantitative psychological assessment, measuring psychological functioning through using psychometric measures and participating in the design, managing and evaluating the psychological assessment procedure (Health Professions Act, No 56, 1974c). This means that psychometrics is a form of psychological assessment. Both subsystems are further regulated by the EEA (1998) that aims to ensure culturally fair, valid, reliable and unbiased assessment practices when psychological assessments are used for selection purposes (Foxcroft & Roodt, 2009).

1.5.2 Applicable psychological paradigms

The predominant schools of thought in this study are grounded in the cognitive and behaviourist perspectives of which a brief history and applicability will be discussed next.
The cognitive perspective was at the forefront when psychology was founded in the late 1800s. Wolfgang Köhler began theorising on what intelligence, problem-solving and insight encompassed. Köhler was a member of the Gestalt Psychology Movement that informed the

topics of intelligence, problem solving and insight. Gestalt psychology was focused on how we perceive experiences by integrating many experiences into a singular knowledge (Passer & Smith, 2003).

Psychometric selection assessments include competencies, e.g. problem solving that is a cognitive process. The verbal and numerical reasoning assessments contribute to scoring these problem-solving competencies. Verbal reasoning tests fall under cognition, and thus this school of thought is used to investigate how the student comprehends, speaks, reads and writes the English language. Vygotsky's learning theory (1986) further ads to this notion that speech is central to learning, and communication becomes internalised and positions the basis for the development of thought. Additionally, numerical reasoning has measured the extent to which students use numbers, mathematical computations and how they draw conclusions from numerical data, which is also relevant to cognition (Foxcroft & Roodt, 2009).

A further consideration is given to the behaviourist model in which the OPQ32r is grounded. This theory is based on the view that our experiences and habits are learnt from both our immediate environments and our collectively gained experiences throughout our life stages (Passer & Smith, 2003).

The OPQ32r is a personality measure developed to test behavioural preferences or characteristics relating to the individual's work context, which are based on psychometric properties and not on observable data (SHL, 2011a). Regardless of the OPQ32r not being based on observational behaviour, it is a psychometric measure, which means that this personality assessment measures competencies that are formed through previous experiences (SHL, 2011a), which makes the OPQ32r applicable to the behaviourist model.

1.5.3 Meta-theories and models

Psychometric theory informs this research in which the assessment results are regarded as a "classification of behaviours into categories measured against a normative standard" (Moerdyk, 2009, p. 3). The normative standard in this regard is the norm group against which the candidates are measured. Validity is a further psychometric construct that refers to the extent to which a technique measures what it claims to measure (Moerdyk, 2009). It further forms part of the statutory requirements of psychological assessments that are prohibited unless found to be valid in its claim of what it is designed to measure (EEA, 1998).

Specific cognitive functions are assessed as part of the psychometric assessment of IO Psychology master's students, which include the verbal and numerical ability of the candidates (Foxcroft & Roodt, 2009). The theory of cognition was found to be influenced first by Gestalt psychology. It supposed that the human mind has the ability to experience meaningful wholes through imposing structure and organisation when being exposed to a sensory experience. Unlike the Gestalt Psychologists, Piaget believed that the human mind develops as it matures and does not remain the same (Hergenhahn & Olson, 1997; Kretchmar, 2013) and this led Piaget to be first to link biological principles to the study of intelligence (Kretchmar, 2013).

Behavioural theory, on the other hand, believes that learning is determined through the environment that individuals find themselves in (Kretchmar, 2013). This theory is predominantly used to identify who performs certain behaviours and why they do so (Scherrens et al., 2018). The personality assessment that is one of the measures used in the selection assessments is based on behavioural theories and takes approaches from Cattell, Eysenck and Murray into account (Foxcroft & Roodt, 2009). Raymond Cattell (1989) championed our scientific understanding and prediction of personality action; Hans Eysenck (1988) linked psychological concepts such as emotion, inhibition and excitation to biological causes and Murray (1938) sought to understand the whole person through personality assessments and measures.

1.5.4 Applicable concepts and constructs

The primary constructs and concepts that are investigated in this study are predictive validity, academic success and competency.

Validity refers to the extent to which the assessment "measures what it claims to measure" (Moerdyk, 2009, p.47). Predictive validity described by Durrheim and Painter (2006, p.148) is the method used to determine whether the measure "indeed predicts future events that are logically related to the construct". This means that this study will look at the accuracy of the psychometric selection assessments of the IO Psychology master's students and how well it predicts the future academic success of these students once selected (Foxcroft & Roodt, 2009; Moerdyk, 2009; Xiangdong, 2018).

Academic success is seen as the final year mark per module and final year's percentile mark for the M1 year of the candidates. The dissertation mark and the final percentile mark of the full master's degree will also be considered. These become the criterion score in this study.

A competency is defined as personal characteristics that are required for above-average job performance (Weiss & Hartle, 1997). Furnham (2008) lays out the competency along with various collections of knowledge, skills, attitudes and values. This means that a competency encompasses what a person knows, what that person can do, how he/she feels about various issues and his/her values that drive his/her decisions. Competencies as a concept in this study include the list of competencies that have been identified along the competency profile of the IO Psychologist on which the psychometric measures are modelled (Kriek, 2009a; Stevens, 2013).

Additional general constructs are defined as the student who in this case, is an IO Psychology master's student at the research institution for the period, 2012 to 2016.

1.6 RESEARCH DESIGN

The research approach, method, participants, measuring instrument, procedure and statistical analysis are as follows:

1.6.1 Research approach

This study follows a non-experimental quantitative research approach (Tredoux, 2002). Quantitative research involves the collection of numerical data and entails statistical types of analyses (Durrheim, 2006a). A non-experimental approach refers to the researcher not being in direct control of the independent variable (Tredoux, 2002). Richters and Melis (2017) argue that, when non-experimental methods are well designed and applied, they can provide more relevant evidence than experimental designs used in isolation.

1.6.2 Research methods

The research method consists of four parts: sampling, the measuring instruments, the research procedure and the statistical analysis.

1.6.2.1 Sampling

The total research sample consisted of 133 IO Psychology master's students who were or had been students at the research institution between the years, 2012 and 2016. This time frame was used since the competency profile on which the selection competencies are based was established in 2011. The competencies used for selection have not changed since 2011.

The accessible data pertaining to the IO Psychology master's students included their collated PJM scores, their individual sten scores on the VMG3 and the NMG3, their OPQ32r sten scores, their academic results at the end of their M1 and M2 degree components respectively and their overall IO Psychology master's degree academic results.

1.6.2.2 Measuring instruments

The IO Psychology master's students completed two ability tests, namely, the VGM3, the NMG3 from the SHL's Management and Graduate Item Bank (MGIB) and a personality measure, namely, the OPQ32r.

i. Ability tests

The MGIB assessments are commonly applied for selecting and developing graduates along a broad scope in industry (Kotze & Griessel, 2008). SHL's Verify Graduate Ability Test was used to measure verbal and numerical reasoning. Both numerical and verbal tests are regarded as deductive reasoning tests that work on the assumption that problems can be solved by applying previously established rules (Burke et al., 2013). The VMG3 measures the ability to evaluate logic behind different kinds of verbal arguments that are commonly found within the world of work. The NMG3 measures the ability to understand numerical data and to complete relevant calculations that are commonplace within the world of work. The results of the Verify Graduate Ability Tests are presented in two transformed standard score scales, namely, a T-Score and a sten score on which interpretations can be based (SHL, 2007). Studies based on both ability tests have proven predictable, significant and substantial in their correlations with academic success. Their estimated validities range from 0.4 to 0.6 (Kotze & Griessel, 2008; SHL, 2007). In terms of the reliability of the ability tests, Kotze and Griessel (2008) reported on high alpha coefficients (between 0.82 and 0.91) obtained.

ii. Personality measure: OPQ32r

The OPQ32r was developed based on the trait theory of personality and applied a forced-choice method that has normative properties (CEB, 2010). A vital benefit of the OPQ32r is that it is highly reliable (SHL, 2009) with the mean of the Item Response Theory (IRT) composite reliability being 0.84 (SHL, 2009). This assessment provides information on the individual's preferred style of behaviour at work and is thus commonly used for managerial and professional applications. Thirty-two dimensions or factors of an individual's preferences

with regard to behaviour at work make up this occupational model of personality (SHL, 2013), and are referred to in Table 1.5 as follows:

TABLE 1.5: OPQ32r Domain and Sub-Domain Scales (CEB, 2010)

Category 1:	**Relationship with People**
Subdomain 1:	Influence
Scales:	Persuasive Controlling Outspoken Independent-minded
Subdomain 2:	Sociability
Scales:	Outgoing Affiliate Socially confident
Subdomain 3:	Empathy
Scales:	Modest Democratic Caring
Category 2:	**Thinking Style**
Subdomain 4:	Analysis
Scales:	Data Rational Evaluative Behavioural
Subdomain 5:	Creativity and Change
Scales:	Conventional Conceptual Innovative Variety-seeking Adaptable
Subdomain 6:	Structure
Scales:	Forward-thinking Detail-conscious Rule-following
Category 3:	**Feelings and Emotions**
Subdomain 7:	Emotions
Scales:	Relaxed Worrying Tough-minded Optimistic Trusting Emotionally controlled
Subdomain 8:	Dynamism
Scales:	Vigorous Competitive Achieving Decisive

The 32 competencies fall in three main categories, namely, relationships with people, thinking styles and feelings and emotions and their sub-domain scales of Influence, Sociability, Empathy, Analysis, Creativity and Change, Structure, Emotions and Dynamism and the 32 competencies that make up these eight sub-scales (CEB, 2010; Joubert et al., 2015). These broad sub-domain scales are referred to as the “Great Eight” competency factors that have been developed through self-rating and manager ratings of work performance (Bartram, 2005, p. 1185).

According to the Health Professions Council's list of classified and certified psychological assessments, the OPQ32r is a registered psychological assessment (HPCSA, 2014). Results will be shown along the PJM competencies including the essential competencies, the desirable competencies, the less relevant competencies as well as the not relevant competencies as seen in the IO Psychology master's student competency profile. Additionally, Joubert and Kriek (2009) have found a striking similarity between scores of the OPQ32r when having given the test under direct supervision as opposed to completing an online format, as seen in this study. This means that, even though the psychometric measures were presented in an online and unsupervised platform, the results obtained can still be viewed as reliable and relevant for selection purposes.

1.6.2.3 Research procedure

Secondary data were obtained from students who registered for the IO Psychology master's degree at the research institution between the years, 2012 and 2016. The secondary data stem from the selection results based on the criteria that had to be met by each successful IO Psychology master's student. This included the results of their Verify Graduate Ability tests, their OPQ32r results as well as the PJM competency scores. Additional data were sourced from their M1- and M2-year's academic results at the research institution. Special consideration was given to those students who were still completing their degrees, but was taking longer than the initial two years to do so.

It was paramount to gain ethical clearance to access this secondary data set of the IO Psychology master's students from the Research Ethics Review Committee. Ethical clearance was provided (ERC Reference number: 2017_CEMS/IOP_010) (see Appendix A) based on the data remaining anonymous to the researcher. The researcher was therefore not given access to any identifiable data of any of the IO Psychology master's students who were included in the sample.

1.6.2.4 Statistical analysis

Descriptive statistics aim to describe characteristics of the sample and of each of the research variables (Durrheim, 2006a). The variables are the academic results taken at the end of the M1 year as well as the academic results taken from the end of the M2 year spanning over a five-year period. The invariables are the IO Psychology master's students' results on the psychological measures used for selection purposes. This included the Verify Graduate Ability

tests (VMG3, NMG3), the OPG32r scores and the PJM competency scores (scores collated from the Verify Graduate Ability test scores and the OPQ32r).

A multiple regression correlation was applied in order to correlate the dependent and invariables. Here, results that indicate how far the scores lie from the 'best fit' regression line is reported on (Lachenicht, 2002a) in order to determine predictive validity.

1.6.3 Measures to ensure reliability and validity of the study

External validity and reliability were ensured by only giving the researcher access to data that had been anonymised. All the data available had been collected in the same manner, and the assessment data used, had not changed, nor had they been amended in any way. Internal and external consistency were therefore ensured.

The reliability and validity of the psychometric measures used in this study are as follows:

The operational validity of the Verify Graduate Verbal Ability test was 0.50, and its reliability was at 0.81 (SHL, 2007). The estimated operational validity of the Verify Graduate Numerical Ability Test was 0.39, and its reliability was at 0.83 (SHL, 2007). The OPQ32r had been found to be reliable and valid in its researched psychometric properties (Kotze & Griessel, 2008). OPQ32r's IRT composite reliability was 0.84 (SHL, 2009).

1.7 ETHICAL CONSIDERATIONS

Within this research project, the data that were analysed were made accessible to the researcher by the research institution. The researcher could not contact the individual students in any way, as the data did not include the names or identifiers of any of the participating students. Anonymity was further ensured, as no identifiers were provided to the researcher. The statistical program, SPSS, was used to correlate the results of the Verify Graduate Ability tests and the OPQ32r with the academic results of the IO Psychology master's students' M1 results as well as their final results for their degree at the end of M2.

Additionally, a confidentiality agreement (Appendix B) between the researcher and the test publisher was sought in order to verify the responsibilities of both parties involved. Ethical clearance from the participating university's ethical clearance committee was also sought to ensure that the rights of the participants involved were followed and respected.

The secondary data analysis used is commonly found to be used in the identification of knowledge gaps (Stewart, 2012) together with data that was initially gathered for other purposes and made suitable for new research (Ellram & Tate, 2016). The negative aspect of secondary data collection includes a possible difficulty to ensure that the data were collected in an ethical manner (Ellram & Tate, 2016; Steward, 2012). Further considerations include the relevant university's policy on secondary data usage, which was met by obtaining ethical clearance from the relevant research institution.

1.8 REPORTING ON RESULTS

The empirical results of the study are presented in Chapter 3. Descriptive statistics and correlation results are displayed graphically in tables and graphs, and the results are analysed and discussed. The empirical results are displayed in a manner that makes it suitable to be published as a journal article or to be presented at a conference. Chapter 4 is the concluding chapter of this study with conclusions based on the findings, a discussion of the limitations and applicable recommendations for future research.

1.9 CHAPTER LAY-OUT

The structure of this study, in terms of chapter layout, is as follows:

Chapter 2 of this study constitutes a literature review where the variables are described and discussed. These are essential in order to formulate the importance of evaluating the predictive validity of the selection criteria used to establish academic success for the IO Psychology master's students at the research institution.

Chapter 3 is presented as a research article. The methodology, data collection and the statistical analysis are presented as well as the references used. How the selected measuring instruments were applied and how the data was collected are discussed, and the final statistical evidence found is tabled and its significance argued.

Chapter 4 concludes with arguments on the crucial data or lack thereof and possible limitations to the study that may have had an impact on the findings. Further recommendations for both proposed future studies within IO Psychology and recommendations to the organisation in which the research took place are listed.

1.10 CHAPTER SUMMARY

The scientific orientation of this research was outlined in this chapter. Also included are the background and problem statement of this study as well as the general aims and paradigms applied and the research methods used. The chapter layout concluded this chapter.

CHAPTER 2. LITERATURE REVIEW

2.1 INTRODUCTION

The literature review consists of the essential underlying constructs and meta-theoretical constructs pertaining to this study. In order to do so, research was focused on various areas that motivate the importance of such a validity study.

Academic success is defined along with recent trends in research as well as the importance of the need to improve and predict academic success within the South African context. More specifically, the importance of ensuring the academic success of the IO Psychology master's student is discussed. Adding to this, conceptualising validity and its importance in selection testing in South Africa are argued as well as the significance of psychometric measures and its legislative importance in this context.

2.2 ACADEMIC SUCCESS

In recent years, different influencing factors have been found to affect academic achievement. Common factors relied on to understand academic success, including demographic information such as gender and the student's socioeconomic status (Tinto, 1993) as well as high-school completion and academic marks achieved (Jeynes, 2016). Recent trends in research have highlighted other factors that lead to academic success. Throughput rate has also become an important consideration.

2.2.1 Recent trends in research aimed to predict academic success

Killen (1994) concluded that factors that most significantly impact academic success include a person's interest, motivation and self-discipline. Self-concordance, which is the extent to which one's underlying goals fit one's interests and values, is a crucial additional indicator found for academic success (Kale & Etyemez, 2017; Salend & Whittaker, 2017) as well as the student's general emotional intelligence (Parker, Saklofske & Keefer, 2017). The Need for Cognition (NFC) appears to be a newly researched phenomenon in which the academic success of the students is not sorely dependent on their cognition, but how they seek to develop their cognitive profiles through challenging themselves and gaining satisfaction from doing so (Grass, Strobel & Strobel, 2017). Conscientiousness has also been found to be a strong predictor for academic success in post-graduate learning (Kappe & Van der Flier,

2011). These results point to the value of using behavioural or psychological criteria over and above cognitive abilities when selecting students for potential academic success.

Roksa and Whitley (2017) found that motivation to academically succeed, affects some students' academic performance, but appears to be dependent on their ethnicity. Schreiber and Yu's (2016) found in their study at a South African university that the higher-performing students include female and non-Black students, and that females make up almost 70% of the top 20th percentile. The study continues to show that the top 71% of all students are either Indian/White or Coloured students, even though they make up about 53% of the sample of 868 students.

Reflective writing has also been successfully used to predict academic success (Tsingos-Lucas, Bosnic-Anticevich, Schneider, & Smith, 2017). The University of the Western Cape uses reflective writing as a technique in their recognition of prior learning assessments to measure the students' applied competence for alternative access (Cooper & Ralphs, 2016). Essential role models in a student's life have also been indicated as a factor to be considered in academic success. Research on parental characteristics and how parents impact their children's academic success, show the father's educational status as well as the combined monthly income of the parents as the strongest predictors of their children's academic success (Machika & Johnson, 2015; Önder & Şeyma, 2017).

Teachers are relevant role models, and a teacher's communication skills have also been found to impact the academic achievements of students (Khan, Khan, Zia-Ul-Islam & Khan, 2017). In terms of communication, technology has also been found an essential factor to consider in higher education and how the educational institution communicates its business practices and relevant online interventions (Adamiak & Sauls, 2017) including social media support (Akgündüz & Akınoğlu, 2017). In general, listening, reading, speaking and writing skills have been found in a meta-study to impact the academic success of students and their careers once qualified (Biçer, 2017).

Some researchers, however, indicate that personality and cognition outrank experience and previously acquired skills as predictors of academic success. In a meta-study of 19 selection methods taken over 85 years, with the criterion being job and training performance, Smidt and Hunter (1998) found job experience as the lowest predictor and biographical data, conscientiousness, integrity, and cognitive ability tests among the most reliable predictors for success. Cognition far outranked the rest of the predictors (Bartram, 2005; Kotze & Griessel, 2008).

When considering the relationship between cognition and personality, Rammstedt, Danner and Martin (2016) report that conscientiousness and cognitive ability are negatively correlated; this means that individuals with a lower level of cognitive abilities are more likely to plan and organise more often to compensate for their lack of complexity and problem-solving abilities. Regardless, conscientiousness is still found as the best personality trait predictor for academic success (Hakimi, Hejazi & Lavasani, 2011). A definite link between personality and cognition has however been found for openness and emotional stability. The higher the cognitive ability, the more emotionally stable and open to new experience the individual has been found to be (Rammstedt et al., 2016; Von Stumm & Ackerman, 2013).

