THE EFFECT OF DISABILITY ON LABOUR MARKET OUTCOMES

A RESEARCH DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS OF THE DEGREE MASTER OF COMMERCE IN ECONMIC DEVELOPMENT AT THE UNIVERSITY OF CAPE TOWN

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DECLARATION

The work presented in this paper is my original work and has not been presented before in the university or any other institution outside the university. The information collected from different sources is true and relevant and has not been manipulated in any way.

Signature Signed by candidate Date_____

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ABSTRACT

This study estimated the effect of disability, disability type and disability grants on labour force participation, employment and wages using NIDS data from Wave 1 to Wave 4. Data was analysed as a panel to account for the effects over time. A pooled OLS, a random effects and a fixed effects model were applied on the panel dataset to explain the effects of disability, disability type and disability grants on labour market outcomes. To determine which of these models was the most appropriate, specification tests were performed. The Hausman test revealed that the fixed effects model was the most appropriate model in explaining the panel dataset. Results from the fixed effects model indicated that disability had no effect on labour force participation and employment but had a negative effect on wages, as wages were likely to decrease by 8% after an individual became disabled. Disability grants had disincentive effects on labour supply as grant recipients were 12% less likely to participate in the labour market and 8% less likely to be employed. Disability type was found to have no effect on labour force participation, employment and wages except for individuals with sight/hearing and speech disabilities as their wages were likely to decrease by 14% after individuals developed problems with sight, hearing or speech. Results from the pooled OLS and random effects model however found significant effects of disability, disability type and disability grants on all labour market outcomes. Despite estimation biases that do not account for self-selection or the lack of correlation between unobservable characteristics and independent variables, random effects models allow for the generalization of results beyond the sample and may be of interest to policy makers. This however requires further investigation using multilevel models that correct for selection bias. This study concluded that disability had negative effects on labour market outcomes particularly on wages, demonstrating that PWDs remain economically disadvantaged. The implementation of policies that prioritize equity for PWDs in workplaces is therefore recommended.

CHAPTER ONE
INTRODUCTION

1.0 Background to the study

Studies have attempted to explain the inequalities in labour market outcomes which take the form of wage or non-wage discrimination based on characteristics such as age, gender, marital status, and religion, just to mention a few. Wage discrimination occurs when there are disparities in income based on non-productivity characteristics, while non-wage discrimination occurs when there are disparities in non-monetary compensation rewarded to employees beyond the traditional wage and salary payments (Budd, 2004). Despite the growing population of people with disabilities (PWDs), there exists limited research on discrimination based on disability, yet PWDs are important to an economy because they are a source of labour and convey a sense of social responsibility for the organisations that employ them. PWDs provide an untapped pool of talent that can provide a solution to the shortage of skills, especially in the case of South Africa which faces a looming skills gap (Silver & Koopman, 2002).

With an estimated population of 55 million, 7.7% of the South African population has reported some form of disability (Statistics South Africa, 2016). Such large numbers require an understanding of the relationship between disability and labour market outcomes because of the huge disparity that exists between PWDs and their non-disabled counterparts. Given that only 1.2% of top management jobs are currently occupied by PWDs, with less than 1% participating in senior management, professionally qualified, skilled, semi-skilled and unskilled job levels, it is important for policy makers to offset the negative effects that come with having a disability (Commission for Employment Equity, 2017). The adverse effects associated with the hiring of PWDs stem from the negative perception of society towards disability because it defies cultural norms and is sometimes viewed as a curse (Baldwin & Johnson, 2000; Eskay et al., 2012). Overtime, several organisations have emerged fighting for the rights of PWDs because of the high rates of poverty that are evident within this group (United Nations, 2011). The United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) is one such organisation that ensures PWDs participate in the labour market especially after statistics indicated that in 2000, at the peak of economic expansion, the percentage of working age PWDs that lived below the poverty

line increased to 28.5% from 26.6% in 1989, while that of non-disabled persons declined from 9% to 8.1% within the same period (United Nations, 2011; Stapleton, Burkhauser & Houtenville, 2004).

Even though there has been a shift towards the acceptance of PWDs, such emphasis has been theoretical more than it has been practical. PWDs remain economically disadvantaged as they are more likely to work in lower level occupations or have lower employment rates and earnings, because of their lower levels of education (Elwan, 1999; Hum & Simpson, 2015; Brown & Emery, 2008). Such poor labour market outcomes have been attributed to high dropout rates from traditional education systems but even the emergence of special education schools has not tilted the outcome in their favour (Aron & Loprest, 2012). As is the case in several developed countries, the case in South Africa is not any different. The disabled are marginalised in accessing education from early childhood development to tertiary education, which explains the existence of low qualifications amongst this group (Statistics South Africa, 2011).

Given that low labour market participation rates have direct consequences on employment earnings, it is no surprise that PWDs find themselves at the lower end of the economic ladder. This further entrenches the existence of a relationship between poverty and disability because of the substantial differences in income between PWDs and their non-disabled counterparts (Elwan, 1999). Hum & Simpson (2015), Brown & Emery (2008) and Baldwin & Johnson (2000) provide evidence confirming the existence of a relationship between poverty and disability when they find that PWDs earn less than persons without disabilities. Cain (1986), Hahn (1988) and the Organisation for Economic Co-operation and Development (OECD) (2003) provide further evidence suggesting high unemployment rates and low earnings amongst PWDs, which increases their risk of poverty and social exclusion. To minimize these effects, several countries have adopted policies that seek to reduce the disparities in labour market outcomes for PWDs.

In the UK and USA, the Disability Discrimination Act and the Americans with Disability Act have both been enacted to minimize and eliminate discrimination against PWDs (Jones, 2008). Such Acts of legislation intensify the fight against workplace discrimination and promote the attainment of equality in labour market outcomes, but their usefulness in reducing unemployment rates has

been questioned by several scholars. In both cases, these Acts have been found to have no direct impact on the employment of PWDs because of high financial costs associated with their recruitment, and a lack of awareness amongst both employers and the disabled (Bell & Heitmueller, 2009; Acemoglu & Angrist, 2001). The South African Government has made similar attempts through the introduction of the Integrated National Disability Strategy of South Africa, the Employment Equity Act, the Code of Good Practice on the Employment of PWDs in the Workplace and the White Paper on the Rights of Persons with Disabilities (Republic of South Africa, 2002; Republic of South Africa, 1997; Republic of South Africa, 1998; Republic of South Africa, 2015). The effects have however been unsatisfactory with minimal progress as labour market participation rates for PWDs remains low (Commission for Employment Equity, 2017).

In addition to the various Acts of legislation, other disability benefit policies have been implemented to compensate for the loss in cash flow experienced by PWDs. In OECD countries particularly, the number of recipients of disability benefits has grown considerably over time because recipients become dependent on the grant and rarely go back to the labour market once the benefit has been awarded (OECD, 2003). South Africa has a similar social benefits system that is administered by the South Africa Social Security Agency (SASSA) where there are currently 1.06 million people receiving the disability grant (SASSA, 2018). This number has however declined over the past decade, compared to the period between 2001 and 2007 where significant increases in the number of recipients were observed (Kelly, 2013). The decline in the number of recipients has been attributed to the introduction of a harmonized assessment tool that attempts to regulate the application process by better defining disability and increasing the oversight function of medical officers and SASSA agents (Kelly, 2013). Unlike other developed countries where the disability grant is quite high, disability grant holders in South Africa currently receive R1 690 per month, which is substantially low especially if the grant is the only source of income for an individual or household.

Although social grants may alleviate poverty, they may not necessarily yield the positive results for which they are intended (Leibbrandt & Woolard, 2010; Park, Yoon & Henderson, 2007). This is because grants tend to have disincentive effects on labour supply by altering the labour market behavior of working age individuals, such that individuals look for work less (Leibbrandt &

Woolard, 2010). Studies have suggested that social grants may be beneficial to persons with disabilities in their prime age, but the same disincentive effects have been found when disability grants have been tested (Leibbrandt & Woolard, 2010; Mutasa, 2012). This is because the generous amount of benefits distorts work decisions for PWDs as disability benefits are higher than unemployment benefits in some developed countries, and even in instances where the benefits are low as in the case of South Africa, disability grants have still been found to promote dependency and reduce labour supply (Jensen et al., 2005; Gruber, 1996; Mutasa, 2012). The effects of disability grants are further clouded by the difficulty in defining disability, which distorts work decisions because of the possible subsidizing of early retirement for workers who may not be disabled (Gruber, 1996).

The various definitions of disability have also led to challenges in research because of the difficulty that arises in identifying the disabled (OECD, 2003; Wolfe & Haveman, 1990). This is because many characteristics such as blindness, deafness, activity limitation, diabetes, epilepsy, HIV, chronic illness, schizophrenia or bipolar have been classified as disabilities (Wasserman et al., 2016). In sub-Saharan Africa, the challenge of identifying the disabled and the lack of experience, expertise and what constitutes evidence, have similarly contributed to the lack of research in this area (Swartz, 2014). The lack of experience and expertise relates to the exclusion of the disabled from conducting research, such that their non-disabled counterparts are at the forefront, while that which constitutes evidence relates to research methods applied by different scholars which may yield different results (Swartz, 2014). In the case of South Africa, the disability prevalence measure is based on the degree of difficulty in seeing, hearing, communicating, remembering, walking and self-care which may differ from that of other countries because of differences in the classification of PWDs (Statistics South Africa, 2011). Despite differences in the definition and classification of disability, there exists a body of research on the effects of disability on labour market outcomes.

In terms of the interaction between disability and other labour market determinants, an individual's age may influence disability. The likelihood of developing a disability increases with age but the age at which an individual gets disabled has further repercussions on an individual's employment and earnings. Evidence suggests that those who develop disabilities earlier in life have higher unemployment rates than those who develop disabilities later, because of reduced investments in

education and skills (Loprest & Maag, 2003). In relation to gender and race, women with disabilities have poor labour market outcomes compared to women without disabilities while the black population suffers from a higher disability prevalence rate than other racial groups (Baldwin & Johnson, 1995; Newacheck et al., 2003; Dunlop et al., 2007). PWD's are also less educated than persons without disabilities because of limited education opportunities which have not improved even with the introduction of special education schools (Elwan, 1999; Aron & Loprest, 2012). In relation to marriage and depression, PWDs are less likely to marry and more likely to suffer from depression than their non-disabled counterparts and therefore likely to have lower employment rates and earnings especially in the case of employers who perceive married people to be more stable. Also, because depression affects productivity, the same poor labour market outcomes are likely to be observed amongst PWDs (Morris, Sinclair & DePaulo, 2007; Lerner & Henke, 2008).

In as much as there has been a growing body of research on the effects of disability on labour market outcomes, the minimal progress made towards reducing the penalties of having a disability raises concern. This is because disability penalties appear to be on the rise compared to other labour market discrimination penalties as Berthoud (2008) found that the disability penalty had increased over the past three decades, while the gender penalty had reduced over the same period. Policies on labour market discrimination for the disabled have therefore proved ineffective and require further policy interventions which form the motivation for this study.