In light of the findings reported above, it is not surprising that researchers are calling for the inclusion of personality measures together with cognition to predict academic success. Educators can additionally use the data gathered on personality measures to assist the students more appropriately in their learning journeys (Kappe & Van der Flier, 2011).

In this study, personality and cognition are regarded as significant predictors of academic success and become the foundational constructs that are assessed during the selection process of IO Psychology master's students. Personality and cognition are the predictive constructs in this study. The invariables are the IO Psychology master's student's results on the psychological measures used for selection purposes. This included the Verify Graduate Ability tests, the OPG32r scores and the PJM competency scores which are collated from the Verify Graduate Ability test scores and the OPQ32r.

In gaining an understanding from a theoretical perspective around the constructs that predict academic success, it is vital to conceptually consider academic success as the dependent variable in this study. One of the factors used to define academic success, apart from pass rates and actual academic marks, is the throughput rate. Throughput rate within the South African context is discussed next.

2.2.2 Throughput rate in South African higher education institutions

In order to gain a broader perspective of what the South African government has planned for the higher education sector of South Africa, some focal points need to be highlighted as presented in the National Development Plan (NDP) (2013). The NDP seeks to eliminate poverty and reduce inequality by enabling citizens to become active champions of their own development with governmental support to improve their capabilities. Universities and education providers are seen as the key to developing South Africa and are motivated to do

this by increasing the participation rate in higher education by 30% (NDP, 2013). Massively expanding enrolments into higher education by almost 70% is at the forefront throughout in order to promote lifelong learning and personal development towards a stronger South African economy (NDP, 2013). Apart from increasing participation and enrolment rates, the overall envisioned throughput rate by 2030 stands at 80% (NDP, 2013). Educational institutions will, therefore, be monitored on their performances, based on the throughput rate of their graduates (NDP, 2013).

The throughput rate is calculated by taking the number of first-time undergraduate students and tracking them to see how many have completed their studies within the timeframe made available to them (Council on Higher Education and Training [CHE], 2014). The CHE (2014) reported that the 2007 first-year students in higher education had a pass rate of 50%, in 2008 it rose to 53% and again in 2009 it went back to being 50%.

Of relevance to this study, the master's degree enrolments at South African higher education institutions totalled a number of 43,723 enrolments in 2009, and in 2014 the enrolment number rose to 53,675. More specifically, the throughput rate for coursework master's degrees with the first year of enrolment being in the year 2009, constituted 56% graduates whereas 44% of the 2009 first-year students appear to have dropped out (CHE, 2014). This is in line with Cilliers and Harry's (2012) study on the throughput rate of IO Psychology master's students that was found to be 60%. As part of the Department of Higher Education's (2015) strategic plan, an academic success rate of 78% was envisioned for the 2018 academic year.

A 78% throughput rate was therefore expected by the DHET in 2018 for all higher education qualifications, which in terms of the 60% throughput rate of IO Psychology master's students in 2012 (Cilliers & Harry, 2012; DHET, 2015) was an increase of 18%. This leads to the task to increase the academic success of the IO Psychology master's students, which is discussed next.

2.3 THE IMPORTANCE OF ACADEMIC SUCCESS OF THE INDUSTRIAL AND ORGANISATIONAL PSYCHOLOGY MASTER'S STUDENT

A needed increase in overall throughput and academic success is highlighted in the South African National Development Plan (NDP, 2013), as also stated by the relevant quality council of higher education (CHE, 2014) and the DHET (2015). The importance of skills development in South Africa is discussed as part of the broader socio-economic context indicating a progressively pertinent need for IO Psychology skills in the workplace.

2.3.1 Skills development in South Africa

South Africa is seen as a country that struggles with skill shortages, which negatively impact the country's targeted growth rate of six per cent (Erasmus & Breier, 2009). In reaction to this, one and a half per cent of the South African Gross Domestic Product (GDP) is annually allocated to skills development in the form of tertiary training and education initiatives (Engelbrecht, 2017).

The White Paper on Higher Education and Training (DHET, 2013; 2018) states that education and training should be coordinated with the needs of society in mind. The socio-economic context thus determines which skills and competencies are required to address the resource needs in society. These skills and competencies then need to inform programme development within higher education and research institutions (DHET, 2014; NDP, 2013). Admission requirements need to be additionally set to predict the academic success of the student as far as possible for the intended qualification (DHET, 2005).

Skills development in South Africa needs to focus on what the current and future world of work demands to ensure economic growth. A look at the need for competent IO Psychologists within the South African workplace is outlined next.

2.3.2 The importance of Industrial and Organisational Psychologists in the workplace

Workplace changes are called for in South African companies including applying more of 'the internet of things' (IoT) solutions to managing the workforce, ensuring a quality experience of the employee, promoting a healthier mindset and boosting increased collaboration of skilled employees to find solutions to the changing world of work demands (Trim & Leap, 2018). IO Psychology is a specialisation field that concerns itself with identifying and finding solutions to these national and global demands of societies and organisations as they deal with constant change (Schreuder & Coetzee, 2010). A particular focus on trying to predict work behaviour within organisations has been found when looking at research that has been completed in the field of IO Psychology in recent years (Schreuder & Coetzee, 2010).

Although the IO Psychologist is not listed amongst the top one hundred skills desperately needed in South Africa (DHET, 2018), it is listed as a highly sought after skill in other countries (Australian Visa Bureau, 2013). The need for skilled IO Psychologists in the new world of work has been emphasised by many (Gratton, 2011; Lawler, 2011; Maitland et al., 2011; Schreuder & Coetzee, 2010; Van Vuuren, 2010). Guest and Kriek (2017) wrote that, due to South Africa

having come from a past that is riddled with inequality, the South African IO Psychologists are set in a unique world of work where they can take part in the diversity and transformation that is steering South Africa towards change.

With regard to the future world of work, the IO Psychologist is additionally challenged with finding new solutions to the currently evolving and future work environments nationally and internationally (Gratton, 2011; Lawler, 2011; Maitland et al., 2011; Omarjee, 2015; Van Vuuren, 2010). Van Vuuren (2010) lists the multidisciplinary character of the IO Psychologist to include personnel, organisational, career, consumer psychology and psychological assessment as well as the interdisciplinary roles that stem from IO Psychology bridging the gap between psychological science and economic and business sciences. SIOPSA further outlines IO Psychology as working within a multidisciplinary environment (Landy & Conte, 2016). When considering the future world of work and its upcoming changes, the IO Psychologist is now challenged to meet these demands in not only one discipline but many specialist disciplines from an organisational management perspective as well as the psychological perspective of the science of behaviour at work (Landy & Conte, 2016; Van Vuuren, 2010). It is therefore essential to increase the throughput rate in IO Psychology master's programmes not only to meet legislative and strategic visions for South Africa but also to address the need for IO Psychologists' competencies in managing talent and change. Guest and Kriek (2017) provide the following statistics:

In 2007, 1123 IO Psychologists and 274 interns were registered with the HPCSA. To date, a total of 11,931 psychologists are registered with the HPCSA, but this number includes other categories outside IO Psychology (HPCSA, 2017). This number of registered psychologists is said to grow in the future to meet the demands that industry places on psychology in general (Guest & Kriek, 2017). In response, 14 South African Universities offer IO Psychology-related qualifications in light of the need to train and aid in the registration of the IO Psychologist (Guest & Kriek, 2017).

To guarantee the increase of IO Psychologists in the South African workplace, valid selection measures need to be employed in order to predict the academic success of the IO Psychology master's student effectively. An increase in the throughput rate of IO Psychology master's students should also be ensured to meet both legislative requirements driven by the need for socio-economic development and workplace demands in terms of human capacity development and management. The importance of ensuring the validity of psychological measures applied for selection purposes is discussed in the following section.

2.4 VALID SELECTION PROCEDURES

One of the critical themes in best practice psychological assessment is grounded in the validity of the measures used (Schmidt, 2006). Validity is concerned with what the test measures, and how well it is done. Validity should not be regarded as a particular property of a measure, but rather for a specific purpose. This means that if a personality measure is applied, this measure should not test something else other than personality (Foxcroft & Roodt, 2009; Kriek, 2009a; Roodt, 2009; Salkind, 2016). There are three types of validity; namely, content, construct and criterion validity (Foxcroft & Roodt, 2009; Salkind, 2016). Sections on a brief history of psychological assessments in South Africa, understanding validity and validity in terms of job relevance follow below.

2.4.1 A historical overview of psychological assessments in South Africa

Psychological measures in South Africa developed similarly to those in Europe and in America, but the significant difference was the context in which these developments took place (Claassen, 1997; Foxcroft & Roodt, 2009). The context that informed the development of South African psychological assessments was the apartheid regime, the era of racial discrimination segregated along racial boundaries (Ferreira, 2016; Claassen, 1997).

As early as 1915 researchers in South Africa worked on intelligence measures and consistently used the scores that were normed for white children, proving the superior intellect of white children in comparison to black children's intellect (Laher & Cockroft, 2014). This was mainly due to the fact that most psychological measures were developed exclusively for the white population where only a few were developed for the black population of South Africa (Claassen, 1997; Roodt & Foxcroft, 2013). Racial inequality was, therefore, in the foreground and has unwittingly informed the future segregation models that the apartheid era was commonly known for (Foxcroft & Roodt, 2009; Roodt & Foxcroft, 2016). During the apartheid years (1952-1994) psychological measures were further adapted and standardised for the white population and were applied to reach decisions about the black test-takers in order to prove white superiority (Ferreira, 2016). Later, sanctions imposed on South Africa due to its practice of apartheid, forbade South African psychologists to use international tests. From the 1980s onwards, as the struggle to fight apartheid heightened in its momentum, and when the international voice grew louder, issues of measurement bias, equivalence and fairness became increasingly evident. The Senior South African Individual Scales-Revise became the first normed test that included a norm group for "environmentally disadvantaged" children, but it was still only available in English and Afrikaans (Foxcroft & Roodt, 2009; Laher & Cockroft,

2014). Following this, during the 1980s and 1990s, the General Scholastic Aptitude Test and the Ability, Processing of Information, Learning Assessments (APIL-B) could further be applied to various cultures (Laher & Cockroft, 2014).

After the era of apartheid had been abolished in 1994, a new turn within psychological assessments and its use was evident but slow in its uptake. Since psychological assessments, especially cognitive assessments were used by the South African apartheid government to justify cultural segregation, the local population of the new free and democratic nation was untrusting towards the use of psychological measures in general (Laher & Cockroft, 2014). Similar opposition to the use of psychological measures was seen in the United States in the 1970s (Claassen, 1997). In South Africa, the banning of psychological assessments was seen in the first draft of the Employment Equity Act (EEA) No 55 (1998) that was later amended to be used if it has been proved to be valid, reliable, fair and unbiased (Foxcroft & Roodt, 2009; Laher & Cockroft, 2014). Additionally, the banning of school readiness assessments was seen in several South African provinces because it was argued that it favoured the white applicant over the back applicant (Claassen, 1997; Foxcroft & Roodt, 2009). Even though legislation sought to protect its citizens against the improper use of tests, commonly applied tests had still been found to only be available in English and Afrikaans with culturally biased test items throughout. No central control agency seemed capable of regulating its use until the formation of the Psychometric Board in 1996 (Laher & Cockroft, 2009). After the establishment of the Psychometric Board, measures could be classified as psychometric, and various companies and institutions across South Africa began once again to research tests and assessments within the South African context whilst being guided by the new legislation (Laher & Cockroft, 2014). However, the disjointed information gathering through different sources aimed at pushing their revised assessment forward is still causing contention among academics and test users (Claassen, 1997; Laher & Cockroft, 2014). Assessments are now viewed for what they should be used for with regard to development, growth and potential fulfilment rather than applying them as an exclusionary function (Ferreira, 2016; Roodt & Foxcroft, 2016).

Now that the historical importance of ensuring validity has been highlighted, conceptualising what validity is and how it can be ensured are outlined in the following section.

2.4.2 Conceptualising Validity

Salkind (2016) points towards three essential aspects to consider when forming the idea of what validity is. One, validity refers to the results of the measure or test and not the measure or test itself. Two, the results show a degree of validity only. Either there will be a high validity

or a low validity, but never a score to show validity or no validity at all. Lastly, the results of the measure or test should be regarded within the context in which the study occurs (Salkind, 2016). In this case, the context of the study is the selection assessment of IO Psychology master's students only. The results should therefore not be generalised into other contexts other than the one in this study.

Assessment decisions are mainly based within the positivist science that applies mathematical equations to reach an objective conclusion rather than one based on values and opinions. With regard to the types of validity available, content-, construct- and criterion-related validity have been in use since the 1950s and are still widely accepted (Roodt, 2009; Schmidt, 2006). Content validity is a non-statistical type of validity and is used to determine whether the content of the measure adequately represents the sample of the aspects to be measured. In other words, does the sample of questions selected measure what it intends to measure (Foxcroft & Roodt, 2009; Salkind, 2016). Construct validity refers to the extent to which the theoretical construct, problem-solving, for example, is measured (Roodt, 2009; Salkind, 2016). Thirdly, criterion validity involves the correlation coefficient that is calculated between the predictor(s) and the criterion. In this study, the predictive validity of the psychometric measures is measured by focusing on future performance prediction (Salkind, 2016). The predictors, in this case, were the psychometric measures that were made up of the Verify Graduate ability tests and the OPQ32r. The criterion was academic success. According to Schmidt (2006), not all three validity types need to be used to prove validity but should be used as different types of evidence that are best applied in conjunction with others to contribute to the judgement of validity of a measure (Roodt, 2009).

When regarding selection practices within a multicultural and diverse pool of applicants within the South African context, as was the case in this study, valid selection procedures that add value do not discriminate unfairly and minimise adverse impact (Theron, 2009).

In response to the unfair use of psychological measures as seen in South Africa's controversial history, legislation and professional guidelines have been promulgated in order to protect the country's citizens against inequality and to promote fairness, validity, reliability and most importantly accountability during all applied psychological assessments, especially in the workplace (Foxcroft & Roodt, 2009). These legislative and professional guidelines are discussed in more detail below.

2.4.2 Valid and job-relevant psychological assessments: a legal imperative

Selection assessments are used to separate the successful applicants from the unsuccessful ones. This is the case when there is a higher pool of applicants than there are vacancies available within a company or, in this case, an academic programme (Kriek, 2009b). Another purpose for selection assessments is to find proof that a competency is present and to what degree in order to aid the decision process (Wilcox, 2016). Therefore, the evidence or proof thereof should be trusted in order to inform value-added decision making along who should be accepted and who should be rejected. Specific legislative guidelines have been put in place to ensure that this is the case.

In reaction to this history of bias and discrimination, the primary South African legislation governing occupational assessment became the EEA (1998). It has the dual objective of ensuring that only valid and reliable assessments are used and that assessments are used in a fair manner and are free from bias and unfair discrimination. The Employment Equity Act (1998, p. 14) specifically states that:

> (1) No person may unfairly discriminate, directly or indirectly, against an employee, in any employment policy or practise, on one or more grounds, including race, gender, sex, pregnancy, marital status, family responsibility, ethnic or social origin, colour, sexual orientation, age, disability, religion, HIV status, conscience, belief, political opinion, culture, language or birth.
>
> (2) It is not unfair to discriminate to –
>
> a) Take affirmative action measures consistent with the purpose of the Act, or
> b) Distinguish, exclude or prefer any person on the basis of an inherent requirement of a job."

On page 15 of the EEA (1998), it continues with:

> Psychological testing and other similar assessments of an employee are prohibited unless the test or assessment being used –
>
> c) Has been scientifically shown to be valid and reliable,
> d) Can be applied fairly to all employees and
> e) Is not biased against any employee or group.

Furthermore, according to the Health Professions Act, No 56 (1974a), Section 37 (2) (a), (b), (c), (d) and (e), a psychological act with respect to assessment is defined as being:

> f) The use of measures to assess mental, cognitive, or behavioural processes and functioning, intellectual or cognitive ability or functioning, aptitude, interest, emotions, personality, psychophysiological functioning or psychopathology (abnormal functioning).

Since psychological measures are used as part of the selection assessment battery of the IO Psychology master's students, the EEA (1998) as well as the Health Professions Act (1974a) and its guidelines come into effect. This means that it needs to be ensured that the psychological assessment measures that are used for selection are valid and reliable as well as non-discriminatory. Additionally, the EEA (1998) stipulates job relevance as a fair discriminator, yet, even though the current assessment is based on a thorough job profile, no data has yet been examined to determine the psychological assessment measures' utility in identifying successful IO Psychology students. It becomes the responsibility of, in this case, the research institution, that discrimination is fair and based on the essential requirements of what is to be expected of the IO Psychology master's student (Rheeder, 2018). Rheeder (2018) continues that, if an applicant who is not of the employ of a company can prove that he/she has been assessed unfairly and/or has been discriminated against, he/she has the mandate to involve the Commission of Conciliation, Mediation and Arbitration (CCMA) to represent them against the employer who has to prove that this is not the case. The only case in which the CCMA can be involved is in the case of an applicant that is not a current or recent employee of the company or institution that the arbitration is taken up against.

Another point is to be made about the general ambiguity of the IO Psychologists' multiple roles within industry (Van Zyl, Nel, Stander & Rothmann, 2016). The definitions of the IO Psychologist are wide-ranging and can lead to a professional identity confusion (Van Zyl, Stander & Coetzee, 2013). To ensure the survival and to distinguish the profession of the IO Psychologist from similar professions such as the Human Resources Profession in South Africa, a clear and purposeful profile of the IO Psychologist is needed to ensure this (Moyo, 2012; Van Zyl, Nel, Stander & Rothmann, 2016). Since the competency profile of the IO Psychology master's student is based on a thorough job profiling session by current working IO Psychologists within industry as well as IO Psychologist scholars in academia, the job relevance of the selection assessments was ensured to add to the validity of this study (Viviers & Van Niekerk, 2012).

It is vital to validate the selection assessments along the purpose for what it was designed to remain in line with the EEA. Schmidgall (2017) points to two aspects that need to be considered in relation to a validity study. One, do the scores obtained in the selection assessment mean what they are supposed to mean, and two, do the selection assessments meet the purpose for what they are used for. Schmidgall (2017) continues to argue that the outcome of the selection assessments should be beneficial to the stakeholders in question. The stakeholder, in this case, is the IO Psychology master's student. The benefit here refers to the selection assessment measuring what is required to be successful in the programme. If for example a student is given access to a programme but does not meet the inherent programme requirements, the student is being set up for failure. This then is not beneficial to them, and in this case the selection assessment may be deemed ineffective. If it is found to be ineffective, one could argue unfair discrimination against the test user and infer the selection assessments to be not valid or reliable along the intended purpose of selection assessments. This would then lead to a direct contravention of the EEA.

To safeguard effectiveness and to ensure fair discrimination in their selection, a CBA approach was used by the research institution to ensure that the selection of IO Psychology master's students measures the candidates' competencies along the inherent programme requirements. Competency based assessments are used to ensure job relevance by linking assessment measures to the inherent job requirements (Potgieter & Van der Merwe, 2002; SHL, 2011b).