1.1 Motivation for the study

Studies on disability have previously been viewed from a clinical perspective rather than an economic or social perspective, which explains the existence of limited research on the economic and social impacts of disability. The medical model of disability which implies that the difference between PWDs and persons without disabilities is a problem that can be fixed by medical treatment has taken centre stage in disability studies, which is different from the social model of disability which implies that disability is caused by the disabling barriers of society and not necessarily impairment (Oliver, 2013). An emphasis on the social model of disability is therefore paramount to the integration and inclusion of PWDs in society, to minimize the negative attitudes and physical barriers faced by PWDs. To apply the social model of disability, the social and economic effects of disability must however first be understood which this study seeks to analyse.

PWDs represent a vulnerable group in society because of the economic and social disadvantages they face, but in comparison to other vulnerable groups such as the elderly, women, youth and children, research on their economic well-being is significantly absent (Wolfe & Haveman, 1990). Despite increases in activities that address the challenges facing the disabled, the lack of research has been attributed to the fact that PWDs are less visible than other economically disadvantaged groups because they work less, are immobile and sometimes older (Wolfe & Haveman, 1990). The lack of objectivity in identifying the disabled in survey data has also contributed to minimal research because disability is not clearly defined. Definitions of disability are often broad as some definitions restrict it to social conditions, economic conditions and self-perceptions, while other definitions apply more stringent measures restricted to specific health conditions or objective health measures (Wolfe & Haveman, 1990). Economic research further limits the definition of disability to self-reported work limiting health conditions, the ability to meet a defined criterion of incapacity and the period for which an individual faces disability (Wolfe & Haveman, 1990). Self-reported measures may however yield potential measurement errors because disability is subjective and therefore does not determine whether an individual is suffering from a long-term health problem or whether their disability is work limiting and therefore underestimates the number of people in the working age population who are disabled and employed (Jones, 2008; Burkhauser et al., 2002).

Disability may also be misreported because of social and economic incentives such that the declaration of disability depends on work preferences and the access to disability benefits (Jones, 2008). This leads to biased measurements of disability because disability becomes a justification for non-employment and is subsequently endogenous when performing regressions. Similarly, the use of specific health conditions or objective health measures, does not provide information that is closely related to work limitations and therefore leads to errors in measurement (Jones, 2008). Despite limitations in the measurement of disability in economic research, self-reported measures, a defined criterion of incapacity or a combination of both, have been applied to determine the effects of disability on labour market outcomes. Hum & Simpson (2015) used a combination of both when analysing labour market outcomes for Canadians, while Stapleton, Burkhauser & Houtenville (2004) analysed the difference in employment outcomes when disability was defined

by work limiting conditions and when it was defined by general activity limitation. These differences in measurement further make it difficult for researchers to compare the economic effects of having a disability, but do not necessarily negate the findings of research. Such studies also allow for the drawing of conclusions to inform policy which further motivates this study.

1.2 Statement of the problem

Through the application of taste-based and statistical discrimination theories, evidence suggests that discrimination in the labour market exists particularly in relation to race and gender, but limited research exists on the extent to which these inequalities exists for PWDs. Studies in South Africa have attempted to explain these inequalities in relation to race and gender as Burger & Jafta (2006) found no effect on the narrowing of the wage gap between races in their study on returns to race in post-apartheid South Africa, while Kollamparambil & Razak (2016) and Bosch (2015) found that females in South Africa earned significantly less than males even though the gap had narrowed over time. In the case of PWDs, anecdotal evidence suggests the existence of inequalities in labour market outcomes in terms of employment and earnings, but minimal research has been done to ascertain the extent to which this is true. Studies on PWDs have been centered on health and educational outcomes, or the barriers they face in employment with limited statistical evidence explaining this phenomenon (Maja et al., 2011; Gida & Ortlepp, 2007). In cases where statistical evidence has been applied, studies on the effects of disability grants have been examined, showing disincentive effects on labour market participation (Mutasa, 2012).

Even though there exists data from multiple surveys that can be used for analysis, the effect of having a disability on labour market outcomes relative to persons without disabilities in South Africa is unknown. Similarly, the effect of different types of disability and how they affect labour market outcomes relative to persons without disability has not been tested in the case of South Africa. Despite limitations in the measurement of disability from surveys, there is a consensus amongst researchers that such data can be used to analyse trends in labour market outcomes for PWDs (Burkhauser et al., 2002). Considering the availability of data and the lack of research on the effects of disability and disability type on the labour market, there exists a gap which this study seeks to fill. As a result, this study seeks to identify the existence of inequalities in labour market outcomes by measuring the effect of disability on labour force participation, employment and

wages while at the same time identifying how these outcomes manifest across different types of disability. The effect of disability grants on participation will also be tested to compare any similarities or differences on the disincentive effects of disability grants on labour supply following the findings of Mutasa (2012). The motivation for this study is also founded on the right to equal opportunities for all persons including PWDs as stipulated in the South African constitution. This study will seek to answer the research question "what is the effect of disability, disability type and disability grants on labour force participation, employment and wages in South Africa?"

1.3 Objectives of the study

The general objective of this study is to identify the effects of having a disability on labour market outcomes. The specific objectives of the study are:

a) To determine the effect of disability on labour force participation, employment and wages

b) To determine the effect of disability type on labour force participation, employment and wages

c) To determine the effect of disability grants on labour force participation, employment and wages

1.4 Significance of the Study

This study adds to the existing body of literature on disability and labour market outcomes and will particularly be significant in its contribution towards identifying the effects of disability type on labour market outcomes in South Africa. The sections that follow cover a literature review of past studies, the methodology employed in analysing data, a chapter on the findings of the study, and concludes with a summary of results, limitations of the study, and recommendations for future research.

CHAPTER TWO
LITERATURE REVIEW

2.0 Introduction

This chapter discusses theories on labour market discrimination, barriers to the employment of persons with disability and the relationship between disability and other labour market determinants. It concludes by discussing empirical evidence on the effects of disability, disability type and disability grants on labour market outcomes.

2.1 Theoretical framework

The fundamental assumption underlying the economic status of PWDs is that they are economically disadvantaged because of discrimination in the labour market, which occurs when different groups of workers with equal productivity have different mean wages or employment opportunities (Beegle & Stock, 2003; Baldwin & Johnson, 2000). Labour market discrimination for PWDs has been attributed to both prejudice and the limiting effects of health conditions, where the origins of prejudice are purely based on demographic characteristics and the perception that PWDs defy cultural norms and standards (Cain, 1986; Hahn, 1988). According to Baldwin & Johnson (2000) and Jones (2008), employers are assumed to be prejudiced if they incur disutility by hiring persons whom they are prejudiced. In the case of PWDs, the observed lack of labour market participation occurs when an employer views disability as an indicator of productivity, making labour market participation subjective. This subjectivity can be observed when productivity is cited as a barrier to the employment of PWDs in a productivity intense organisation, while higher productivity levels are reported for PWDs in a different organisation (Maja et al, 2011).

The limiting effects of health conditions on the other hand play a role in labour market discrimination because prejudice alone without taking into consideration the limiting effects of health conditions, overestimates the negative impact of disability when in fact there is the possibility that PWDs would not participate in the labour market even in the absence of discrimination (Baldwin & Johnson, 2000). Discrimination also plays a reversed role in decision making for PWDs who may choose not to participate in the labour market because they already

sense that they will be discriminated on (Jones, 2008). As a result, PWDs do not invest in education which leads to low levels of skill which inevitably sets them up to having inferior characteristics, ultimately leading to poor labour market outcomes (Jones, 2008). The lack of interest in work further influences labour market outcomes for PWDs as observed by the lack of interest in work for one third of new enrollees into community based mental health programmes (Macias et al., 2001).

Theories on labour market discrimination date as far back as 1957 where two dominant models of taste-based and statistical discrimination emerged (Becker, 1957; Arrow, 1971). These theories laid the foundation for future research but the challenge of not being able to make a clear distinction between taste-based and statistical discrimination is one that has been faced by many researchers (Cahuc et. al., 2014). Studies are more likely to indicate the presence of discrimination or measure its magnitude but are not specific as to whether discrimination is based on taste or is statistical. In the case of disability, several studies have found the presence of discrimination in the labour market but have not explicitly indicated which of the two models apply to their findings (Baldwin & Johnson, 2000; Hum & Simpson, 1996; Brown & Emery, 2008). The measurement of discrimination in the labour market is further complicated by other econometric problems such as the omitted variable bias because of the use of causal relationships which may attribute a difference in wages to an individual being part of a discriminated group, without taking into consideration the effect of differences in skills or other unobservable characteristics that may be correlated to this group (Guryan & Charles, 2013). The fact that unobservable characteristics are in themselves unobserved makes the problem of omitted variable bias even more difficult to avoid.

Furthermore, regression and decomposition methods which are used in measuring the extent of discrimination in labour markets may control for too little or too much and therefore underestimate or overestimate the role of discrimination (Guryan & Charles, 2013). This is because the lack of clarity on what characteristics to control for and determining what to manipulate and what remains constant requires choosing characteristics that are inherently tied to members of the discriminated group, which may be difficult to define (Guryan & Charles, 2013). The use of pre-market factors such as education which is endogenous to discrimination also brings about problems of endogeneity when used as a control in the wage equation and underestimates the role of

discrimination (Cahuc et. al., 2014). Other pre-market factors such as attitudes towards risk and social norms may affect earnings as individuals who are risk averse tend to settle for stable jobs which pay less, and not taking these factors into consideration, overestimates the role of discrimination (Cahuc et. al., 2014).

Selection bias also poses a challenge in measuring labour market discrimination as wages are only observed for those who are employed, leaving out the potential earnings of those who are unemployed. The results from such studies are often biased because they are not reflective of the entire population as this censored population is left out of the regression model (Heckman, 1979). Inserting wages of the non-participants into the model or including a participation control variable as a regressor in the participation equation are some of the methods that have been developed to correct for selection bias. Other mechanisms such as audit, correspondence and experimental studies have also been developed to correct the problems of bias (Guryan & Charles, 2013; Cahuc et. al., 2014). Audit studies match all other observable characteristics other than those subject to discrimination to detect differences in labour market outcomes but have been criticized for their difficulty in achieving a perfect match for all relevant attributes (Neumark, 2010). Correspondence studies create fictitious resumes with identical qualifications in response to real job openings, to detect different outcomes for discriminated groups but have been criticized for tracking intermediate outcomes and for their methods in signaling the race or gender of applicants (Neumark, 2010; Guryan & Charles, 2013). The use of experiments however provides more reliable results because experimental studies allow for the control and partial measure of discriminated traits when they are well designed.

2.1.1 Taste-based discrimination

Taste-based discrimination occurs when employers, co-workers or customers have an aversion towards a certain group and are willing to pay a price to avoid interaction with that group (Guryan & Charles, 2013). It can be seen in the wage difference between members of two groups where individuals of the discriminated group earn less than the non-discriminated group who are typically paid based on their productivity (Cahuc et. al., 2014). With the assumption that the labour market is composed of two groups x and y where x represents the discriminated group and y represents the non-discriminated group, the wages of the discriminated group can be explained by:

$i)\ w_x = z - u$

where:

w_x = wage of x, z = quantity produced, u = aversion

While the wages of the non-discriminated group are represented by:

$ii)\ w_y = z$

This means that members of the non-discriminated group earn more than the discriminated group because of aversion.