2.5 COMPETENCY-BASED ASSESSMENT

Within the current and future world of work, a competent workforce is said to be essential in organisational strategy, in order for the organisation to remain competitive (Potgieter & Van der Merwe, 2002). Competency-based assessment is thus used to measure a person's performance along with inherent job requirements (Potgieter & Van Der Merwe, 2002), thus guiding adherence to Clause 6 par 2 of the EEA (1998).

Building on McClelland's (1973) initial idea of a competency, Wilcox (2016, p.83) defines a competency as follows:

> "The combination of observable and measurable knowledge, skills, abilities and personal attributes that contribute to enhanced employee performance and ultimately result in organisational success."

Using the assessment of talent as an example, Wilcox (2016) argued that, in order to assess talent effectively, a recruiter would first screen the candidate's curriculum vitae for language and essential technical expertise. The specific attitudes and skills that are required for the candidate to be successful and how these are transferable to the new job refer to the candidate's competencies. When selecting a new candidate, it is often good practice to measure him/her against the competency framework of the organisation that includes predefined levels of performance that the candidate has to measure up against. Competency modelling is the process that builds such a framework and entails identifying, defining and measuring the criterion sample, which then becomes the competency to be measured (Bartram, 2004; Schippmann et al., 2000). In this case, the competency model that was used to select the IO Psychology master's students was based on pre-defined levels of performance. This performance was measured by the psychometric measures and also reflected in the candidates' PJM scores.

Before discussing the scores of the competencies measured, we need to understand what a competency is and how it is applied in the workplace. This is done through considering the historical development of competencies to build a clearer understanding of this term and how it is relevant to this study as well as how CBA is being applied in the workplace.

2.5.1 The historical development of competencies

David McClelland (1973) is credited for the term, competency modelling, regardless of him failing to clearly define the term, competency, in his first paper. His initial stance criticised the use of intelligence testing as a means to measure performance outside educational applications, and he started to advocate the use of psychometric testing. Here, criterion samples that were used to differentiate between good and poor performance became the competency that was used as a prerequisite for good performance (Moerdyk, 2009; Stevens, 2013). Raisova (2012) describes competencies as stable characteristics of a person's behaviour. If the level of the competency is known, the assessor can then anticipate the quality of human behaviour along the measured competency, which is the measured criterion samples. In a study done for the United States, Ennis (2008) defined competencies as structures of six to nine core competencies linked to the role of the job. The competencies are commonly made up of personal characteristics, physical attributes, internal and external constraints as well as environments and relationships that relate to the job. The first competency test was done by McClelland (1973) where the individual characteristics of an employee were analysed to predict his/her success and performance in the workplace. In this study a number of competencies were identified as desirable for the future IO Psychologist

through a competency modelling process that became the IO Psychology master's competency profile (Kriek, 2009a; McClelland, 1973; Stevens, 2013).

McClelland (1973) began to highlight the need for competencies and that a detailed job analysis should form the basis to inform the competencies required for good job performance. This is what he referred to as competency modelling. McClelland (1973) continued to outline that competencies are taken from what a person actually does in a job in order to begin developing the competency model used to measure good performance for that role. These tasks that inform what the individual actually does become the criterion samples that are then incorporated into the assessments as competencies. This, in turn, contributes to the face validity of the measure or test (Stevens, 2013).

McClelland (1973) began to recognise that competencies needed to be applicable for more than just one job role and championed the use of broader competencies that could encompass more general performance outputs as a competency. Best practice in competency modelling would then include ensuring that a thorough job analysis or job profile is conducted before choosing the competencies to be measured (Bartram, 2004; Schippmann et al., 2000; Stevens, 2013).

Areas of research that came additionally to that of McClelland included assessing managerial performance and defining core competencies (Stevens, 2013). Assessing managerial performance was researched along with competencies required rather than tasks that needed to be completed by the managers. These competencies that were identified as required for managerial performance were not always observable but included interpersonal skills such as teamwork and building relationships. In this study, a job profiling session asked IO Psychologists job-related questions about the skills, abilities and knowledge that an IO Psychologist would need to succeed within the job (Sackett & Laczo, 2003; Stevens, 2013; Viviers & Van Niekerk, 2012). Core competencies were contributed to the work of Parhalad and Male (1990), which are seen to exist at the organisational level and not at the job role level. The core competencies of Woolworths Ltd Australia, for example, include world-class supply chain, branding and marketing, innovation and integration that are at organisational level (Uddin, Hassan & Arafat, 2012).

2.5.2 Competency-based assessment in the workplace

Various types of competency-based assessments are available, including case studies, in-basket exercises, job sample tests, portfolios, questioning or structured interviews, projects

and assignments, simulation exercises and trainability tests (Potgieter & Van Der Merwe, 2002). In this study, psychometric measures were included in the competency-based assessment battery and constituted the focus of this study.

There are two best-practice considerations with regard to competency models, one being the appropriate identification of the competency and the second being the construction of the competency model (Stevens, 2013). Since McClelland's (1973) call for the use of job analyses as the basis of identifying competencies, it comes as no surprise that job analysis has been taken as a best practice technique from the onset (Stevens, 2013). The design of competency models should be conducted by a trained professional and not be seen as a quick and easy method conducted by someone that has little to no training (Foxcroft et al., 2009; Schippmann et al., 2000; Stevens, 2013).

To ensure job relevance, the competency profile of the job is built from taking the organisational context into consideration in which the job is to be performed. Valuable input received form executives and managers about what they deem essential for that job are added to the behavioural event interview in order to gather the necessary detail about the job. The final job profile is then put together, which detail the critical and required competencies for good performance (Campion et al., 2011).

Psychometric tests used in isolation often fail to measure competencies that are linked to job performance, but they remain a valuable tool to measure a more significant number of candidates in an objective way (Potgieter & Van Der Merwe, 2002) and are frequently included as part of a CBA assessment battery.

Within the South African work context, using psychometric measures in a CBA battery during selection is highly valuable in that they remain in line with the EEA's stipulation that psychological assessments used, need to be valid as well as based on the inherent job requirements (EEA, 1998). By using psychometric competency-based assessments, the user can now cut across gender, racial and cultural differences (Potgieter & Van Der Merwe, 2002), which makes this an invaluable approach.

2.6 CHAPTER SUMMARY

In this chapter, the dependent variable relevant to this study, which is academic success, was discussed, and the invariables that are made up of specific behavioural, personality and

cognition competencies were outlined. This chapter followed a structured approach to understanding these constructs and how they apply in this study.

Academic success was described according to findings from recent research in terms of predictors of academic success as well as the legislative requirements that constitute academic success according to the CHE. The literature review regarding predictors concluded that cognition and personality measures combined are the best predictors of the academic success of a student. The throughput rate, which is the academic success rate measured by the CHE, for coursework master's degrees that was lastly reported on by the CHE in 2014 was at 56%. An increase up to 78% in throughput was expected by the DHET by 2018. This means that cognition and personality measures should be applied to predict the academic success of IO Psychology master's students by 22% and higher.

Another essential part of the academic success of the IO Psychology master's students was discussed in the context of much-needed skills development in South Africa and the importance of the IO Psychologist in the workplace. The importance of the IO Psychology professionals in South Africa and globally is additionally motivated by the changes that the world of work predicts as well as by seeking new ways to meet South African industry demands in order to remain competitive with the world market (Gratton, 2011; Lawler, 2011; Maitland et al., 2011; Omarjee, 2015; Van Vuuren, 2010).

The importance of validity was also discussed with particular reference to how the current validity requirements are meeting the need of post-apartheid South Africa and how this is informed by current legislative requirements with regard to psychological assessment measures and CBAs. In this case, the IO Psychology master's selection assessments should be ensured to be proven valid in predicting academic success at the research institution.

A detailed look was taken at what constitutes a competency, how and why it was developed and applied in the psychometric measures as seen in this study, and how it is best used in practice when using competency modelling and psychometric measures.
In conclusion, the importance of predicting the academic success of the IO Psychology master's student within the South African context is evident in terms of industry demands and meeting the high throughput rates expected in 2018. Adding new data regarding which competencies aid the better prediction of academic success for future selection at the research institution can only be received positively, whilst taking into account the importance of validity studies and psychometric selection practices to measure job relevance and future academic performance.

CHAPTER 3. ARTICLE

SELECTION OF INDUSTRIAL AND ORGANISATIONAL PSYCHOLOGY MASTER'S STUDENTS: EXPLORING THE VALIDITY OF APPLIED PSYCHOMETRIC MEASURES

Abstract: The objective of this study was to investigate how well the academic performance of the Industrial and Organisational Psychology master's students at a research institution can be predicted by psychometric measures.

Orientation: Predictions around what the future world of work will look like, include changes in job security due to increased automation, a war on talent by organisations to remain competitive and managing diverse cultures and individuals. A pivotal figure to aiding organisations in managing these challenges is the Industrial and Organisational Psychologist. A valid method to select Industrial and Organisational Psychology master's students is therefore essential to lead the way towards the adequate training and development of competent Industrial and Organisational Psychologists.

Research purpose: The purpose of this study was to validate the psychometric measures included in the selection assessment of Industrial and Organisational Psychology master's students at a higher education institution. This includes investigating how well the applied psychometric measures of cognition, personality and the Industrial Organisational Psychology master's students' competency profiles predict their academic success.

Motivation for the study: The Employment Equity Act (1998) requires all psychological assessments applied in the work context, to be valid, reliable and culturally fair and to be based on the inherent requirements of the job. Context-specific validation studies such as that of the current Industrial and Organisational Psychology master's selection assessments are therefore imperative.

Research design: A non-experimental design was applied to secondary data of N=133 registered Industrial and Organisational Psychology master's students at the research institution. The data included the results of the psychometric measures included in the selection battery between the years, 2012 and 2016, as well as academic success results. The data were analysed by means of descriptive and correlation statistics.

Main findings: The results relating to the relationships between the psychometric results and academic success of the Industrial and Organisational Psychology master's students at the research institution included the following findings:

A small, but definite relationship was found between the sten scores of the cognition measures and academic success. Only one sub-domain of the personality measure displayed a small but definite relationship with academic success. No relationship was found between the overall Industrial and Organisational Psychology master's students' person-job-match competency score and academic success. The competencies that displayed a relationship with academic success mostly contained scores from both the personality and cognitive measures.

Practical implication: A review of the Industrial and Organisational Psychology master's students' competency profiles would be valuable in order to re-align this to the future world of work demands as well as training requirements. A separate weighting to the ability tests and another weighting to the person-job-match competency profile are strongly recommended. It is also recommended that the competency-based interview, the article assignment and the previous academic marks be included in a follow-up validation study. Lastly, it would be valuable to conduct research on the personality preferences of students who complete their studies within four years versus those who struggle to complete the qualification for additional predictive competencies.

Contribution/value add: The results of this study should be considered when regarding the Industrial and Organisational Psychology master's students' selection criteria for the next intake of students. Even though the Industrial and Organisational Psychology master's students seem to do well in their M1 year, a drop in throughput is evident in the M2 year. Recommendations are made with regard to revising the Industrial and Organisational Psychology master's student competency profile against which new students are selected. This should be done to increase a higher probability of these students succeeding in passing both the M1 and M2 years so that more Industrial and Organisational Psychology master's students can meet the training requirements of the coursework master's at a higher education institution.

Keywords: World of work; Academic success; IO Psychology master's student; Graduate Verify Numerical Ability test; Graduate Verify Verbal Ability test; OPQ32r; Validity; Competency-based assessment; Competency; Person Job Match; Selection

3.1 INTRODUCTION

The future world of work includes several challenges to human resources and talent management. In particular, managing talent in the workplace will be confronted by machine intelligence exceeding human capability; political uprising driven online; virtual reality and artificial intelligence moving into the space of academia and research and technology, in general, becoming the primary source to finding solutions to global crises (Franklin, 2017; Spreitzer, Cameron & Garrett, 2017; Xu, David & Kim, 2018). It is predicted that over 26 billion devices will be connected through the internet of things (IoT) by the year, 2020, replacing many current jobs and creating new ones (Morgan, 2014). The fourth industrial revolution or otherwise referred to as the digital revolution is said to be the cause of this rapid change in industry (Xu et al., 2018). Moreover, the uncertainty of the future world of work remains real (Omarjee, 2015) in the context of rising oil prices and the depletion of natural resources (Gratton, 2011; Maitland et al., 2011).

In addition to the global and technological changes that are impacting the employee and the organisation, research scrutinising the changing face of the workforce has pointed towards a slowly declining birth rate, an ageing workforce, a global lack of skilled employees and increased cultural diversity (Ganaie & Haque, 2017). Due to the lack of highly skilled employees to face this technologically-driven future world of work, organisations are at war for talent to remain competitive and relevant (Ganaie & Haque, 2017; Wilcox, 2016). Branson (2014) writes that an organisation is only as strong as its people and that selecting talent and putting employees at the centre of the business are central to remaining viable and successful. One discipline that is dedicated to providing evidence-based data to improve organisational effectiveness is the field of Industrial and Organisational (IO) Psychology (Salas, Kozlowski & Chen, 2017). The IO Psychologist plays a vital role in helping organisations understand the impact of the digital revolution that is currently disrupting every industry in every country along the entire system of management, governance and production (Xu et al., 2018). The Society of Industrial and Organizational Psychology (SIOP) in the United States of America defines the role of the IO Psychologist as someone that works with individuals, organisations and society as a whole, understanding systemic interdependence as well as recognising the effects that political influences, consumers and skill shortages have on the future world of work (Landy & Conte, 2016). IO Psychology is the scientific study of individual, group and organisational behaviour in the workplace and is aimed at optimising performance throughout (Cilliers & Flotman, 2016). The IO Psychologist is additionally tasked to help his/her clients manage talent resources (Ganaie & Haque, 2017; Theron, 2009; Wilcox, 2016), ensuring a work environment that is focused on the well-being and individuality of the employee (Lawler,

2011; Van Vuuren, 2010) and on challenges that the employee faces outside of the work environment (Barkhuizen et al., 2014; Landy & Conte, 2016).

Before someone attains the role of an IO Psychologist within the South African context, strict educational and professional registration requirements have to be met as detailed in the Health Professions Act, No 56 of 1974. An individual is required to complete an associated bachelor's degree, a relevant honours degree and a coursework master's degree as well as a 12-month supervised internship before he/she is allowed to write the final Board exam to register as an IO Psychologist in South Africa (Cilliers & Flotman, 2016; HPCSA, 2017). With relevance to this study, the coursework master's degree is structured into two parts, one being the coursework year that is referred to as the M1 year and the second part is the M2 year that encompasses the dissertation section, spanning from one to three years (Cilliers & Flotman, 2016; Viviers & Van Niekerk, 2012). The M1 year consists of five academic modules including Career, Personnel and Organisational Psychology as well as Psychometrics, Psychological Research and Personal Growth (Cilliers & Flotman, 2016). The M1 and M2 parts each contribute 50% towards the final mark for the degree (Cilliers & Flotman, 2016; Viviers & Van Niekerk, 2012). In their 2016 study, Flotman and Cilliers raised concerns that, even though most of the selected students in the IO Psychology coursework master's degree seemed to have passed the M1 part of the degree, only 60% of these students completed the M2 part of the programme, resulting in an overall lower throughput rate. This finding mirrored Cilliers and Harry's (2012) study of the throughput rate for the same qualification.

To build the capacity of qualified IO Psychologists in the world of work, research institutions need to select the best suitable candidates to ensure that the students have the ability to complete the qualification successfully and at the standard of the institution (Taylor, McManus & Davison, 2018). Having a valid selection procedure to select students who meet the requirements of the M1 and the M2 years successfully is imperative. The aim of this study was to investigate the predictive validity of the psychometric measures that are currently used as part of the assessment battery applied to select IO Psychology master's students. The successful completion of the IO Psychology master's degree is referred to as academic success in this study.

3.1.1 Predictors of Academic Success

Common factors that are traditionally related to predicting academic success include the students' socio-economic status and biographical details (Tinto, 1993) as well as the academic marks that they achieved during their schooling (Jeynes, 2016). Although these factors remain

regarded as valid predictors of academic success, recent research points to a variety of factors relating to the prediction of academic success. These include the students' interests and motivation, self-concordance, emotional intelligence, challenging themselves cognitively, conscientiousness, ethnicity, gender, reflective writing, stable role-models, parental support, communication skills, technological competence, support received and the general communication skills of the students and teachers (Adamiak & Sauls, 2017; Akgündüz & Akınoğlu, 2017; Bartram, 2005; Biçer, 2017; Grass, Strobel & Strobel, 2017; Kale & Etyemez, 2017; Kappe & Van der Flier, 2011; Khan, Khan, Zia-Ul-Islam & Khan, 2017; Killen, 1994, Kotze & Griessel, 2008; Machika & Johnson, 2015; Önder & Şeyma, 2017; Parker, Saklofske & Keefer, 2017; Roksa & Whitley, 2017; Salend & Whittaker, 2017; Schreiber & Yu's, 2016; Schmidt & Hunter, 1998; Tsingos-Lucas, Bosnic-Anticevich, Schneider & Smith, 2017).

Of importance to this study, in a meta-analysis of 19 selection methods taken over 85 years with the criteria being job and training performance, Schmidt and Hunter (1998) found job experience as the lowest predictor and biographical data, conscientiousness, integrity and cognitive ability among the most reliable predictors for academic success. Cognition far outranked the rest of the predictors in the meta-study (Bartram, 2005; Kotze & Griessel, 2008). It comes as no surprise that the inclusion of personality measures combined with measures of cognition are commonly used for selection assessment for access to training programmes (Kappe & Van der Flier, 2011). Additionally, the general mental ability or what is commonly referred to as a person's intelligence is the "most validated individual differentiating construct in psychology" (Puchert, Dodd & Viljoen, 2017, p.1). Mathematics as a problem-solving ability has further been found to be a strong predictor for academic success and is motivated by Puchert et al. (2017) to be a critical part of the selection criteria for post-school training programmes. The study additionally adds that secondary training can be used as a useful pre-screening tool to admit candidates into higher-level training programmes.

One of the factors that has been used to define academic success, apart from pass rates and actual academic marks, is the throughput rate. One method of approaching throughput is regarding the students that have completed their studies within the specified time frames that are provided for a programme (Council on Higher Education and Training [CHE], 2014), where the other method is to consider the percentage of students that have completed their qualification regardless of having achieved this within the time frame that has been provided. In this study, throughput is regarded as the rate at which the student completed the qualification within the time frame provided by the research institution. The Department of Higher Education and Training's (DHET) strategic plan for 2018 required that academic success rates should be at 78% within registered higher education programmes (DHET,

2015). The latest statistics that are available for the academic success rate of the coursework master's degrees within South Africa sits at 56% in 2009 after the first year of enrolment (CHE, 2014). This means that the DHET required an increase in throughput rate within the coursework master's degree at South African Universities by 2018.

Academic success is commonly predicted through the use of cognitive assessments primarily and secondarily, combined with personality assessments to ensure a high throughput rate. When cognitive and personality assessments are used for selection, which is the case in this study, the validity of the specific measures used, remains essential.

3.1.2 Validity

Psychometric measures form part of the competency-based assessment battery that is currently applied in selecting IO Psychology master's students at the research institution. Specifically, this includes a personality measure, the Occupational Personality Questionnaire (OPQ32r) and a cognitive measure, the Verify Ability Tests (VMG3 & NMG3). Since these psychological assessments are used for selection, specific legislative guidelines need to be adhered to according to the Employment Equity Act (EEA), No 55 (1998). The EEA (1998), in this case, has the dual objective of ensuring that only valid and reliable assessments are used and that assessments are used in a fair manner, free from bias and unfair discrimination. In this legal context it is therefore also critical that the psychometric measures used to select IO Psychology master's students be evaluated for its predictive validity in terms of academic success. The main focus of this research was therefore to validate the current psychometric selection assessments of the IO Psychology master's students at the research institution.

Psychometric measures are grounded in the validity of the measure used (Schmidt, 2006). The validity of a measure is concerned with how well the assessment measures what it is supposed to be measuring. There are three types of validities; namely, content, construct and criterion validities (Foxcroft & Roodt, 2009; Salkind, 2016). Content validity is a non-statistical method that concerns itself with whether the measure actually measures what it is designed to measure (Foxcroft & Roodt, 2009; Salkind, 2016). Construct validity regards the theoretical construct of the measure and its validity (Roodt, 2009; Salkind, 2016). Lastly, criterion validity concerns itself with the relationship of the predictor(s) that in this study are the results of the psychometric measures and the criterion that is academic success (Salkind, 2016). Salkind (2016) points towards two essential aspects to consider when conceptualising validity. One, validity refers to the results of the measure or test and not the measure or test itself. Two, the results show a degree of validity (not absolute validity) referring to the degree of relationship

between the covariates and the criterion (Potter, 2006; Salkind, 2016). In this study, the validity of how well the psychometric measures measure academic success is investigated (Foxcroft & Roodt; 2009, Kriek, 2009; Roodt, 2009; Salkind, 2016).

3.1.3. Fairness in selection: competencies reflecting the inherent requirements of the job

With regard to fairness, the EEA (1998) states that discrimination (relevant to selection) may be regarded as fair when it is aligned with the inherent requirements of the job.

The competency profile of an ideal IO Psychology master's student was created by conducting a job analysis of the IO Psychologist's role. This competency profile was designed by SMEs that consisted of practising IO Psychologists and IO Psychology master's academic staff members (Barnard, 2015; Viviers & Van Niekerk, 2012). SHL's 20 generic competencies (SHL, 2009) were used as a point of departure, as it includes competencies that have been found to contribute to superior performance in different roles and positions in the workplace (SHL, 2011b). These were paired according to their relevance with the competencies identified by the SMEs, which in turn was guided by success criteria in the IO Psychologist's role identified by the Texas Industrial and Organisational Psychologists (TIOP) (Blakeny et. al., 2002) as well as the HPCSA's professional training and registration requirements (Viviers & Van Niekerk, 2012).

The competency profile was organised along essential, desirable, less relevant and not relevant competencies. Essential competencies indicate those competencies identified by the SME panel to be required for nearly all the role objectives of an IO Psychologist. Desirable competencies are those competencies identified to be crucial to most job requirements, whereas relevant competencies were those required in meeting at least some objectives. Less relevant and not relevant competencies were indicated by the SME panel to have very little relevance to the competency profile of the IO Psychologist and were therefore excluded from the final competency profile (Viviers & Van Niekerk, 2012). Table 3.1 outlines the competencies in the competency profile of an IO Psychology master's student. The essential and desirable competencies consequently constituted the selection criteria against which applicants were assessed for entry into the IO Psychology master's programme at the research institution in the period, 2012-2016.

TABLE 3.1: Competencies, definitions and relevance to the IO Psychology master's student competency profile (Viviers & Van Niekerk, 2012)

PJM Competencies	Definition
Essential competencies	
Writing and Reporting	Writes convincingly; writes clearly, succinctly and correctly; avoids the unnecessary use of jargon or complicated language; writes in a well-structured and logical way; structures information to meet the needs and understanding of the intended audience.
Learning and Researching	Rapidly learns new tasks and commits information to memory quickly; demonstrates an immediate understanding of newly presented information; gathers comprehensive information to support decision making; encourages an organisational learning approach (that is, learns from successes and failures and seeks staff and customer feedback).
Working with People	Shows respect for the views and contributions of other team members; shows empathy; listens, supports and cares for others; consults others and shares information and expertise with them; builds team spirit and reconciles conflict; adapts to the team and fits in well.
Analysing	Analyses numerical data and all other sources of information, to break them into component parts, patterns and relationships; probes for further information or greater understanding of a problem; makes rational judgements from the available information and analysis; demonstrates an understanding of how one issue may be a part of a much larger system.
Adhering to Principles and Values	Upholds ethics and values; demonstrates integrity; promotes and defends equal opportunities; builds diverse teams; encourages organisational and individual responsibility towards the community and the environment.
Presenting and Communicating Information	Speaks fluently; expresses opinions, information and key points of an argument clearly; makes presentations and undertakes public speaking with skill and confidence; responds quickly to the needs of an audience and to their reactions and feedback; projects credibility.
Desirable competencies	
Deciding and Initiating Action	Takes responsibility for actions, projects and people; takes initiative and works under own direction; initiates and generates activity and introduces changes into work processes; makes quick, clear decisions which may include tough choices or considered risks.
Planning and Organising	Sets clearly defined objectives; plans activities and projects well in advance and takes account of possible changing circumstances; identifies and organises resources needed to accomplish tasks; manages time effectively; monitors performance against deadlines and milestones.
Adapting and Responding to Change	Adapts to changing circumstances; tolerates ambiguity; accepts new ideas and change initiatives; adapts interpersonal style to suit different people or situations; shows an interest in new experiences.
Coping with Pressures and Setbacks	Maintains a positive outlook at work; works productively in a pressurised environment; keeps emotions under control during difficult situations; handles criticism well and learns from it; balances the demands of a work life and a personal life.
Achieving Personal Work Goals and Objectives	Accepts and tackles demanding goals with enthusiasm; works hard and puts in longer hours when it is necessary; seeks progression to roles of increased responsibility and influence; identifies own development needs and makes use of developmental or training opportunities.
Relating and Networking	Easily establishes good relationships with customers and staff; relates well to people at all levels; builds wide and effective networks of contacts; uses humour appropriately to bring warmth to relationships with others.
Less relevant competencies	
Applying Expertise and Technology	Applies specialist and detailed technical expertise; uses technology to achieve work objectives; develops job knowledge and expertise (theoretical and practical) through continual professional development; demonstrates an understanding of different organisational departments and functions.
Following Instructions and Procedures	Appropriately follows instructions from others without unnecessarily challenging authority; follows procedures and policies; keeps to schedules; arrives punctually for work and meetings; demonstrates commitment to the organisation; complies with legal obligations and safety requirements of the role.
Creating and Innovating	Produces new ideas, approaches, or insights; creates innovative products or designs; produces a range of solutions to problems.
Formulating Strategies and Concepts	Works strategically to realise organisational goals; sets and develops strategies; identifies, develops positive and compelling visions of the organisation's future potential; takes account of a wide range of issues across, and related to, the organisation.
Delivering Results and Meeting Customer Expectations	Focuses on customer needs and satisfaction; sets high standards for quality and quantity; monitors and maintains quality and productivity; works in a systematic, methodical and orderly way; consistently achieves project goals.
Not relevant competencies	
Leading and Supervising	Provides others with a clear direction; motivates and empowers others; recruits staff of a high calibre; provides staff with development opportunities and coaching; sets appropriate standards of behaviour.
Persuading and Influencing	Gains clear agreement and commitment from others by persuading, convincing and negotiating; makes effective use of political processes to influence and persuade others; promotes ideas on behalf of oneself or others; makes a strong personal impact on others; takes care to manage one's impression on others.
Entrepreneurial and Commercial Thinking	Keeps up to date with competitor information and market trends; identifies business opportunities for the organisation; maintains awareness of developments in the organisational structure and politics; demonstrates financial awareness; controls costs and thinks in terms of profit, loss and added value.

3.1.4 Research objectives

The aim of this study was to determine the predictive validity of the psychometric component of the competency-based assessment battery applied to select IO Psychology master's students, with regard to academic success.

The author formulated the following research hypotheses:

H_0: The psychometric component of the IO Psychology master's competency profile is not a valid predictor of academic success

H_1: The psychometric component of the IO Psychology master's competency profile is a valid predictor of academic success

H_2: The Verify Graduate Ability Test (VMG3, NMG3) is a valid predictor of academic success

H_3: The OPQ32r is a valid predictor of academic success

H_4: The IO Psychology master's Person Job Match competency profile is a valid predictor of academic success

3.2 RESEARCH DESIGN

3.2.1 Research approach

In this non-experimental, positivist study, a descriptive quantitative approach was followed. Multivariate statistical techniques were used to analyse secondary data that were collected over a period of five years in order to explain the relationships of the constructs and variables (Babbie, 2005).

3.2.2 Research procedure

Secondary data were derived from the period, 2012 to 2016, with regard to the psychometric and academic results for IO Psychology master's students. The psychometric results included students' Verify Graduate Ability Test scores, OPQ32r sten scores and the overall Person Job Match (PJM) competency profile scores. These scores were covariates assumed to be affecting the academic success of the IO Psychology master's student (Potter, 2006).

The Verify Graduate Ability Test is a cognitive measure and the OPQ32r a personality measure. The PJM competency profile is constructed on the essential and desirable competencies of an IO Psychologist. Scores are calculated for each of these PJM competencies from the results of the Verify Graduate Ability Tests and the OPQ32r. The Verify Graduate Ability tests' sten scores, the OPQ32r sten scores and the PJM competency profile sten scores were sourced from the responsible, independent test publisher. The students' academic success scores were accessed from the student system of the research institution for the period of 2012 to 2016. The academic results included the final results of the M1 year, the final results of the M2 year and the overall results of the completed degree.

3.2.3 Research Method

Sample

The sample consisted of the IO Psychology master's students that have been successfully selected into the IO Psychology master's programme in the years, 2012 to 2016.

TABLE 3.2: Demographics of the IO Psychology master's students

Category	Frequency	Percentage
Gender		
Female	96	72.2
Male	37	27.8
Ethnicity		
African	46	34.6
Coloured	13	9.8
Indian	20	15.0
White	54	40.6
Previous Educational Level		
Degree or 3-year Diploma	2	1.5
Postgraduate	131	98.5
Native Language		
Afrikaans	32	24.1
English	53	39.8
Ndebele	2	1.5
Northern Sotho	8	6
Other	5	4.6
Southern Sotho	3	2.3
Tsonga	7	5.3
Tswana	8	6.0
Venda	2	1.5
Xhosa	3	2.3
Zulu	10	7.5

The sample consisted of female students (72.2%) and fewer males (27.8%). The white student cohort made up the most significant number of students (40.6%) with the remainder being African (34.6%), Indian (15%) and Coloured (9.8%). The minimum requirement to apply for the IO Psychology master's degree is a related honours degree. Only 1.5% of the students had a degree or 3-year diploma before entering into the IO Psychology master's programme where the rest had honours degrees (98.5%). The few (1.5%) diploma/undergraduate students were due to them having been busy completing their honours degrees during the time of the data collection. The sample showed the following along the native language of the students: English (39.8%), Afrikaans (24.1%), Zulu (7.5%), Tswana (6%), Tsonga (5.3%), Unspecified (4.6%), Southern Sotho (2.3%), Xhosa (2.3%) and Venda and Ndebele at both (1.5%) each. Demographic characteristics are depicted in Table 3.2 above.

Measuring Instruments

Data were collected on the IO Psychology master's students' results on the Verify Graduate Ability Tests, the OPQ32r and the PJM competency profile scores as well as academic results from their M1 and M2 years and final overall master's, in a five-year period spanning 2012 to 2016.

3.2.4 Verify Graduate Ability tests (VMG3, NMG3)

SHL's Verify Graduate Ability tests were used to measure verbal (VMG3) and numerical (NMG3) reasoning of the IO Psychology master's students. Both the numerical and verbal tests are seen as deductive reasoning tests that work on the assumption that problems can be solved by applying previously established rules (Burke et al., 2013). The results of the Verify Graduate Ability tests are presented in two transformed standard score scales, namely, a T-Score and a Sten score along which interpretations can be made (SHL, 2007). Studies based on both ability tests have proven predictable, significant and substantial in their correlations with academic success. Their estimated validities range from 0.4 to 0.6 (Kotze & Griessel, 2008; SHL, 2007). In terms of the reliability of the ability tests, Kotze and Griessel (2008) reported on high alpha coefficients (between 0.82 and 0.91) obtained. The norm group used for the Verify Graduate Ability tests was the general UK population that had been normed for South African purposes (SHL, 2007).

3.2.5 Occupational Personality Questionnaire

The OPQ32r was developed based on the trait theory of personality and applied a forced-choice method that has normative properties (CEB, 2010). A benefit of the OPQ32r is that it is highly reliable (SHL, 2009) with the mean of the IRT composite reliability being 0.84 (SHL, 2009). This personality measure provides information on the individual's preferred style of behaviour at work and is commonly used for managerial and professional applications (SHL, 2009).

Thirty-two dimensions of an individual's preferences with regard to behaviour at work make up this occupational model of personality (Burke et al., 2013; CEB, 2010; Joubert et al., 2015). The 32 dimensions are clustered in eight broad sub-domain scales as seen in Table 3.3. The eight broad sub-domain scales are referred to as the "Great Eight" competency factors that have been developed through self-rating and manager ratings of work performance, and they are further categorised under three main categories, namely, relationships with people, thinking styles and feelings and emotions (Bartram, 2005, p. 1185).

TABLE 3.3: OPQ32r Categories, Sub-Domain Scales (CEB, 2010), Competencies and Definitions (SHL, 2005)

Sub-Domain	Competency	Higher Score Definition	Lower Score Definition
Category 1: Relationship with People			
Influence	Persuasive	Rarely pressures others to change their views, dislikes selling, less comfortable using negotiation	Enjoys selling, comfortable using negotiation, likes to change other people's views
	Controlling	Happy to let others take charge, dislikes telling people what to do, unlikely to take the lead	Likes to be in charge, takes the lead, tells others what to do, takes control
	Outspoken	Holds back from criticizing others, may not express own views, unprepared to put forward own opinions	Freely expresses opinions, makes disagreements clear, prepared to criticise others
	Independent-minded	Accepts majority decisions, prepared to follow the consensus	Prefers to follow own approach, prepared to disregard majority decisions
Sociability	Outgoing	Quiet and reserved in groups, dislikes being the centre of attention	Lively and animated in groups, talkative, enjoys attention
	Affiliate	Comfortable spending time away from people, values time spent alone, seldom misses the company of others	Enjoys other's company, likes to be around people, can miss the company of others
	Socially Confident	Feels more comfortable in less formal situations, can feel awkward when first meeting people	Feels comfortable when first meeting people, at ease in formal situations
Empathy	Modest	Makes strengths and achievements known, talks about personal success	Dislike discussing achievements, keeps quiet about personal success
	Democratic	Prepared to make decisions without consultation, prefers to make decisions alone	Consults widely, involves others in decision making, less likely to make decisions alone
	Caring	Selective with sympathy and support, remains detached from others' personal problems	Sympathetic and considerate towards others, helpful and supportive, gets involved in others' problems
Category 2: Thinking Style			
Analysis	Data Rational	Prefers dealing with opinions and feelings rather than facts and figures, likely to avoid using statistics	Likes working with numbers, enjoys analysing statistical information, bases decisions on facts and figures
	Evaluative	Does not focus on potential limitations, dislikes critically analysing information, rarely looks for error or mistakes	Critically evaluates information, looks for potential limitations, focuses on errors
	Behavioural	Does not question the reasons for people's behaviour, tends not to analyse people	Tries to understand motives and behaviours, enjoys analysing people
Creativity and Change	Conventional	Favours changes in work methods, prefers new approaches, less conventional	Prefers well-established methods, favours a more conventional approach
	Conceptual	Prefers to deal with practical rather than theoretical issues, dislikes dealing with abstract concepts	Interested in theories, enjoys discussing abstract concepts
	Innovative	More likely to build on than generate ideas, less inclined to be creative and inventive	Generates new ideas, enjoys being creative, thinks of original solutions
	Variety-Seeking	Prefers routine, is prepared to do repetitive work, does not seek variety	Prefers variety, tries out new things, likes changes to regular routine, can become bored by repetitive work

	Adaptable	Behaves consistently across situations, unlikely to behave differently with different people	Changes behaviours to suit the situation, adapts approach to different people
Structure	Forward-Thinking	More likely to focus on immediate than long-term issues, less likely to take a strategic perspective	Takes a long-term view, sets goals for the future, more likely to take a strategic perspective
	Detail-Conscious	Unlikely to become preoccupied with detail, less organised and systematic, dislikes tasks involving detail	Focuses on detail, likes to be methodical, organised and systematic, may become preoccupied with detail
	Conscientious	Sees deadlines as flexible, prepares to leave some tasks unfinished	Focuses on getting things finished, persists until the job is done
	Rule-Following	Not restricted by riles and procedures, prepared to break rules, tends to dislike bureaucracy	Follows rules and regulations, prefers clear guidelines, finds it difficult to break rules
Category 3: Feelings and Emotions			
Emotions	Relaxed	Tends to feel tense, finds it difficult to relax, can find it hard to unwind after work	Finds it easy to relax, rarely feels tense, generally calm and untroubled
	Worrying	Feels calm before important occasions, less affected by key events, free from worry	Feels nervous before important occasions, worries about things going wrong
	Tough-minded	Sensitive, easily hurt by criticism, upset by unfair comments or insults	Not easily offended, can ignore insults, may be insensitive to personal criticism
	Optimistic	Concerned about the future, expects things to go wrong, focuses on negative aspects of a situation	Expects things will turn out well, looks to the positive aspects of a situation has an optimistic view of the future
	Trusting	Wary of others' intentions, finds it difficult to trust others, unlikely to be fooled by people	Trusts people, sees others as reliable and honest, believes what others say
	Emotionally controlled	Openly expresses feelings, finds it difficult to conceal feelings, displays emotion clearly	Can conceal feelings from others, rarely displays emotion
Dynamism	Vigorous	Likes to take things at a steady pace, dislikes excessive work demands	Thrives on activity, likes to be busy, enjoys having a lot to do
	Competitive	Dislikes competing with others, feels that taking part is more important than winning	Has a need to win, enjoys competitive activities, dislikes losing
	Achieving	Sees career progression as less important, looks for achievable rather than highly ambitious targets	Ambitious and career-cantered, likes to work to demanding goals and targets
	Decisive	Tends to be cautious when making decisions, likes to take time to reach conclusions	Makes fast decisions, reaches conclusions quickly, less cautious

The norm group applied in interpreting applicants' OPQ32r results consisted of a large UK population that had been normed for South African purposes (SHL, 2009; 2006). According to the Health Professions Council's list of classified and certified psychological assessments, the OPQ32r is registered as a psychological assessment (HPCSA, 2017).

3.2.6 The Person-job-match profile

The scores from two of the psychometric measures applied in the selection assessment were used to create a candidate's PJM profile. The Verify Graduate Ability Tests (VMG3, NMG3), as well as the OPQ32r, were used to calculate a categorical match score on each of the desirable and essential competencies in which the IO Psychology master's student needs to

prove competence for selection purposes. These scores constitute the candidate's PJM profile and indicate the extent of fit between the applicant's competencies and the required role competencies. An overall categorical match score is also calculated, indicating an overall PJM score as well as the bands of extremely weak, weak, moderate, strong or extremely strong match (SHL, 2011b). The PJM profile thus provides an overall score as well as a band match score for each of the competencies in the profile (i.e. the essential and desirable competencies indicating the student's level of suitability for the role of an IO Psychology master's student) (SHL, 2011b).