Taste-based discrimination however does not occur in perfect markets because workers in perfect markets are paid based on their marginal productivity, such that their wages are not in any way different from members of the alternative group (Cahun et. al., 2014). This means that employers under perfect competition have no aversion towards members of a particular group and therefore allow these members to freely enter the labour market. Under perfect competition $w_x = w_y = z$. This means that in an economy where there is no discrimination, wage differentials between the disabled and non-disabled would be statistically insignificant (Hum & Simpson, 1996). Imperfect markets on the other hand have a high occurrence of taste-based discrimination because the degree of monopoly enjoyed by firms allows them to create barriers to entry for individuals of a certain group (Dewey, 1958). Also because of a strong collective bargaining power, they are able to implement employment policies that favour a particular group while discriminating another. Low wages and low levels of employment for discriminated groups are therefore persistent in imperfect markets as they often obtain a lower wage compared to the non-discriminated group.

A study attempting to test the presence of taste-based discrimination by analysing changes in ethnic preferences and their effect on admission to the New York Stock Exchange (NYSE) during World War 1, found that the War made German Americans an ethnic minority whose probability of being rejected for seats on the NYSE relative to Anglo-Saxons was more than double (Moser, 2008). A reduction in productivity for German Americans relative to Anglo-Saxons could have been a possible explanation for these changes because the War prevented business with Germany, but data on the exits of Germans from the NYSE did not indicate this. There was also no decline in the number of German applicants which revealed that applicants were instead rejected because of the admission process where they were evaluated by remaining committee members who were

not driven by higher prices, but by future interactions with applicants and therefore ethnically biased (Moser, 2008). Similarly, a study on taste-based discrimination in hiring with geographic variation found that an employer was more likely to discriminate against a minority group in municipalities which had a negative attitude, especially when hiring individuals in low level occupations (Carlsson & Rooth, 2011).

2.1.2 Statistical discrimination

Statistical discrimination occurs when a decision maker uses easily observable characteristics of a broad societal category such as race, gender or ethnicity to determine unobservable characteristics of an individual (Fang & Moro, 2011). It is based on rational behavior and asymmetric information and occurs when employers assess the expected productivity of a worker using limited information which they may obtain from resumes and interviews (Guryan & Charles, 2013). Also, because they are aware of the potential employee's race, gender or ethnicity, employers base their decisions on the characteristics of members of these groups and apply these traits to the potential employee. The employer's decision is therefore a weighted average of an individual's signals and that of the productivity of members of the applicant's group (Guryan & Charles, 2013). This means that the more information an employer has on an individual's characteristics and that of his/her associated group, the more the weight the employer places on the information they have.

Statistical discrimination begins when employers evaluate the performance of workers using hiring tests where the probability of passing the test is given by the equation:

$$iii)\ \Pr\{h = h^{+} \mid success\} = \frac{\pi}{\pi + p(1-\pi)}$$

The expected productivity of a person who passes the test is given by the equation

$$iv)\ \frac{h^{+}\pi}{\pi + p(1-\pi)}$$

Where h= low productivity, h^{+}= high productivity, π = proportion of efficient workers of the demographic group who are considered, p = probability of inefficient workers passing the test and being wrongly classified as efficient

Wages in the above equation (iv) increase with π which represents the proportion of efficient workers in the demographic group who are considered, such that individuals with identical abilities

tend to have different wages and career paths because of the average productivity of the group that they belong to (Cahuc et. al., 2014). An increase in *p* which is the probability of inefficient workers passing the test and being wrongly classified as efficient, also has a negative effect on the wages of the discriminated group.

Employers are said to be statistically discriminating when wages are not correlated with an individual's productivity, which the employer is expected to learn over time, but rather correlated with unobservable characteristics (Guryan & Charles, 2013). This explains why individuals of a discriminated group persistently earn less than their non-discriminated counterparts even with employer learning. The presence of statistical discrimination in labour markets also influences the behavior of individuals who may choose not to obtain certain skills when employers discriminate against their group despite them having the right qualifications. If a worker's productivity depends on their level of education for example, but employers believe that the proportion of inefficient workers in the discriminated group is high, the returns to education are low therefore discouraging members of this group from getting an education. When these members choose not to prioritize education, the perceived notion of inefficient workers that employers have of this group then becomes a reality, such that employers encounter less efficient workers amongst this group.

A study on statistical discrimination and employer's recruitment practices for low-skilled workers found that signals such as old age, immigration status and long-term unemployment played a reduced role on the recruitment strategies of employers, compared to signals that indicated soft skills and motivation because the former was overrepresented in low-skilled applicants (Bonoli & Hinrichs, 2010). Employers were also not allowed to be picky with their hiring strategies because of the poor working conditions that surrounded low skilled workers. Soft skills were on the contrary regarded as positive signals because formal qualifications did not have a huge bearing on low-skilled occupations, while motivation was indicated by applications that were unsolicited instead of those that were referred by the public employment service (Bonoli & Hinrichs, 2010).

Both taste and statistical discrimination account for wage differentials but it is difficult to identify which of the two models is an accurate measure as they both have their own limitations. It has also become increasingly difficult for scholars to identify which of the two models is more apparent in

labour markets as researchers provide evidence of discrimination but fail to justify which of the two models apply to their findings. The inability to distinguish between the superiority of these two models however does not derail the importance of research in eliminating poor labour market outcomes for PWDs.