All the essential and desirable competencies derive their PJM competency scores from the OPQ32r. Competencies in the PJM profile that specifically include results from the Verify Ability tests are Presenting and Communicating, Writing and Reporting, Analysing and Learning and Researching (SHL, 2007). Additional competencies that are not part of the IO Psychology master's students' PJM profiles that include scores from the Verify Ability tests are Applying Expertise and Technology, Creating and Innovative and Formulating Strategies and Concepts (SHL, 2007). Table 3.4 outlines the PJM assessment matrix denoting, which psychometric measures cover which competencies of the IO Psychology master's student's competency profile.

TABLE 3.4: PJM Assessment Matrix
(SHL, 2007; 2011b; Viviers & Van Niekerk, 2012)

PJM Competencies	Verify Graduate Ability Tests	OPQ32r
Writing and Reporting	X	X
Learning and Researching	X	X
Working with People		X
Analysing	X	X
Adhering to Principles and Values		X
Presenting and Communicating Information	X	X
Deciding and Initiating Action		X
Planning and Organising		X
Adapting and Responding to Change		X
Coping with Pressures and Setbacks		X
Achieving Personal Work Goals and Objectives		X
Relating and Networking		X

3.2.7 Ethical considerations

The initial instructions for the online assessments were sent to applicants via email. The e-mail provided a link to the online assessment portal. Informed consent was obtained from each

potential student on the online assessment portal before the applicant was able to proceed with the assessments. Applicants were informed of the purpose and nature of the assessment, and that their results may be used for research purposes. Further ethical clearance was sought from the research institution to access the non-identifiable data from the student management system. Ethical clearance to use the secondary data was obtained from the Research Ethics Review Committee of the College of Economic and Management Sciences at the research institution (ERC Reference number: 2017_CEMS/IOP_010) (see Appendix A).

3.2.8 Statistical analyses

Descriptive statistics (means and standard deviations) were used to determine and describe the degree to which the variables exist in the sample. A further Pearson's two-tailed correlation investigated the relationship between the Verify Graduate Ability tests' sten scores and the OPQ32r sten scores with the academic success of the student to determine the predictive validity of the psychometric measures. A Pearson's two-tailed correlation was used to measure the level of strength between two variables (Lachenicht, 2002b), namely, the students' academic achievement scores along their M1, M2 and final percentage scores and the Verify Graduate Ability tests, the OPQ32r and the twelve competency scores of the PJM profile. Additional PJM competencies that are not part of the IO Psychology master's student's competency profile were investigated with regard to possible significance to academic success. The statistical significance was set at 0.01 and 0.05. The cut-off point for practical significance as determined by Guilford's informal interpretation of the magnitude of r (Lachenicht, 2002b) was applied, which states ≤ 0.200 as almost no relationship, 0.201 to 0.400 as a definite, but small relationship, 0.401 to 0.700 as a substantial relationship, 0.701 to 0.900 as a strong relationship and 0.901 to 1.000 as a very dependable relationship. For the purpose of this study, the small, substantial, strong and dependable relationships are reported on.

3.3 RESULTS

3.3.1 Descriptive Statistics

In Table 3.5, the number of students that were selected into the IO Psychology master's programme is displayed between the years of 2012 to 2016. This totalled the number of students to 133 constituting the sample for this study.

TABLE 3.5: Students enrolled per year, 2012-2016

Number of accepted students	Frequency	Percent	Cumulative Percent
2012	28	21.1	21.1
2013	27	20.3	41.4
2014	29	21.8	63.2
2015	29	21.8	85.0
2016	20	15.0	100.0
Total	133	100	

Table 3.6 displays the degree of the students' PJM band match. The PJM results count 25% towards the final selection of the student into the IO Psychology master's programme (Van Niekerk, 2018). More importantly, the PJM results are also used as a funnel selection tool, which means that the PJM scores are used to select the final forty students who are then requested to complete the academic assignment section as well as the interview (Viviers & Van Niekerk, 2012). So, even though the PJM scores may contribute 25% to the final decision for access, it is also a pre-selection tool used to get shortlisted for the last two assessments in the selection battery. The PJM is derived from the applicant's Verify Ability tests (NMG3 and VMG3) and OPQ32r. As seen below, quite a number of students who obtained a moderate and lower match have been successfully selected into the IO Psychology master's programme (27.1%). The largest group of successful applicants (72.9%) is however made up of the students who scored a strong to extremely strong match on the PJM.

TABLE 3.6: Descriptive statistics of students' PJM Band Category

PJM Band Category	Frequency	Percent	Cumulative Percent
Extremely Weak Match	2	1.5	2.3
Weak Match	6	4.5	6.8
Moderate Match	27	20.3	27.1
Strong Match	35	26.3	53.4
Extremely Strong Match	62	46.6	100.0
Total	133	100	

Of the total sample (n=133) as seen in Table 3.7, only a small number of IO Psychology master's students failed their M1 year (6.8%). Since the M2 year can be completed on a full- or part-time basis (Viviers & Van Niekerk, 2012), a large number of student data remains outstanding (n=78). The outstanding data results from the number of IO Psychology master's students still in the process of completing their M2 year (n=63) plus those that have dropped out (n=15). Furthermore, no-fail data are available for the M2 year since the thesis that forms

part of the M2 year only gets submitted once it has been thoroughly checked by the attending supervisors at the research institution before the IO Psychology master's student can submit it to be examined (Viviers & Van Niekerk, 2012). This means that up until 2016, only 41.4% (n=55) of students have completed both the M1 and M2 years successfully.

TABLE 3.7: Descriptive statistics of students' academic success

Academic Success Categories	Frequency	Percent	Cumulative Percent
Year 1 Mark			
Fail	9	6.8	6.8
Pass	112	84.2	91.0
Distinction	12	9.0	100.0
Total	133	100	
Year 2 Mark			
Pass	47	35.4	35.4
Distinction	8	6	41.4
Missing	78	58.6	100.0
Total	133	100.0	
Degree Completed			
No	78	58.6	58.6
Yes	55	41.4	100
Total	133	100	
Students that dropped out			
No	118	88.7	88.7
Yes	15	11.3	100
	133	100	

3.3.2 Correlation Statistics

Pearson's two-tailed correlation is used to measure the level of strength between variables (Lachenicht, 2002b). The invariables consisted of the Verify Graduate Ability Test sten scores, the OPQ32r sten scores, the PJM overall score and the PJM competency scores that were used as covariates affecting the dependent variable, namely, the academic success rates of the IO Psychology master's students (Potter, 2006). Academic success is seen as the percentage scores obtained in the M1 year, the M2 year and the final percentage score on completion of the degree. The results of the correlation analysis pertain to the set hypotheses and are discussed below in terms of whether they confirm the research hypotheses.

Hypothesis 2: The Verify Graduate Ability test is a valid predictor of academic success

Table 3.8 reports the correlation coefficients of the Verify Graduate Ability test with academic success. The correlation between the Verify Graduate Numerical Ability test and academic success displays a correlation coefficient of 0.199 for the M1 year, 0.323 for the M2 year and 0.305 for the overall result of the programme. A definite, but small relationship is evident, demonstrating the Verify Graduate Numerical Ability test's ability to predict academic success as seen in the M1 year, the M2 year and the overall programme results. The correlation between the Verify Graduate Verbal Ability test and academic success displays a correlation coefficient of 0.218 for the M1 year, -0.004 for the M2 year and 0.193 for the overall result of the programme. The magnitude of r is between 0.201 and 0.400 of the M1 year only. Therefore a definite, but small relationship is evident, demonstrating the Verify Graduate Verbal Ability test's ability to predict academic success as seen in the M1 year only.

Hypothesis 2 is accepted.

TABLE 3.8: Pearson Correlation between Academic Success and the Verify Graduate Ability Tests (VMG3, NMG3)

Variable		M1 Year Mark %	M2 Year Mark %	Final result %
Verify Graduate Ability Test sten scores				
Verify Graduate Numerical Reasoning	Pearson Correlation	0.199*	0.323*	0.305*
	Sig. (2-tailed)	0.022	0.017	0.026
	N	132	54	53
Verify Graduate Verbal Reasoning	Pearson Correlation	0.218*	-0.004	0.193
	Sig. (2-tailed)	0.012	0.976	0.161
	N	133	55	54

** Statistically significant at the 0.01 level
* Statistically significant at the 0.05 level

Hypothesis 3: The OPQ32r is a valid predictor of academic success.

Table 3.9 reports on the correlation coefficients between the OPQ32r sten scores and academic success. Only a few individual competencies were found to display a statistically significant relationship with academic success on the lower score for the M1 year that include outspoken, relaxed, optimistic and trusting ($p \geq 0.0005$) and on the higher score for emotionally controlled ($p \geq 0.0001$). The competency, innovative, saw a significant relationship on the lower score ($p \geq 0.0005$) with the M2 year results and worrying on the higher score ($p \geq 0.0005$) with the M2 year results of the IO Psychology master's students.

Hypothesis 3 is not accepted.

TABLE 3.9: Pearson Correlation between Academic Success and the OPQ32r sten scores

Variable		M1 Year Mark %	M2 Year Mark %	Final result %
OPQ32r sten scores				
Persuasive	Pearson Correlation	0.038	-0.085	-0.069
	Sig. (2-tailed)	0.667	0.539	0.620
	N	133	55	54
Controlling	Pearson Correlation	0.157	0.028	0.172
	Sig. (2-tailed)	0.072	0.838	0.213
	N	133	55	54
Outspoken	Pearson Correlation	-0.198*	-0.208	-0.178
	Sig. (2-tailed)	0.023	0.127	0.197
	N	133	55	54
Independent-minded	Pearson Correlation	-0.028	-0.140	-0.007
	Sig. (2-tailed)	0.749	0.310	0.961
	N	133	55	54
Outgoing	Pearson Correlation	-0.032	0.044	0.142
	Sig. (2-tailed)	0.718	0.752	0.306
	N	133	55	54
Affiliative	Pearson Correlation	-0.041	0.005	0.081
	Sig. (2-tailed)	0.643	0.972	0.561
	N	133	55	54
Socially Confident	Pearson Correlation	-0.123	-0.259	-0.199
	Sig. (2-tailed)	0.159	0.056	0.150
	N	133	55	54
Modest	Pearson Correlation	0.103	0.114	0.024
	Sig. (2-tailed)	0.238	0.409	0.865
	N	133	55	54
Democratic	Pearson Correlation	-0.014	0.144	0.055
	Sig. (2-tailed)	0.870	0.294	0.694
	N	133	55	54
Caring	Pearson Correlation	-0.127	0.045	0.001
	Sig. (2-tailed)	0.144	0.747	0.993
	N	133	55	54
Data Rational	Pearson Correlation	-0.057	-0.225	-0.238
	Sig. (2-tailed)	0.511	0.099	0.083
	N	133	55	54
Evaluative	Pearson Correlation	0.066	-0.122	0.049
	Sig. (2-tailed)	0.451	0.374	0.723
	N	133	55	54
Behavioural	Pearson Correlation	0.034	0.218	0.260
	Sig. (2-tailed)	0.699	0.111	0.058
	N	133	55	54
Conventional	Pearson Correlation	-0.087	-0.084	-0.205
	Sig. (2-tailed)	0.317	0.542	0.137
	N	133	55	54
Conceptual	Pearson Correlation	0.043	-0.211	-0.056
	Sig. (2-tailed)	0.624	0.123	0.685
	N	133	55	54
Innovative	Pearson Correlation	0.115	-0.278*	-0.128

	Sig. (2-tailed)	0.187	0.040	0.357
	N	133	55	54
Variety-seeking	Pearson Correlation	0.087	-0.002	0.090
	Sig. (2-tailed)	0.321	0.987	0.516
	N	133	55	54
Adaptable	Pearson Correlation	0.154	0.066	0.023
	Sig. (2-tailed)	0.076	0.630	0.866
	N	133	55	54
Forward-thinking	Pearson Correlation	-0.027	-0.262	-0.154
	Sig. (2-tailed)	0.754	0.054	0.267
	N	133	55	54
Detail-conscious	Pearson Correlation	0.070	0.175	0.079
	Sig. (2-tailed)	0.424	0.202	0.571
	N	133	55	54
Conscientious	Pearson Correlation	-0.061	0.061	0.055
	Sig. (2-tailed)	0.483	0.658	0.694
	N	133	55	54
Rule-following	Pearson Correlation	-0.140	0.225	0.075
	Sig. (2-tailed)	0.108	0.099	0.590
	N	133	55	54
Relaxed	Pearson Correlation	-0.217*	-0.200	-0.263
	Sig. (2-tailed)	0.012	0.143	0.054
	N	133	55	54
Worrying	Pearson Correlation	0.074	0.298*	0.245
	Sig. (2-tailed)	0.396	0.027	0.075
	N	133	55	54
Tough-minded	Pearson Correlation	-0.160	-0.025	-0.052
	Sig. (2-tailed)	0.066	0.856	0.710
	N	133	55	54
Optimistic	Pearson Correlation	-0.175*	-0.096	-0.066
	Sig. (2-tailed)	0.044	0.485	0.637
	N	133	55	54
Trusting	Pearson Correlation	-0.192*	-0.199	-0.220
	Sig. (2-tailed)	0.027	0.145	0.110
	N	133	55	54
Emotionally Controlled	Pearson Correlation	0.224**	0.167	0.126
	Sig. (2-tailed)	0.010	0.223	0.363
	N	133	55	54
Vigorous	Pearson Correlation	0.163	-0.012	0.106
	Sig. (2-tailed)	0.061	0.929	0.447
	N	133	55	54
Competitive	Pearson Correlation	0.113	0.039	0.164
	Sig. (2-tailed)	0.196	0.780	0.236
	N	133	55	54
Achieving	Pearson Correlation	0.010	-0.137	-0.059
	Sig. (2-tailed)	0.908	0.320	0.673
	N	133	55	54
Decisive	Pearson Correlation	0.020	-0.108	-0.102
	Sig. (2-tailed)	0.816	0.434	0.462
	N	133	55	54

** Statistically significant at the 0.01 level
* Statistically significant at the 0.05 level

Hypothesis 4: The IO Psychology master's PJM competency profile is a valid predictor of academic success

Table 3.10 reports on the correlation coefficients of the overall PJM and PJM Band scores with academic success. No statistically significant relationship is reported on between either the overall PJM scores or the PJM Band scores.

TABLE 3.10: Pearson Correlation between the PJM Overall score and Band score and academic success

Variable		M1 Year Mark %	M2 Year Mark %	Final result %
Overall PJM Score				
PJM Score overall	Pearson Correlation	0.100	0.011	0.155
	Sig. (2-tailed)	0.256	0.938	0.269
	N	132	54	53
PJM Band Score	Pearson Correlation	0.080	-0.026	0.072
	Sig. (2-tailed)	0.362	0.852	0.611
	N	132	54	53

** Statistically significant at the 0.01 level
* Statistically significant at the 0.05 level

Table 3.11 reports the correlation coefficients of the IO Psychology master's student's PJM competency profile with academic success.

Individual competencies that have proven to display a statistically significant relationship with academic success ($p \leq 0.0005$) include writing and reporting and coping with pressure and setbacks for the M1 year. A statistically significant relationship with academic success ($p \leq 0.0001$) was also found for competencies that include learning and researching and analysing for the M1 year. Individual competencies that have proven to display a statistically significant relationship with academic success in terms of the final result ($p \leq 0.0005$) include learning and researching.

Hypothesis 4 is not accepted.

TABLE 3.11: Pearson Correlation statistics: Essential- and Desirable PJM competency scores with Academic success

Variable		M1 Year Mark %	M2 Year Mark %	Final result %
Essential Competencies				
Writing & Reporting	Pearson Correlation	0.209*	-0.061	0.164
	Sig. (2-tailed)	0.016	0.661	0.239
	N	132	54	53
Learning & Researching	Pearson Correlation	0.238**	0.089	0.288*
	Sig. (2-tailed)	0.006	0.524	0.036
	N	132	54	53
Working with People	Pearson Correlation	-0.096	0.046	-0.005
	Sig. (2-tailed)	0.273	0.741	0.973
	N	132	54	53
Analysing	Pearson Correlation	0.232**	0.027	0.224
	Sig. (2-tailed)	0.008	0.845	0.106
	N	132	54	53
Adhering to Principles & Values	Pearson Correlation	-0.162	0.088	-0.039
	Sig. (2-tailed)	0.064	0.525	0.779
	N	132	54	53
Presenting & Communicating Information	Pearson Correlation	0.106	-0.258	-0.097
	Sig. (2-tailed)	0.225	0.060	0.490
	N	132	54	53
Desirable Competencies				
Deciding & Initiating Action	Pearson Correlation	0.006	-0.258	-0.144
	Sig. (2-tailed)	0.949	0.060	0.305
	N	132	54	53
Planning & Organising	Pearson Correlation	0.026	-0.029	0.027
	Sig. (2-tailed)	0.768	0.837	0.845
	N	132	54	53
Adapting & Responding to Change	Pearson Correlation	0.068	0.081	0.089
	Sig. (2-tailed)	0.436	0.561	0.525
	N	132	54	53
Coping with Pressure & Setbacks	Pearson Correlation	-0.183*	-0.061	-0.118
	Sig. (2-tailed)	0.036	0.664	0.401
	N	132	54	53
Achieving Personal Goals & Objectives	Pearson Correlation	0.080	-0.086	0.063
	Sig. (2-tailed)	0.361	0.538	0.655
	N	132	54	53
Relating & Networking	Pearson Correlation	-0.040	-0.119	-0.102
	Sig. (2-tailed)	0.645	0.392	0.469
	N	132	54	53

** Statistically significant at the 0.01 level
* Statistically significant at the 0.05 level

For interest sake, Table 3.12 reports the correlation coefficients of the PJM competencies that are not included in the IO Psychology master's competency profile with academic success.

Two of these competencies display a statistically significant relationship with academic success, namely, creating and innovating with the M1 year ($p \leq 0.0001$) and the final result ($p \leq 0.0005$), and Formulating Strategies and Concepts with the M1 year ($p \leq 0.0005$).

TABLE 3.12: Pearson Correlation statistics: Less relevant and not relevant PJM competency scores with Academic success

Variable		M1 Year Mark %	M2 Year Mark %	Final result %
Less Relevant Competencies				
Applying Expertise & Technology	Pearson Correlation	0.165	-0.102	0.125
	Sig. (2-tailed)	0.058	0.463	0.374
	N	132	54	53
Following Instructions & Procedures	Pearson Correlation	-0.034	0.218	0.134
	Sig. (2-tailed)	0.698	0.113	0.338
	N	132	54	53
Creating & Innovating	Pearson Correlation	0.271**	0.116	0.324*
	Sig. (2-tailed)	0.002	0.402	0.018
	N	132	54	53
Formulating Strategies & Concepts	Pearson Correlation	0.173*	-0.153	0.098
	Sig. (2-tailed)	0.047	0.269	0.484
	N	132	54	53
Delivering Results & Meeting Expectations	Pearson Correlation	0.019	0.127	0.106
	Sig. (2-tailed)	0.831	0.360	0.448
	N	132	54	53
Not Relevant Competencies				
Leading & Supervising	Pearson Correlation	-0.019	0.029	0.044
	Sig. (2-tailed)	0.833	0.836	0.752
	N	132	54	53
Persuading & Influencing	Pearson Correlation	-0.029	-0.105	-0.025
	Sig. (2-tailed)	0.739	0.450	0.860
	N	132	54	53
Entrepreneurial & Commercial Thinking	Pearson Correlation	0.150	0.046	0.152
	Sig. (2-tailed)	0.086	0.739	0.278
	N	132	54	53

** Statistically significant at the 0.01 level
* Statistically significant at the 0.05 level

The null hypothesis that states that the psychometric component of the IO Psychology master's competency profile is not a valid predictor of academic success is not rejected, based on the correlation results reported above. Only the Verify Graduate Ability tests have predictive values for the M1, M2 and final academic results of the IO Psychology master's student. The OPQ32r sten scores only displayed a select few competencies that display a small, but definite relationship with academic success. The overall PJM score and PJM band score did not display any relationship with predicting academic success and of the PJM competencies used for the election of the IO Psychology master's students, only a select few displayed a significant relationship that was mostly due to the fact that the Verify Graduate Ability test has a weighting in the competency scores that displayed predictive values.

3.4 DISCUSSION

The aim of this study was to investigate whether the covariates (IO Psychology master's students' results along their Verify Graduate Ability Test scores, their OPQ32r scores and their overall and specific PJM competency profile scores) are able to predict the academic success for the IO Psychology master's students' M1 year, their M2 year and their overall academic success at the research institution.

The sample consisted of IO Psychology master's students who were successfully selected and accepted into the IO Psychology master's programme between the years, 2012 and 2016 (n=133). An average number of 27 students made up the student cohort in each year. More than two-thirds of the sample was made up of female students, and close to half of the sample consisted of white students. Not all students who had been selected displayed a strong to extremely strong match with regard to their PJM student profile results or band category. This could be due to the fact that the PJM band match only weighs 25 per cent of the final recommendation for access to the programme (Van Niekerk, 2018).

The overall academic success results of the IO Psychology master's students with regard to pass and fail percentage was only available for the M1 year, which displays a pass rate of 93.4% for the total sample (n = 133). This means that most students who were selected into the M1 year completed the academic requirements of the M1 year. Of the students in the sample who started with the master's programme, fifteen students dropped out, 55 students completed their IO Psychology master's degree and 78 students were still in the process of completing their IO Psychology master's degree. That indicates that more than half of the students who started in the year 2012 were still in the process of completing their qualification at the research institution. The M2 year consists of a research component where the student

is tasked to complete a research dissertation of limited scope that can be completed over two to four years (Viviers & Van Niekerk, 2012). It is therefore acceptable that most of the students who completed their master's degree were registered in the 2012 to 2014 period. Only a few students first registered in 2015 and 2016 completed their degrees. Yet, many students who had been registered for four or more years have not completed their degrees, and mostly because the M2 year was not finalised. A study that focused on post-graduate throughput rates found that students are said to struggle with multiple roles, feelings of isolation and rigid programme structures (Abiddin, 2011). Suggestions along supporting students during their research section of the postgraduate degree include establishing regular meetings between supervisor and student and requesting regular progress reports from the students (Abiddin, 2011).

The Verify Graduate Ability tests displayed a definite, but small relationship with being able to predict the academic success of the M1 year results. More specifically, the Verify Graduate Numerical Reasoning test specifically showed a definite, but small relationship with the M1, M2 and final results of the IO Psychology master's students. The Verify Graduate Verbal Reasoning test showed a definite but small relationship with the M1 marks only. The validity ranges as found in this study (0.002 to 0.004) are not in line with Kotze and Griessel's (2008) study that found correlation coefficients of 0.400 to 0.600. Regardless, one could postulate that the Verify Graduate Ability test is the strongest predictor in this study as mirrored in various studies that suggest that cognition is the best predictor for academic success (Bartram, 2005; Kappe & Van der Flier, 2011; Kotze & Griessel, 2008; Puchert et al., 2017). Numerical reasoning is further motivated to be included as a selection criteria into higher training due to its predictive values for academic success (Puchert et al., 2017).

The OPQ32r sten scores presented with some relationships with the criterion. Statistically significant relationships between select competencies and the M1 and M2 academic results can be highlighted. With significance levels with academic achievement respectively ($p \geq 0.0005$ and $p \geq 0.0001$), the IO Psychology master's student who achieved academically, appears most likely to be (SHL, 1999) reserved by holding back from criticising others and may not express his/her own views or own opinions (outspoken), may tend to be more tense (relaxed), nervous before significant events (worrying), concerned about the future (optimistic) and wary of others' intentions (trusting) whilst displaying emotions clearly (emotionally controlled) (SHL, 1999). The limited relationship of the OPQ32r and academic success could be attributed to possible range restriction as the sample constituted only successfully selected students.

Correlational analysis found no relationship between the overall PJM score and PJM band score and academic success. When regarding the specific competencies of the competency profile, some competencies were found to display a significant relationship with academic success. From the essential competencies of the PJM, writing and reporting (M1 year), learning and researching (M1 year and final result), analysing (M1 year) and coping with pressure and setbacks (M1 year) were the only competencies that displayed a small relationship with academic success. Noteworthy is that most of the individual PJM profile competencies that have shown a relationship with academic success included scores from both the OPQ32r and the Verify Graduate Ability test and mostly predicted academic success for the M1 year. Only coping with pressure and setbacks as a competency that displays some statistical significance does not include scores from the Verify Graduate Ability tests. Of the PJM competencies that were not included in the IO Psychology master's PJM competency profile, two competencies display a further statistical significance to academic success, namely, creating and innovating (M1 year and final result) and formulating strategies and concepts (M1 year). Both of these competencies include scores from the Verify Graduate Ability tests. It could then be argued that the addition of the Verify Graduate Ability tests to the overall competency score adds validity to the competency with regard to academic success.
Taking a closer look at the IO Psychology master's PJM competency profile, it begs the question if it is useful to base access requirements to the master's programme on an IO Psychologist's job profile. The SHL's 20 generic competencies (SHL, 2009) were used as a point of departure and include competencies that have been found to contribute to superior performance in different roles and positions in the workplace (SHL, 2011b). The profiling session should also focus on academically successful IO Psychology master's students as opposed to only focussing on the profile of a practising IO Psychologist. Revisiting the IO Psychology master's student's competency profile may also be necessary in light of the changing world of work. This study points to some predicative competencies and measures that can be used to revise the IO Psychology master's student's competency profile for future selection and development applications to ensure validity, reliability, credibility and fairness as required by the EEA (1998).

The empirical aim of this study was to determine whether the psychometric component of the assessment battery is a valid predictor of academic success for the IO Psychology master's students at the research institution. The cognitive component of the psychometric assessment was found to be the strongest and most reliable predictor of academic success as seen in both the Verify Graduate Ability test sten scores and all the PJM competencies that included scores from the Verify Graduate Ability tests.

3.4.1 Limitations

Four areas of measure contribute towards the final acceptance of the IO Psychology master's student into the programme at the research institution. One is the academic result of the student's honours degree, the other is the PJM score of the candidate, the third is the CBI score of the student, and the last one is the assignment that the student has to complete that is independently scored. Each of these four measures contributes 25% towards the final recommendation for acceptance. This study only regarded the psychometric component of the selection assessment. Since the sample was restricted to candidates successfully selected into the programme, a restriction of range may have affected the correlations obtained. The sample was further skewed by the period of study that is acceptable for a master's degree, namely, four years. It is a challenge to obtain a significant enough sample in a five-year period, which will present students with a completed degree and therefore a better picture of the criterion of academic success (i.e. M1, M2 and final percentage results). Due to the limited scope of this study, the other measures in the selection assessment have not been included in the analyses. These include the previous academic results of the student, the article assignment and the CBI that all contribute equally to the final decision of acceptance of the IO Psychology master's student.

3.4.2 Recommendations

It is recommended that this study be redone with a larger sample size on the M2 and final results of the students in order to gain results that may not be so heavily impacted by the current restriction of range. The previous academic results (e.g. honours results), the article assignment and the CBI should also be included to derive additional insight into the potential incremental validity of the full assessment battery. It would also be valuable to conduct a further validity study to consider the personality competencies of the students that have been able to complete their degrees within the four years as is required against those students who are struggling to complete the degree within the four years required.

Finally, it is recommended that selection to increase its weighting along the cognitive assessment results of the psychometric measures since these measures seem to have the most positive predictive value in selecting IO Psychology master's students who will meet the programme requirements. The Verify Graduate Numerical Ability test has the best predictive value for the M1, M2 and final result. Particular notice should be given to the numerical score for selection purposes.

3.4.3 Practical Implication

The practical implication of the results from this study is that the Verify Graduate Ability test result be used as a separate weighting additionally to the PJM scores as part of the selection process. By regarding the Verify Graduate Ability test results separately to the PJM scores, the Verify Graduate Ability test results will carry more weight towards the final recommendation along access into the IO Psychology master's degree at the research institution.

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CHAPTER 4. CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

Chapter 4 outlines the conclusions, limitations and recommendations.

4.1 INTRODUCTION

This dissertation investigated the relationship between the psychometric measures applied for selection purposes and the academic success of IO Psychology master's students at a research institution.

4.2 CONCLUSIONS

Research conclusions from the literature review and the empirical study for each of the research aims, as stated in 1.4, Chapter 1, will be outlined below. The specific literature objective was to conceptualise academic success, the importance of academic success of an IO Psychology master's student and the importance of validity in selection and measurement in South Africa and psychological assessment best practice. This was achieved by means of a literature review regarding academic success, the importance of academic success of the IO Psychology master's student, valid selection procedures and competency-based assessments.

Academic success is challenging to define since it broadly implies that successful learning has taken place in the classroom (York, Gibson & Rankin, 2015). In this study, academic success is defined as the IO Psychology master's students' successful completion of their M1 and M2 years and their final mark for the IO Psychology master's degree.

Trends in research include various ways in which one can predict academic success. The student's interest and motivation, self-concordance, emotional intelligence, challenging the self cognitively, conscientiousness, ethnicity, gender, reflective writing, stable role-models, parental support, teacher communication skills, technological competence, support received and general communication skills have been found to predict academic success (Adamiak & Sauls, 2017; Akgündüz & Akınoğlu, 2017; Bartram, 2005; Biçer, 2017; Grass, Strobel & Strobel, 2017; Kale & Etyemez, 2017; Kappe & Van der Flier, 2011; Khan, Khan, Zia-Ul-Islam & Khan, 2017; Killen, 1994; Kotze & Griessel, 2008; Machika & Johnson, 2015; Önder & Şeyma, 2017; Parker, Saklofske & Keefer, 2017; Roksa & Whitley, 2017; Salend & Whittaker, 2017; Schreiber & Yu, 2016; Schmidt & Hunter, 1998; Tsingos-Lucas, Bosnic-Anticevich, Schneider & Smith, 2017).

In a meta-study by Smidt and Hunter (1998), cognition far outranked other academic success predictors commonly relied on. Conscientiousness, emotional stability and integrity also ranked high as good predictors as well as the biographical data of the student (Bartram, 2005, Kotze & Griessel, 2008; Rammstedt et al., 2016; Von Stumm & Ackerman, 2013). Seeing that both personality competencies, emotional stability and conscientiousness together with cognition are amongst the highest predictors, it is common to apply both personality and cognition assessments to be combined in their aim to predict academic success (Kappe & Van der Flier, 2011).

The importance of predicting academic success does not only lie with finding high-potential candidates but also to satisfy the requirements of the Department of Higher Education and Training in South Africa (DHET, 2015). The DHET requires the South African higher education institutions to reach a 78% throughput rate (DHET, 2015). In Cilliers and Harry's (2012) study, a throughput of 60% was found for the IO Psychology master's students. This is not at the percentage level required by the DHET.

IO Psychology is a specialisation field that deals with identifying and finding solutions to national and global demands of society and organisations as they deal with change in the workplace (Schreuder & Coetzee, 2010). This the IO Psychologist is expected to do in multidisciplinary roles that aim at managing talent and change (Landy & Conte, 2016; Van Vuuren, 2010). The importance of the IO Psychologist in the current and future workplace is therefore essential due to the continually changing world of work and talent management demands (Gratton, 2011; Guest & Kriek, 2017; Landy & Conte, 2016; Lawler, 2011; Maitland et al., 2011; Schreuder & Coetzee, 2010; Van Vuuren, 2010).

To ensure an increased throughput rate of the IO Psychology master's students, valid selection methods need to be applied to predict the academic success of the IO Psychology master's students at the research institution effectively. Validity is concerned with what the test measures, and how well it does so. Validity should not be seen as a particular property of a measure, but rather for its specific purpose. This means that, if a cognition measure is applied, this measure should not test something else other than cognition (Foxcroft & Roodt, 2009; Kriek, 2009a; Roodt, 2009; Salkind, 2016). Of additional importance with regard to validity is the Employment Equity Act (EEA) (1998) that clearly states that no psychometric measures may be used for selection if they have not been proven to be valid, reliable, fair, free from bias and credible. It is also noted in the EEA that it is fair to discriminate a person on the basis of an inherent job requirement. The EEA has been developed in reaction to South

Africa's history of bias and discrimination during the apartheid era (Ferreira, 2016; Claassen, 1997; Laher & Cockroft, 2014). No predictive validity studies have been conducted on the psychometric measures that are used as part of the selection battery for the IO Psychology master's students; it becomes vital to do so.

Competency-based assessment is a method of ensuring job relevance through linking assessment measures to the inherent job requirements (Potgieter & Van der Merwe, 2002; SHL, 2011b). The CBA approach was therefore applied at the research institution to ensure that the assessments used for selection, ensured that the selection of IO Psychology master students measure the candidates' competencies along the inherent IO Psychology master's degree requirements (Viviers & Van Niekerk, 2012).

A competency is the knowledge, skills, abilities and personal attributes that contribute to the performance of the candidate (Wilcox, 2016). If the appropriate competencies of the IO Psychology master's students are in place, they should be able to succeed, not only as IO Psychology master's students, but also as IO Psychologist once qualified (Viviers & Van Niekers, 2012; Wilcox, 2016). In order to appropriate the correct competencies required for the role of IO Psychology master's students, a competency modelling process is typically used to build such a framework that entails the identification, definition and measurements of the competency to be measured (Bartram, 2004; Schippmann et al., 2000). The final competencies that have been linked to the inherent requirements of the job then become the job profile (Campion et al., 2011).

The objective of the empirical study was to determine whether or not there was a relationship between the academic performance of the IO Psychology master's students and the IO Psychology master's students results on the Verify Graduate Ability tests' (VMG3, NMG3) sten scores, their OPQ32r sten scores and their PJM competency profiles, after each had completed his/her academic year and after the full degree had been completed. It was of additional importance to determine whether there were additional critical competencies that displayed a significant correlation with academic success that did not form part of the IO Psychology master's students' profiles.

The sample in this study consisted of those who had been successfully selected into the IO Psychology master's programme over a five-year period. The sample comprised of two-third females with a demographic representation of mostly white students with the remainder of the sample consisting of African, Indian and Coloured students. The only pass rate available in this study was for IO Psychology master's students' M1 year results that displayed a 93.7%

pass rate. This indicated that most students who were selected into the IO Psychology master's course passed their M1 year. However, more than half of the students that formed part of this study were still in the process of completing their qualification, which requires them to complete the M2 year. The M2 year consists of a mini dissertation component. This runs in line with Abiddin's (2011) recommendation that more structure and supervision aids should be incorporated during the thesis component of higher education courses.

The empirical study found a small but definite relationship between the IO Psychology master's students' academic performance and Verify Graduate Ability tests. More specifically, the Verity Graduate Numerical Ability test showed a small, but definite relationship with predicting the academic success of the M1, the M2 year and the final results of the student ($p \geq 0.0005$). The Verify Graduate Verbal Ability test showed a small but definite relationship with predicting academic success for the M1 year only ($p \geq 0.0005$). These results make the Graduate Verify Ability tests the strongest predictive assessments of the psychometric assessment battery used for predicting academic success. It is not surprising since cognition under which the Graduate Verify Ability tests fall is regarded the strongest predictor for academic success in general (Bartram, 2005; Kappe & Van der Flier, 2011; Kotze & Griessel, 2008; Puchert et al., 2017).

Only a few competencies of the OPR32r displayed a small but definite relationship with academic success. This resulted in the OPQ32r not displaying an overall significant relationship with the ability to predict the academic success of the IO Psychology master's students. Along with the results, an academically achieving student in his/her M2 year could be described as reserved, tense driven, generally anxious and less optimistic, untrusting and emotionally controlled.

In Cilliers and Flotman's (2016) qualitative study on IO Psychology master's students at the same research institution mirrored the OPQ32r's sten score findings in that they sought emotional support, and learnt how to cope with the academic pressure by exploring their emotions. Additionally, it was found that the students were generally anxious and stressed during their studies, and that only some displayed feelings of optimism.

There were research points towards a positive link between personality and cognition. The higher the cognitive ability, the more emotionally stable and open to new experience, the individual was found to be (Rammstedt et al., 2016; Von Stumm & Ackerman, 2013). This is seen in this study as well. The higher the cognitive scores as seen in the Verify Graduate

Ability tests, the more emotionally stable the student has shown to be as reflected in the OPQ32r scores.

No relationship was found between the PJM overall scores and the PJM band scores with academic success. Individual competencies that form part of the IO Psychology master's students' competency profile have displayed a small but definite relationship with academic success. These include writing and reporting, learning and researching, analysing and coping with pressure and setbacks. Only learning and researching was found to have a predictive value for both the M1 year and final result where all the others only displayed a relationship with the M1 year. This could be mostly due to the sample size being much more prominent for the M1 year than for the M2, and final results since a large number of students were still completing these components of the course.

Some competencies that are not part of the IO Psychology master's students' competency profile and have further been found to predict academic success. These competencies include creating and innovating and formulating strategies and concepts. What was of particular interest was that most of the significant competencies included scores from both the Graduate Verify Ability tests and the OPQ32r. The Graduate Verify Ability tests were therefore seen as adding validity to the PJM competencies with regard to predicting academic success of the IO Psychology master's students.

In conclusion, the current study found a small, but definite relationship between the academic success of the IO Psychology master's students and the Graduate Verify Ability tests as well as select competencies that form part of the IO Psychology master's student competency profile. No overall significant relationship was, however found between academic success and the OPQ32r sten scores or the overall PJM scores and PJM band scores.

4.2 LIMITATIONS

A number of significant limitations need to be considered with regard to this empirical study.
One fundamental limitation to consider is that this study only focused on one of the four measures that count towards the final recommendation for acceptance. As part of the selection requirements, the applicant to the IO Psychology master's course is selected along with four measures that contribute 25% each towards the final mark. These include the student's honours mark, the PJM scores of the applicant, the article assignment score and the CBI score.