2.2 Empirical Evidence

2.2.1 Barriers to the employment of PWDs

Apart from discrimination, several other factors influence labour market outcomes for PWDs. These barriers include low levels of skill amongst PWDs, the physical environment, legislation and disability grants.

2.2.1.1 Experience and skills

PWDs are generally found to have lower levels of education compared to non-disabled persons because of limitations to the access of educational opportunities (Elwan, 1999). This lack of opportunities for PWDs has predominantly contributed to the association of high rates of disability with high levels of illiteracy, low levels of skill and limited access to employment opportunities or the occupation of low skilled labour in different sectors of the economy. Hum & Simpson (1996) found that men and women without disabilities had higher qualifications than PWDs, as 16% of them had a university degree compared to 8% of PWDs. The lack of education and participation of PWDs in the labour market has had a significant contribution to the low levels of human capital accumulation amongst this group but even in instances where PWDs have been equipped with the necessary skills and training, such skills have not been recognized because of the employer's perception towards disability. Shier, Graham & Jones (2009) found that despite formal qualifications and experience in crane driving, information technology and the office supply industry, employers were reluctant to hire respondents who had epilepsy, a mobility disability and a reading disorder as soon as they discovered the potential employee's disability condition.

In the case of South Africa, the Integrated National Disability Strategy recognizes the lack of access to educational opportunities as a binding constraint to the attainment of higher qualifications for PWDs as statistics indicated that of those with severe disabilities, only 5.3% had attained higher education while 23.8% had no formal education (Statistics South Africa, 2011). Maja et al., (2011)

found that most organisations in South Africa cited the lack of formal qualifications as a hinderance to the employment of PWDs but for those organisations that hired them, recruitment was done at the entry level followed by the provision of study bursaries for PWDs to pursue their education. This approach would be a step in the right direction for both policy makers and beneficiaries but may not be sustainable for companies with inadequate resources. In instances where employers' attitudes override the experience and skills of PWDs when making recruitment decisions, policies should factor in the role of awareness in changing the perception of the public towards disability, while at the same time seek to improve the educational qualifications of PWDs.

2.2.1.2 Physical environment

The physical environment which includes access to buildings, public spaces, transport and machinery, plays a big role in the mobility of PWDs. Functional working spaces that cater to the needs of PWDs are amongst the many impediments that prevent organisations from hiring PWDs. A study on factors affecting employment among people with mobility disabilities found employment rates to be lower for people with mobility disabilities compared to that of the general population at 34% and 60% respectively (Park, Yoon & Henderson, 2007). Vocational rehabilitation services have also been found not to have a significant effect on influencing environmental factors that affect the probability of employment of people with mobility disabilities, yet mobility and dexterity disabilities are amongst the most common forms of disability as revealed by a study on the barriers to employment of disabled people (Goldstone & Meager, 2002). These services have instead targeted individuals with more severe disabilities failing to influence the probability of employment for persons with mobility disabilities (Park, Yoon & Henderson, 2007). A more inclusive work environment therefore requires the commitment of employers to build facilities that cater to the mobility needs of PWDs, but evidence however suggests that employers are more willing to adjust the physical environment for old employees than new recruits thereby creating a barrier to the initial employment of PWDs (Goldstone & Meager, 2002).

Other than access to functional working spaces, PWDs face several other environmental barriers. A study on the environmental barriers faced by PWDs and persons without disabilities in diverse African settings found that persons with disabilities faced more environmental barriers than person

without disabilities (Visagie et al., 2017). Data was collected from respondents in South Africa, Namibia, Sudan and Malawi through a self-reported survey where environmental barriers were classified into categories consisting of access to products and technology, the natural environment, relationships with others, the attitudes of others; and access to systems, policies and services in education, health, housing and transport. The most significant difference between persons with and without disabilities was observed in the access to transport, health services and access to the natural environment. Environmental barriers were further found to be lower for persons with higher levels of education, better mental health and those with fewer physical disabilities.

South African studies bear similarities to the findings of studies abroad as organisations indicated the lack of disability friendly facilities as a hindrance to the employment of PWDs (Maja et al., 2011). Mobility access was cited as a great barrier to the employment of PWDs as only a few adjustments had been made to accommodate them. This was because organisations considered the cost of adjusting facilities to be high. It is however not necessarily true that all adjustments for PWDs are expensive as Gida & Ortlepp (2007) found that most organisations in the top 100 financial times list had moved beyond the argument of cost, to provide reasonable accommodation by adjusting their facilities to include ramps and lifts for PWDs. It was however difficult to differentiate whether organizations in the top 100 financial times list had adjusted their facilities as merely an act of compliance, or out of their willingness and openness to employ PWDs (Gida & Ortlepp, 2007). Most organisations also revealed that they would rather employ paraplegics because they did not need special equipment to carry out their tasks as do blind or deaf people, further revealing the extent of discrimination within the broader disability group (Gida & Ortlepp, 2007).

2.2.1.3 Legislation

On the premise that PWD's experience labour market discrimination, acts of legislation have been introduced to prevent its occurrence, but even in their presence, labour market outcomes for the disabled remain poor. Legislation plays an important role in protecting the rights of PWDs and creating an environment that promotes access to equal opportunities because in its absence, aspects of past discriminatory laws remain, failing to meet international human rights standards for PWDs. In USA and UK, the Americans with Disabilities Act and the Disability Discrimination Act have

been enacted to ensure employers adjust their physical environments and recruitment processes to cater to the needs of PWDs (Jones, 2008). Legislation without proper implementation may however serve as a barrier to the employment of PWDs because of the lack of accountability on the part of employers. Acemoglu & Angrist (1998) in their study on the consequences of employment protection found that the Americans with Disability Act had a negative impact on the employment of PWD's because of increased costs to employers.