An additional limitation includes the sample that only included successfully selected IO Psychology master's students. A restriction of range may have therefore affected the correlations obtained. The M1 year had a much larger sample than the M2 year and final results. The sample was further slanted by the period of study that is acceptable for a master's degree, namely, four years. It is a challenge to obtain a significant enough sample in a five-year period that contain students who have passed both the M1 and M2 years respectively.

Due to the limited scope of this study, the other measures in the selection assessment have not been included in the analyses. These include the previous academic results of the student, the article assignment and the CBI that all contribute equally to the final decision of acceptance of the IO Psychology master's student.

4.3 RECOMMENDATIONS

It is strongly recommended that this study be redone with a larger sample size. This should be achieved by looking at the results over a longer than five-year period. This should increase the sample of the M2 results, which is necessary to combat the current restriction of range discrepancies. The previous academic results of the applicants, the article assignment marks and the CBI should also be included to derive additional insight into the potential incremental validity of the full assessment battery. An additional validity study could be beneficial when regarding the personality competency scores of the students that have managed to pass their course requirements within the time frame required by the research institution versus those students that are taking longer to complete the course requirements.

A further recommendation includes a relook at the PJM competencies of the IO Psychology master's student. Since the IO Psychology master's student profile was based on a working IO Psychologist, it is recommended that a new competency profile be done that is based on an academically successful IO Psychology master's student instead. This study points to some predicative competencies and measures that can be used to revise the IO Psychology master's student competency profile for future selection and development applications to ensure validity, reliability, credibility and fairness as required by the EEA (1998).

Lastly, it is recommended that selection be weighted stronger along the cognitive assessment results of the psychometric measures. This is due to the fact that the cognitive measures of the psychometric assessment battery displayed the strongest predictive values for academic success of an IO Psychology master's student. It is therefore recommended that the Verify Graduate Ability test results be used as a separate weighting additionally to the PJM scores

as part of the selection process. More specifically, the Verify Graduate Numerical Ability test results should be more closely regarded as a predictor for the M2 year. By doing this, the cognitive measures applied will have a double weighting in that they load onto the PJM competencies as well as receive a weighting on its own. This may improve the probability to select IO Psychology master's students who not only meet the M1 requirements as they do now, but are also most likely to complete the M2 course requirements in order to complete the full IO Psychology master's degree.

4.4 CHAPTER SUMMARY

In chapter 4, the conclusions, limitations and recommendations were outlined.

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5.1 APPENDIX A: ETHICAL CLEARANCE

UNISA university of south africa

UNISA CEMS/IOP RESEARCH ETHICS REVIEW COMMITTEE

20 July 2017

NHREC Registration # : (if applicable)
ERC Reference # :2017_CEMS/IOP_010
Name : Karina A Olivier
Student #: 44044496
Staff #: N/A

Dear Karina A Olivier,

Decision: Ethics Approval from 20 July 2017 to 20 July 2020

Researcher(s): Name: Karina A Olivier
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E-mail address, telephone: barnaha@unisa.ac.za, (012) 4294217
Mrs A Van Niekerk
E-mail address, telephone: vnieka2@unisa.ac.za, (012) 4298231

Working title of research:

Validating a competency based selection battery for Industrial and Organisational Masters students

Qualification: Postgraduate degree

Thank you for the application for research ethics clearance by the Unisa CEMS/IOP Research Ethics Review Committee for the above mentioned research. Ethics approval is granted for **three** years.

*The **low risk application** was **reviewed** by the CEMS/IOP Research Ethics Review Committee on the 18th July 2017 in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment. The decision was approved on 18th July 2017.*

The proposed research may now commence with the provisions that:

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the Unisa CEMS/IOP Research Ethics Review Committee.
3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
4. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.
5. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.
6. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data require additional ethics clearance.
7. No field work activities may continue after the expiry date (20th July 2020). Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:
*The reference number **2017_CEMS/IOP_010** should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.*

Yours sincerely,

Signature
Chair of IOP ERC
E-mail: grobls@unisa.ac.za
Tel: (012) 429-8272

Signature
Executive Dean : CEMS
E-mail: mogalmt@unisa.ac.za
Tel: (012) 429-4805

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
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www.unisa.ac.za

5.2 APPENDIX B: CONFIDENTIALITY AGREEMENTS AND DATA PROTECTION

DATA SECURITY AND CONFIDENTIALITY AGREEMENT

Title of Study: **Validating a competency based selection assessments for Industrial and Organisational Masters' students**

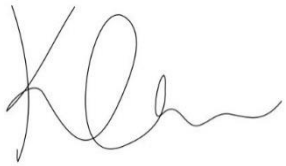
As a member of the research team or in the capacity of providing support to the research team in the above research project:

I, KARINA OLIVIER (name and surname in print letters), confirm that I will maintain the highest level of confidentiality and security with regard to any project data (quantitative, hard copies, recorded or electronic data) that I will have access to.

I understand that participants in the project are provided with a guarantee that their data and personal information will be maintained securely and treated confidentially at all times and that the data that they provide as individuals (either in completing questionnaires or biographical data) will not be disclosed or made available to any person outside of the core research team and its support staff (core research team, statistical support).

Research team member or support staff member:

NAME AND SURNAME: Karina Olivier



Date: 10 March 2017

Research Agreement between Karina Olivier

and

SHL Saville & Holdsworth (PTY) LTD.

CEB | SHL Talent Measurement

SHL Saville & Holdsworth (Proprietary) Limited
Ground Floor Block D, Southdowns Office Park
Corner of John Vorster Road and Karee Road, Irene Ext 54
Centurion 0157
South Africa
Tel: +44-(0)208-335-8000
Fax: +27-12-425-0191

Karina Olivier
Psychometrist – Independent Practice
Nome Consulting
191 Bekker Road
Officewyze Business Centre
Midrand

06 October 2015

Dear Karina Olivier

Research Agreement with SHL Saville & Holdsworth (Proprietary) Limited ("SHL")

The purpose of this agreement is to allow SHL to discuss with you the possibility of supporting you or providing you with materials to carry out a Research Project as further defined in Schedule A, and to disclose to you certain pieces of Confidential Information.

1. DEFINITIONS

In this Agreement, unless the context otherwise requires:

"Confidential Information" means any and all information in whatever form disclosed by one party to the other whether provided orally, in writing or in any other manner, which is designated in writing as being confidential or which by its nature is intended to be confidential including, but not limited to, the terms and conditions of this Agreement, the existence and content of the discussions between the parties, trade secrets, any information relating to a Disclosing Party's plans, designs, ideas, concepts, costs, prices, finances, marketing plans, business opportunities, customers, clients, personnel, products (including software and hardware products), research, development, know-how, any agreement or commercial negotiations concerning the Disclosing Party's products and any other technical or business information of the Disclosing Party but excluding the Excluded Information;

"Disclosing Party" means the party disclosing Confidential Information;

"Receiving Party" means the party receiving the Confidential Information.

2. <u>The Research Project</u>

In collaboration on the Research Project we shall provide you with certain SHL instruments, materials, data and other confidential information as further set out in Schedule A ("SHL Materials"). You shall use SHL Materials only to collect data in relation to the Research Project. As the case may be, SHL will retrieve all data collected in relation to the Research Project using SHL Materials and give a copy of the results to you, and/or you will retrieve and send to SHL a copy of all data collected in relation to the Research Project using SHL Materials or any other materials as soon as reasonably practicable upon completion of the data collection.

Your Supervisors, Professor Antoni Barnard and Mrs. Annelize van Niekerk, will have access to the information described in Schedule A for the sole and limited purpose of your supervision under this agreement subject to their returning a signed copy of SHL's Non-Disclosure Agreement. You agree not to provide the information described in Schedule A to any other party without our express permission, including to any other representative at your University.

In return for authorising you to use SHL Materials for the Research Project, you shall (i) authorise SHL to keep a copy of all data collected (regardless of source) in relation to the Research Project for SHL's own internal research purposes; (ii) appropriately cite SHL Materials and/or SHL in your research findings; (iii) send SHL a copy of the final dissertation and any publication following on from this dissertation before it is published to allow SHL to review the papers for inaccurate insertions, incorrect conclusions, misleading statements or other errors. You agree that prior to publishing such a

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report, all the aforementioned will be either corrected at SHL's direction, or qualified in a manner acceptable to SHL.

SHL further undertakes not to publish the data collected in relation to the Research Project using materials other than SHL Materials or any research findings using such data without your prior consent and only to use such data for SHL own internal researches.

3. Disclosure and Use

3.1. You shall, at all times, treat all SHL Materials disclosed to you as secret and confidential.

3.2. You shall not reproduce, or use any SHL Materials in any other way other than for the purposes of the proper performance of this Agreement or with our prior written consent.

3.3. You shall not disclose any SHL Materials to any other party without our prior written consent. Where such consent is given, you shall ensure that the third-party Receiving Party is subject to a confidentiality agreement in the form of that set out in Schedule B and you agree to provide SHL with a copy of the signed and executed Confidentiality Agreement.

3.4. You may disclose your Research Project to your lecturers, Prof. Antoni Barnard and Mrs. Annelize van Niekerk subject to the terms of this agreement and the Non-Disclosure Agreement entered into between SHL and Professor Antoni Barnard and Mrs. Annelize van Niekerk.

4. Exceptions

The restrictions on use and disclosure set out above shall not apply to any SHL Materials which:-

4.1. is disclosed to you, without any obligation of confidence, after the date of this Agreement by a third party who has not derived it directly or indirectly from us;

4.2. is in or comes into the public domain other than as a result of a breach of this Agreement;

4.3. you disclose pursuant to a legal obligation, providing you first consult with us as to the nature of this obligation and the SHL Materials which you believe must be disclosed pursuant to it so that an appropriate course of action may be agreed; or

4.4. you can prove, by documentary evidence produced to us within 28 days of the date of disclosure of SHL Materials to you, is or was already in your possession and at your free disposal before such disclosure.

5. Legal Compulsion to Disclose

In the event that the Receiving Party, its officers, employees, agents or advisers or anyone to whom that party transmits any Confidential Information becomes (or it is reasonably likely that it or they shall become) compelled to disclose any Confidential Information disclosed by the Disclosing Party by reason of law or government direction or request, prompt notice of such fact shall be given to the Disclosing Party at the above address so that the Disclosing Party may seek an appropriate remedy to prevent such disclosure or waive compliance with the provisions of this agreement preventing such disclosure and the Receiving Party will comply with the reasonable directions of the Disclosing Party regarding the manner, timing and content of such disclosure and will fully cooperate with the Disclosing Party in the event that the Disclosing Party elects to challenge the validity of such requirement.

6. Confidentiality Measures

In order to ensure the secrecy and confidentiality of SHL Materials, you agree:-

6.1. to keep separate all SHL Materials (and any copies thereof) and all information which you will generate based thereon, from all other documents and records held by you;

6.2. not to use, produce, transform or store any of SHL Materials in any externally accessible computer or electronic information retrieval system or transmit it in any form or by any means whatsoever outside your usual place of business unless strictly necessary for the purpose of this Agreement in which case you will use your best endeavours to maintain the secrecy and confidentiality of SHL Materials; and

6.3. to notify us promptly of the date of, and the circumstances involved in, the loss of or unauthorised disclosure, if any, of any documents, data, drawings, descriptions, writings or information comprised in, containing or relating to SHL Materials; and

6.4 refrain from reverse engineering, decompiling or disassembling any software code and/or pre-release hardware devices disclosed by Disclosing Party to Receiving Party under the terms of this Agreement, except as expressly permitted by applicable law; and

6.5 make copies of the Confidential Information only to the extent that it is strictly necessary.

7. Intellectual Property Rights

7.1. You acknowledge that all intellectual property and other property rights in all SHL Materials, including but not limited to copyright, trade marks, service mark, design right, software and patents are and remain in our sole ownership and that no rights of such nature are granted to you under this Agreement.

7.2. We hereby grant you a non-exclusive, revocable licence to use the SHL Materials for your non-commercial personal research purposes only. Such licence shall automatically terminate on expiry or termination of this Agreement unless otherwise agreed by SHL.

7.3. You agree not to cause or permit anything that may damage our intellectual property rights in the SHL Materials and to provide due accreditation and acknowledgement where SHL Materials has been used in your work.

8. Term and Termination

8.1. This Agreement shall commence on the date we receive your signed acceptance and shall continue until the earliest occurrence of any of the following events: (i) Either party decides not to proceed with the Research Project, (ii) pursuant to clause 8.2 below, or (iii) the completion of the Research Project.

8.2. Without prejudice to any rights or remedies available to us, we may immediately terminate this Agreement by notice in writing to you if you commit a material breach of this Agreement, which breach is not capable of remedy or if remediable, has not been remedied within 30 days of being required to do so in writing.

8.3. Upon termination or expiry of this Agreement, you will return to us promptly all SHL Materials and all documents containing SHL Materials together with any copies (whether in electronic or other formats) of the same unless otherwise agreed in writing by SHL.

8.4. Any provision which expressly or by implication is intended to come into or remain in force on or after termination shall continue in full force and effect.

9. Indemnity

9.1. You shall keep us fully indemnified against all costs, claims, actions, expenses, losses or liabilities (including without limitation, economic loss, and loss of profit (direct or indirect), indirect or consequential loss) resulting directly or indirectly from your failure to comply with this Agreement.

9.2. Each party excludes all liability to the other party (except in respect of death or personal injury due to that party's negligence or in respect of any fraudulent misrepresentation) for any loss or damage (whether arising under contract, in tort or otherwise) suffered or incurred by the other party as a result of the supply to that party or the use by that party of the Confidential Information, in particular as a result of any errors or inaccuracies in the Confidential Information whether such losses arise directly or indirectly. In respect of all such computer software and/or hardware forming part of the Confidential Information, such material is provided "AS IS" without warranty of any kind, and the Receiving Party agrees that neither the Disclosing Party nor its suppliers shall be liable for any damages whatsoever arising from or relating to Receiving Party's use or inability to use such software and/or hardware.

9.3. Each party agrees to comply with all applicable international and national laws that apply to any Confidential Information (including any applicable data protection regulations).

9.4. Notwithstanding and without prejudice to the other terms of this Agreement, you hereby consent and agree that any breach of the terms of this Agreement could cause irreparable damage to SHL and in addition to all other remedies SHL shall be entitled to seek injunctive or other interim or equitable relief, including damages (or their equivalent in any jurisdiction), which may be appropriate in the event of any breach or anticipatory breach by you of the terms of this Agreement. Nothing contained in this Agreement shall be construed as prohibiting SHL from pursuing any other remedies available to it either at law or in equity for such breach or anticipatory breach including specific performance and recovery of damages. If you are in breach of this Agreement, you shall be liable to pay SHL's reasonable legal fees in enforcing its rights arising out of or relating to this Agreement.

10. General

10.1. Any notice given under this Agreement shall be in writing and delivered by registered post, fax or email to the address of the party indicated in this Agreement or such other address as notified to the other party from time to time and in the case of notices sent by fax or email, a confirmation copy shall be sent by registered post as set out in this paragraph.

10.2. Nothing in this Agreement shall be regarded as creating a partnership or a relationship of employer and employee, or principal and agent between the parties.

10.3. This Agreement complemented by any specific non-disclosure agreement entered into between the parties, constitutes the entire agreement and understanding between the parties with respect to its subject matter and supersedes any prior agreement, understanding or arrangement between the parties, whether oral or in writing.

10.4. No variation of this Agreement shall bind any party unless made in writing and signed by all parties hereto.

10.5. The invalidity or unenforceability of any term or any right arising pursuant to this Agreement shall not adversely affect the validity or enforceability of the remaining terms and rights.

10.6. You may sub-contract performance of the services (or part thereof) to any person with the prior written consent of SHL provided that you shall remain responsible to us for the performance of such services in accordance with the terms of this Agreement.

10.7. This Agreement shall not be assigned by you without our prior written consent. For the purposes of the Contracts (Rights of Third Parties) Act 1999, the provisions of this Agreement is not intended to, and does not, give any person who is not a party to it any right to enforce any of its provisions.

10.8. Any waiver of any breach of this Agreement shall be in writing. The waiver by either party of any breach of this Agreement shall not prevent the subsequent enforcement of that provision and shall not be deemed to be a waiver of any subsequent breach of that or any other provision.

10.9. This Agreement and any dispute or claim arising out of or in connection with it will be governed by and construed in accordance with the laws of England. All disputes or claims arising out of or relating to this Agreement shall be subject to the exclusive jurisdiction of the English Courts to which both parties irrevocably submit.

I should be grateful if you would sign the enclosed duplicate letter and return it to me to confirm your acceptance of the terms and conditions set out above.

Yours faithfully

_____

for and on behalf of SHL

I hereby confirm my acceptance of the terms and conditions set out above.

Karina Olivier

Name

[For and on behalf of .....]
Dated
22 Oct 2015

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Schedule A

1. Purpose of Research Project

Completion of a dissertation for the Master's degree of Karina Olivier – Validating a competency-based selection battery for Industrial and Organisational Masters students.

2. SHL Research Materials

OPQ32r User and Technical Manuals
Verify User and Technical Manuals

K.O

Schedule B

Non-Disclosure Agreement

Between:

Full name:	Karina Olivier for Nome Consulting
Registered address and company number	191 Bekker Road, Officewyze Business Centre, Midrand **(the "Party 1")**

and

Full name:	SHL Saville & Holdsworth (Proprietary) Limited
Registered address and company number	Ground Floor Block D Southdowns Office Park, CNR of John Vorster Road and Karee Road, Iren Ext 54, Centurion 0157 South Africa - a subsidiary of CEB Inc. ("CEB") **(the "Party 2")**

Term
This Agreement shall be signed by both parties and shall have effect from the later of the two signature dates as set out below, until either party terminates this Agreement by giving the other party at least thirty (30) days prior written notice of termination.

Agreement
In consideration of the mutual covenants and undertakings contained in this Agreement, **THE PARTIES AGREE** to the terms and conditions of this Agreement as set out in this document.

Special terms	
The following terms ("Special Terms") shall apply to supplement, clarify and/or add to the terms attached to this cover letter and in the event of any conflict between such terms, the Special Terms shall prevail.	
Clause 1 (Definition)	**"Purpose"** means the purpose of Validating a competency-based selection battery for Industrial and Organisational Masters students.
Clause 6.6 (Law)	**England**
Clause 6.6 (Jurisdiction)	**English Courts**
Additional Terms	

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1 DEFINITIONS

1.1 In this Agreement, unless the context otherwise requires:

"Confidential Information" means any and all information in whatever form disclosed by one party to the other whether provided orally, in writing or in any other manner, which is designated in writing as being confidential or which by its nature is intended to be confidential including, but not limited to, the terms and conditions of this Agreement, the existence and content of the discussions between the parties, trade secrets, any information relating to a Disclosing Party's plans, designs, ideas, concepts, costs, prices, finances, marketing plans, business opportunities, customers, clients, personnel, products (including software and hardware products), research, development, know-how, any agreement or commercial negotiations concerning the Disclosing Party's products and any other technical or business information of the Disclosing Party but excluding the Excluded Information;

"Disclosing Party" means the party disclosing Confidential Information;

"Excluded Information" means any Confidential Information which:

(a) is in or comes into the public domain other than as a result of a breach of this Agreement or any undertaking given the Disclosing Party;

(b) is disclosed to the Receiving Party, without any obligation of confidence, after the date of this Agreement by a third party who has not derived the Information directly or indirectly from the Disclosing Party;

(c) is independently developed by the Receiving Party without the use of any Confidential Information of the Disclosing Party as evidenced by written documentation;

(d) the Receiving Party can prove, by documentary evidence produced to the Disclosing Party within 28 days of the date of disclosure of the Information, was already in its possession and at its free disposal before such disclosure provided that the source of such information is not subject to any agreement or other duties relating to confidentiality in respect thereof; or

(e) the Receiving Party is required to disclose pursuant to a legal obligation, providing the Receiving Party first consults with the Disclosing Party to agree an appropriate course of action.