The lack of enforcement on legislation across all sectors further creates a barrier to the employment of PWDs as revealed by a study on the barriers to employment for disabled people in the UK. Approximately 52% of respondents reported that their organisation had a policy on the employment of PWDs, but this was more common in large organisations, the public sector and the trade sector, leaving out the private sector and other sectors of the economy (Goldstone & Meager, 2002). Policies were also more common in organisations with disabled employees than those without and fewer organisations had a specific policy on the recruitment of disabled persons. Furthermore, 31% of respondents reported that their organisation had a formal written policy on the recruitment of PWDs but only 19% encouraged such applications (Goldstone & Meager, 2002). Line managers were also found not to be aware of such policies when compared to human resource specialists which demonstrated the lack of awareness on legislation and negative attitude towards the employment of PWDs.

Several Acts of parliament have also been passed in South Africa including the Code of Good Practice on the Employment of People with Disabilities to promote fair treatment of PWDs in the workplace (Republic of South Africa, 2002). As these laws are not legally binding, employers are not at fault for failing to implement such proposed legislation. The fact that employers have the discretion to determine what constitutes unjustified hardship on their part when deciding to employ people from a designated group, shows the extent to which legislation may prove ineffective (Maja et al., 2011). It has further been observed that organisations in South Africa generally have laws that promote equality in the workplace but do not have specific policies on the employment of PWDs (Maja et al., 2011).

2.2.1.4 Disability grants

In the face of labour market handicaps and in the presence of sound economic and social policies, disability grants promote inclusion for PWDs because of the impact they have on poverty alleviation. Disability grants can however not be relied on as the only source of income for PWDs because they are not sustainable and do not fully embody the idea of inclusion. Johannsmeier (2007) proposed an integrated approach to poverty elevation and inclusion for PWDs which required cooperation from the government, the private sector and non-governmental organisations, such that disability programmes formed part of the development programmes targeted at eradicating poverty and exclusion. This was after their study revealed that PWDs used their disability grants to pay extra to access transport services because they needed a guide in cases where they were blind, or someone to push their wheelchairs in cases where they could not walk (Johannsmeier, 2007). These extra payments placed PWDs at a greater risk of poverty compared to persons without disabilities especially in instances where they had similar incomes.

Disability grants were also found to have the effect of income dilution in cases where the grant was used by a large household as the only source of income. This simultaneously had a negative effect on the benefits of disability grants because the amount spent on disability-related costs was limited (Johannsmeier, 2007). In terms of labour market outcomes, disability grants tend to have disincentive effects on labour supply because they serve as an injection of non-labour income. A study on disability grants and labour force participation in South Africa found that the receipt of a disability grant reduced the probability of labour force participation by 22.3%, with the disincentive effect declining to 21.6% when restricted to men and 23.3% in the case of women (Mutasa, 2012). The true labour supply effect of the disability grant was however undetermined because data could not control for the severity of disability between those that received the grant and those who did not. Other than social transfers from the government, grants from family members and other relatives also influence the probability of employment for PWDs as individuals with higher levels of support are least likely to be employed than those with lower levels of support. Park, Yoon & Henderson (2007) found that individuals who received material support from family, friends and others were least likely to be employed because it lessened their economic hardship and therefore lacked the motivation to work.

2.2.2 Relationship between disability and other labour market determinants

2.2.2.1 Relationship between disability and age

Studies have indicated that an individual's age affects their labour market outcomes because earnings are attached to work experience, which tends to increase with age (Luong & Hebert, 2009). Older people are therefore more likely to earn more than younger people, but this may be affected by the likelihood of developing a disability. According to Gerschick (2000) and Loprest & Maag (2003) disability was found to progress with age but the disability onset age had an influence on an individual's employment outcome as individuals who developed disabilities at an earlier age had a lower likelihood of employment compared to persons without disabilities. This was because of the difference in educational outcomes for persons with early onsets of disability who had reduced investments in education and skills relative to persons without disabilities (Loprest & Maag, 2003). When early onset disability was however compared to late onset disability, higher rates of employment were observed amongst those with earlier onset, after education, demographics, severity of disability and receipt of disability grants were controlled for (Loprest & Maag, 2003). This was because individuals with earlier onsets of disability chose careers that were more accommodative than those who developed disabilities at an older age.

When education was however used as a predictor of wages, the outcomes were favorable for individuals with later onsets of disability. Hollenbeck & Kimmel (2008) found greater returns to education for individuals who became disabled after the age of 25 compared to those who became disabled earlier in life when studying the returns to education for males by disability and age of disability. For those with early onsets of disability, there was no advantage on the returns to education because of the quality and quantity of education received. Individuals with later onsets had however acquired the desired knowledge and skills which allowed them to earn more even after becoming disabled. Their higher education qualifications further allowed them to change jobs and work for employers who accommodated their needs. Despite the positive returns to education for persons with later onsets of disability or those who had earlier onsets but chose more accommodative careers, the difference in wages remained wide for both groups relative to their non-disabled counterparts (Loprest & Maag, 2003; Hollenbeck & Kimmel, 2008).

2.2.2.2 Disability and gender

Gender has been identified as a predictor of labour market outcomes following indications of the presence of discrimination when examining wage gaps between men and women across different studies. A study on sex discrimination on restaurant hiring indicated that women were less likely to be called for interviews or receive job offers in higher earning restaurants compared to men, while women in the USA were found to earn less than their male counterparts even though the gender wage gap had been declining over time (Neumark, Bank & Van Nort, 1996; Blau, 1996). Given these negative outcomes, the possibility of double discrimination for women with disabilities arises as PWDs are already disadvantaged in the labour market. Baldwin & Johnson (1995) provided evidence of the double burden faced by women with disabilities arising from both gender and disability-related discrimination when they found that the wage difference between men and disabled women was three times more than the wage difference between disabled women and women without disabilities.