"Purpose" means the purpose set out in the cover sheet of this Agreement; and

"Receiving Party" means the party receiving the Confidential Information.

2 DISCLOSURE AND USE

2.1 Each party shall keep strictly private and confidential in accordance with this Agreement:

(a) the Purpose and the existence of discussions or negotiations taking place between the parties; and

(b) all Confidential Information and not to disclose it to any other person whatsoever except those who are a party's representatives or advisers and who need to know such information for the Purpose.

2.2 Each party agrees to use the Confidential Information only for the Purpose and for no other purpose. Each party agrees not to make any use of any Confidential Information disclosed by the other party with a view to its commercial exploitation either by itself or in conjunction with any other person or entity of whatsoever nature.

3 CONFIDENTIALITY MEASURES

3.1 To secure the confidentiality attaching to the Confidential Information, the Receiving Party shall:

(a) refrain from disclosing any Confidential Information of the Disclosing Party to third parties for five (5) years following the date that Disclosing Party first discloses such Confidential Information to Receiving Party except as expressly permitted in this Agreement;

(b) apply to the Confidential Information no lesser security measures and degree of care than those which the Receiving Party applies to its own Confidential Information and which the

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Receiving Party warrants as providing adequate protection from unauthorised disclosure, copying or use;

(c) refrain from disclosing, reproducing, summarizing and/or distributing Confidential Information of the Disclosing Party except in pursuance of Receiving Party's business relationship with Disclosing Party, and only as otherwise provided hereunder;

(d) refrain from reverse engineering, decompiling or disassembling any software code and/or pre-release hardware devices disclosed by Disclosing Party to Receiving Party under the terms of this Agreement, except as expressly permitted by applicable law;

(e) allow access to the Confidential Information exclusively to those of its employees who have a need to see and use it for the Purpose and inform each of the said employees of the confidential nature of the Confidential Information and of the obligations on that party in respect thereof and shall take such steps as may be reasonably desirable to enforce such obligations;

(f) make copies of the Confidential Information only to the extent that it is strictly necessary;

(g) notify the Disclosing Party immediately upon discovery of any unauthorized use or disclosure of Confidential Information or any other breach of this Agreement by Receiving Party and its employees and consultants, and will cooperate with Disclosing Party in every reasonable way to help Disclosing Party regain possession of the Confidential Information and prevent its further unauthorized use or disclosure.

4 LEGAL COMPULSION TO DISCLOSE

4.1 In the event that the Receiving Party, its officers, employees, agents or advisers or anyone to whom that party transmits any Confidential Information becomes (or it is reasonably likely that it or they shall become) compelled to disclose any Confidential Information disclosed by the Disclosing Party by reason of law or government direction or request, prompt notice of such fact shall be given to the Disclosing Party at the above address so that the Disclosing Party may seek an appropriate remedy to prevent such disclosure or waive compliance with the provisions of this agreement preventing such disclosure and the Receiving Party will comply with the reasonable directions of the Disclosing Party regarding the manner, timing and content of such disclosure and will fully cooperate with the Disclosing Party in the event that the Disclosing Party elects to challenge the validity of such requirement.

5 MUTUAL RIGHTS AND OBLIGATIONS

5.1 **No representation:** The Receiving Party acknowledges that it shall be solely responsible for making its own judgement and decisions on all Confidential Information disclosed to it and except as may be otherwise agreed in writing by the Disclosing Party, the Disclosing Party shall not accept any responsibility for or make any representation, express or implied, with respect to the accuracy or completeness of the Confidential Information (whether written or oral) supplied.

5.2 **Liability:** Each party excludes all liability to the other party (except in respect of death or personal injury due to that party's negligence or in respect of any fraudulent misrepresentation) for any loss or damage (whether arising under contract, in tort or otherwise) suffered or incurred by the other party as a result of the supply to that party or the use by that party of the Confidential Information, in particular as a result of any errors or inaccuracies in the Confidential Information whether such losses arise directly or indirectly. In respect of all such computer software and/or hardware forming part of the Confidential Information, such material is provided "AS IS" without warranty of any kind, and the Receiving Party agrees that neither Disclosing Party nor its suppliers shall be liable for any damages whatsoever arising from or relating to Receiving Party's use or inability to use such software and/or hardware.

5.3 **Legal Compliance:** Each party agrees to comply with all applicable international and national laws that apply to any Confidential Information (including any applicable data protection regulations).

5.4 **No obligation:** Each party agrees that the other party will be under no obligation to accept any offer or proposal which may be made in the course of any negotiations and that each party reserves the right in its sole and absolute discretion to terminate discussions and negotiations with the other party at any time. Each party is under no obligation to reimburse any costs or expenses which the other party may incur in connection with any discussions between the parties concerning the Purpose. Each party shall be entitled at any time to decline to provide or to continue to provide any Confidential Information to the other party.

5.5 **Deliver Up:** Each party shall immediately upon receipt by it of a written request from the other party to do so, deliver up to the other party or to its order all written Confidential Information which had been disclosed by that party (including any copies, analyses, memoranda or other notes made by

either party or in either party's possession or under their custody and control) or at the other party's option, certify the destruction of the same and so far as it is practicable to do so, expunge any such Confidential Information from any computer, word processor or other device in its possession or under its custody and control containing Confidential Information.

5.6 **Additional Remedies:** Notwithstanding and without prejudice to the other terms of this Agreement, each party hereby consents and agrees that any breach of the terms of this Agreement could cause irreparable damage to the other party and in addition to all other remedies each party shall be entitled to seek injunctive or other interim or equitable relief, including damages (or their equivalent in any jurisdiction), which may be appropriate in the event of any breach or anticipatory breach by the other party of the terms of this Agreement. Nothing contained in this Agreement shall be construed as prohibiting either party from pursuing any other remedies available to it either at law or in equity for such breach or anticipatory breach including specific performance and recovery of damages. If the Receiving Party is in breach of this Agreement, it shall be liable to pay the Disclosing Party's reasonable legal fees in enforcing its rights arising out of or relating to this Agreement.

5.7 **Intellectual Property:** All proprietary rights in the Confidential Information (including any copyright, patent, database right, moral right, registered design, trade mark, service mark, domain name, know-how, utility model, unregistered design or where relevant, any application for any such right and all other industrial rights or rights of an intellectual property nature) shall continue to belong solely to the Disclosing Party. This Agreement shall not be construed as a grant by the Disclosing Party to the Receiving Party of any licence of rights or other rights relating to any Confidential Information whether before or after the date of this Agreement.

6 GENERAL

6.1 **Notice:** Any notice given under this Agreement shall be in writing and delivered by registered post to the registered address of the party, or such other address as is notified to the other party from time to time.

6.2 **Void provisions:** If at any time any part of this Agreement is held to be or becomes void or otherwise unenforceable for any reason under any applicable law, the same shall be deemed omitted from this Agreement and the validity and/or enforceability of the remaining provisions of this Agreement shall not in any way be affected or impaired as a result of that omission.

6.3 **Waiver:** Any waiver of any breach of this Agreement shall be in writing. The waiver by either party of any breach of this Agreement shall not prevent the subsequent enforcement of that provision and shall not be deemed to be a waiver of any subsequent breach of that or any other provision.

6.4 **Assignment:** This Agreement is personal to both parties. Neither party shall assign or otherwise transfer the rights and responsibilities under this Agreement to any other party. A person who is not a party to this Agreement shall not have the right to enforce any term of this Agreement without the express prior written agreement of the parties which agreement must refer to this clause.

6.5 **Entire Agreement:** This Agreement sets out the entire agreement between the parties relating to its subject matter and overrides any prior agreement or representations. No purported alteration or variation of this Agreement shall be effective unless it is in writing and is duly executed by the parties to this Agreement. All warranties and conditions not set out in this Agreement whether implied by statute or otherwise are excluded to the fullest extent permitted by law.

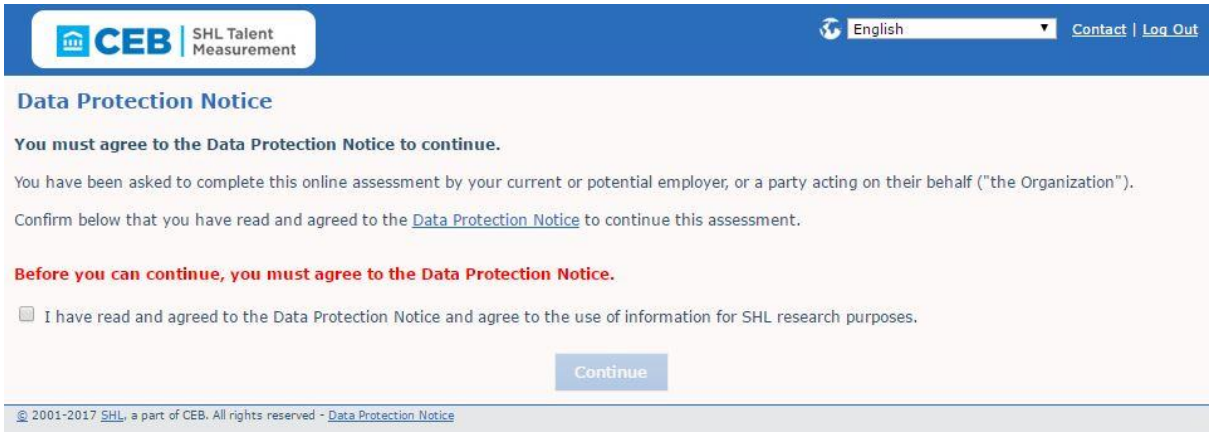
6.6 **Law/Jurisdiction:** This Agreement shall be governed by the laws of the country set out in the cover sheet of this Agreement, and subject to the exclusive jurisdiction of such courts also as set out in the cover sheet of this Agreement, to which the parties irrevocably submit.

Signed for and on behalf of Party 1 by:		Karina Oliver	
Position:	Psychometrist.	**Date:**	22 Oct 2015
Address:	191 Bekke Road Mudrod		

K.O

Signed for and on behalf of Party 2 by: Nolan Davey			
Position:	Operations Director	**Date:**	26/10/15
Address:	24 Kara Road, Irene, Centurion		

APPENDIX C: ONLINE CONSENT FORM



DATA PROTECTION NOTICE

Please read this Data Protection Notice ("Notice") to continue

This Notice describes how CEB Inc., 1919 N. Lynn St. Arlington, Virginia, 22209 USA, the parent company of SHL Group Limited of The Pavilion, 1 Atwell Place, Thames Ditton, Surrey KT7 0NE, England, and its affiliates and (together, "CEB" or "we" or "us") collect and use personal and non-personal information collected through our assessment products and services. When we refer to personal information, we mean information about you, where we may be able to identify you ("Personal Information").

This Notice applies to assessment takers, whether such assessments are carried out online or in any other format.

Please read the entire Notice carefully - by taking an assessment, you consent to its terms (including as amended from time to time). If you do not agree with the terms of the Notice, you should not take the assessment.

[ ] I have read the Notice and agree that my Personal Information can be collected, used and/or disclosed as described in the Notice

[ ] I agree that CEB can contact me, including by email, in order to participate in future test trials, surveys and to provide further information relating to the assessment.

If you have questions about the Notice, please contact us at dataquestions@cebglobal.com.

Information We Collect

Personal Information we collect on behalf of the Employer: If you have been asked to take an assessment by your employer or potential future employer (the "Employer"), that Employer will be the data controller of your Personal Information as described below. Depending on the type of assessment and the instructions we receive from the Employer, the Personal Information that we collect and process on the Employer's behalf may include:

- Your name and email address or other personal details ("Candidate Data");
- Your answers to the assessment questions ("Assessment Data");
- Your assessment results ("Results Data"); and
- Additional information provided by the Employer about you (e.g., CV or resume information, whether you were hired or performance appraisals) ("Employer Provided Data").

As the data processor, we will hold the above mentioned data in accordance with the Employer's instructions and may use such data for subsequent assessments and/or reports, as instructed by the Employer.

Optional Personal Information we may collect: In some cases, at the beginning of an assessment, we may ask you to answer some **optional** research questions by providing certain types of demographic information for research purposes ("Research Data"). Providing this information is **completely optional** – if you do not want to answer a question, simply select the "Prefer not to answer" option. If you choose not to answer these questions, it will not keep you from taking the assessment or affect the results of the assessment in any way.

This data will be used only in an anonymised format for research purposes (described below) and will **NOT** be provided to the Employer. We will be the data controller of this Optional Personal Information.

Technical Information: In addition to the Personal Information described above, we also collect information related to the system ("Technical Information") used to take the assessment, including information about browser types, operating systems, IP addresses, and date/time stamps.

How We Use Your Information

We will compile a report containing the Results Data, potentially combined with the Employer Provided Data (both described above) and/or Benchmark Data (as described below) which will be given to the authorised representatives of the Employer (“Report Data”).

We may use an anonymised combination of your Assessment Data, Results Data, Employer Provided Data, and Research Data (where provided) for the following purposes:

- To develop and improve our assessments and services we offer;
- To ensure that our assessments remain fair and objective and to prevent unfair discrimination;
- To create aggregate benchmark measurements against industry-recognised differences for particular groups, jobs, and industries ("Benchmark Data").

We may disclose aggregated and anonymised results of our research to third parties. This information will not identify any individual or organisation.

Where We Process Your Information

We store Personal Information in our data centres in the United Kingdom. A limited number of personnel in our U.S. and India offices may also have access to Personal Information in order to provide the services. We have an Intragroup Agreement in place, signed by all CEB and SHL entities, which contains the European Union (“EU”) Standard Contractual Clauses which have been approved by the EU data protection authorities for the transfer of data outside the European Economic Area. All CEB and SHL entities have the same technical, physical, and administrative security controls and are required to comply with our data protection policies and procedures, applicable laws, and the terms of our client and member contracts governing the collection and use of personal information.

Disclosures to Third Parties

When we have the appropriate permissions, we may disclose Personal Information to third parties in the following limited circumstances:

- if we contract with third parties to perform or provide certain services on our behalf (in which case those third parties will be contractually required to only use the data for purposes of performing those services);
- if we are under a legal obligation to disclose Personal Information; or
- If we sell any business or assets (in which case the buyer will be obligated to honour the terms of this Notice).

Protecting Your Personal Information

We take appropriate steps to protect Personal Information. We have appropriate technical, administrative, and physical security controls in place to protect Personal Information from unauthorised access, improper use or disclosure, unauthorised modification or unlawful destruction or accidental loss.

Access to your Personal Information

If you took an assessment at the request of an Employer, please contact that Employer directly if you would like access to your Personal Information or to exercise any of your other rights that you may have in relation to your Personal Information.

When we are the data controller of your Personal Information, you may contact us in order to find out what information we hold about you or to access, cancel or correct any information that we hold about you. You may request access to your information as mentioned above by printing and completing a Subject Access Request Form and sending it back to us via post or email. The purpose of this form is to ensure that you give us all the necessary information to enable us to comply with your request. You do not have to use this form, but if you do not, we encourage you to provide all the information requested on the form with your request.

Questions or Complaints

Questions about the results of your assessment or the Employer's use of your Personal Information should be sent directly to the Employer at whose request you are taking the assessment.

If you have any questions about this Notice or how we process your personal information, please email us at dataquestions@cebglobal.com.

We agree that any disputes regarding our data protection policies and related actions regarding Personal Information from Europe can be heard by the European Data Protection Authorities or the Swiss Federal Data Protection and Information Commissioner, and we will be subject to the determinations of those bodies. Formal complaints regarding our data protection practices and related actions regarding Personal Information from countries outside the EU may be addressed directly to the data protection authority in your country.

Sanctions

CEB products and services are subject to US sanctions law. As a result, prohibited individuals, or those located in certain countries (Cuba, Iran, North Korea, Sudan and Syria), are not authorised to take assessments on our systems. Please contact us at dataquestions@cebglobal.com with any questions.

Last Updated: 13 August 2016

APPENDIX D: CONSENT FORM FROM STUDENTS THAT THE RESEARCHER HAS HAD DIRCET CONTACT WITH

Appendix A

Cover Letter

Title of Study: **Validating a competency based selection battery for Industrial and Organisational Masters students**

Dear prospective participants

I, Karina Olivier, student number 44044496 (fka Andreae) as a current directed Masters student in Industrial and Organisational Psychology at the University of South Africa am planning on doing my thesis on the validity of the currently used competency based selection battery for Industrial and Organisational Masters students. Ethical clearance will be obtained before gaining access to the secondary data required for this study.

PURPOSE OF THE STUDY

The aim of this study is to validate the competency based selection battery used currently for the Industrial and Organisational Masters students at the University of South Africa (UNISA). The assessment results that will be regarded here will include the OPQ, the Numerical and Verbal reasoning tests and the Competency Based Interview (CBI) scores obtained that have all formed part of the selection process each one of you have completed.

WHY AM I BEING INVITED TO GIVE CONSENT AND WHAT DOES THE RESEARCH INVOLVE AND THE NATURE OF YOUR PARTICIPATION?

My proposed study involves students from 2012 onwards which would in this case include the current master's class of 2015. In this study, a correlation study with regards to the predictive and construct validity of the selection criteria together with a cross sectional correlation of the Competency Based Interview which will regard the convergent and discriminant validity will require access to the secondary data of the final academic marks of each student in order to determine predictive validity.

CAN I WITHDRAW FROM THIS STUDY?

I will not make use of your secondary data if I have not obtained your consent. This does not in any way effect you. Participation is therefore voluntary. You are under no obligation to consent to participation and may also withdraw from the study without giving any reason. If you decide to take part, you will be asked to sign a group written consent form.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?

The IOP UNISA department could benefit greatly from understanding the predictive validity of the assessment tools that are currently being used in order to source individuals that may academically achieve the outcome required.

WHAT IS THE ANTICIPATED INCONVENEINCE OF TAKING PART OF THIS STUDY?

I do not perceive any inconvenience for you. I, as the researcher, will only access secondary data which will give me access to the academic results and gender but no specific identifying data that may enable me to identify the individual that may be associated with a particular mark or final academic achievement.

WILL MY DATA BE KEPT CONFIDENTIAL AND HOW WILL IT BE STORED?

Confidentiality of information will be maintained, by not having access to your name within the data that will be analysed. Furthermore, CEB who are assisting me in the data analysis of the OPQ, and the reasoning assessments as well as the competency based interview question scoring results will be kept and stored by both CEB and the University of South Africa. I will only have access to the final correlated results.

When you place your name, surname, identification number and signature, you will consent to have your academic marks, gender, age and any other supporting data except for your name be include in this validation study in order to aid UNISA in better understanding the predictive validity of the selection battery for Industrial and Organisational Masters students going forward.

I appreciate your participation and will share my findings when the thesis is completed.

Name & Surname	ID number	Signature

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