Stapleton, Burkhauser & Houtenville (2004) provide further evidence of the penalties faced by women with disabilities when their findings indicated that in 1980, employment rates grew for both women with disabilities and those without, but only continued to grow for women without disabilities. Women with disabilities instead faced negative growth rates as their employment rates declined by 1% within the same period. Some scholars however argue that the negative effects of disability are not only experienced by women but are experienced by both genders. A study on the economic well-being of disabled women found no significant difference in the fall of earnings, income and consumption for households headed by both disabled men and women after disability onset (Meyer & Mok, 2014). Even though women were more likely to develop a disability by the age of forty-five than men were, the effect of having a disability on family income and consumption was lower in women than it was in men. This was because the contribution of women's earnings to family income was small and therefore had a smaller impact on family income and consumption after the onset of disability. These findings may however not hold in households where disabled women are the sole providers

In the case of South Africa where disability prevalence is higher in women than it is in men and wages are lower for women than they are for men, the double burden of discrimination faced by

women with disabilities raises concern because more women than men experience a fall in earnings, income and consumption (Statistics South Africa, 2011; Bosch, 2015). Furthermore, in households where disabled women are the sole contributors to the family's income, the repercussions of double discrimination are even worse.

2.2.2.3 Disability and race

Disability prevalence tends to be higher in the Black population more than in any other race as evidence suggests that this phenomenon holds true. Newacheck et al. (2003) and Dunlop et al. (2007) found disability prevalence to be higher in Black children more than in White children, while African American adults and Hispanics were found to be at a higher risk of developing disabilities than White adults. These findings were similar to those of Statistics South Africa (2011) where it was indicated that disability prevalence was higher in Black South Africa more than in any other race. In terms of labour market outcomes, the relationship between race and employment differs across race. Studies revealed that Black people earned less than any other race across different racial groups as Altonji & Blank (1999) found that the Black population earned less than the white and Hispanic population when estimating differentials in labour market outcomes across race and gender. Burger & Jafta (2006) also found no significant effect on the narrowing of the wage gap across race in post-apartheid South Africa.

Given that disability prevalence is higher in the Black population than it is across other races, and that negative employment outcomes are more likely in the Black population than in any other race, Black individuals who are disabled are likely to suffer a double disadvantage when estimating their labour market outcomes. Moodley & Graham (2015) found that Black disabled people faced a double disadvantage in employment outcomes while studying the importance of intersectionality of disability and gender in South Africa. Furthermore, the repercussions were found to be worse for Black women with disabilities as White women with disabilities were just as likely to be employed as Black men without disabilities. The idea of a double oppression for Black people with disabilities has however elicited debate amongst researchers who are of the idea that it should not be viewed in isolation (Stuart, 1992). This is to mean that research on Black disabled people should take into consideration other related areas of research because both White and Black disabled people experience discrimination, even though the effect is smaller for the white race

because they are easily accepted by society (Stuart, 1992). Whether the double disadvantage of being Black and having a disability is viewed from a simultaneous or isolated perspective, it is clear that in terms of labour market outcomes, Black people have negative labour market outcomes than other races which similarly applies to PWDs relative to persons without disabilities.

2.2.2.4 Disability and education

Education has the potential to influence an individual's economically productive life especially at a young age, because of the role schools play in assisting students to successfully transition to post-secondary education, job training and employment (Aron & Loprest, 2012). For persons with limited opportunities such as PWDs, education plays a central role in changing the persistent negative labour market outcomes they face. The failure of education systems to promote equity and inclusion however makes it difficult for PWDs to break the cycle of poor education and labour market outcomes. Lazarus & Howell (2003) argue that inclusion should not only focus on creating changes at lower levels of education which policy has broadly emphasized, but also at higher levels of education because of the importance of higher education in developing skills and creating a knowledge base that is central to a vibrant economy. Instead of seeking to increase access and participation for disabled students through less discriminatory admission policies, a deeper look into the experience of such learners in higher education institutions should provide a better estimate of their ability to succeed and complete their education (Lazarus & Howell, 2003).

The success of disabled students however depends on the ability of higher education systems to change their structures which have been criticized for being less accommodative to their needs. In most South African higher education institutions with disability units, these units have been found not to cater to all types of impairment and in instances where they were absent, disabled students felt isolated and found it difficult to integrate (Mutanga, 2017). Special education schools have since emerged to cater to the needs of individuals with different types of impairment and to compensate for the limitations in economic and social opportunities for the disabled. Such policies are often cited as progressive but may not be beneficial to all disabled individuals because of the high financial costs attached to them (Lazarus & Howell, 2003). Learners in such schools were also found not to be prepared for the work environment because their curriculum was not rigorous (Lazarus & Howell, 2003).

Evidence further suggests that PWDs still have poor outcomes in post-secondary enrollment and employment compared to their peers without disabilities. Aron & Loprest (2012) found that the likelihood of dropping out of high school was higher for PWDs than it was for individuals without disabilities, as only 46% of PWDs graduated from high school compared to 75% of persons without disabilities. Such low rates of graduation for PWDs lead to lower chances of enrollment in higher education and those that make it to higher education institutions, find it harder to adjust because of the lack of reasonable accommodations. Sachs & Schreuer (2011) found that although there was no significant difference in the education achievements of people with disabilities and those without in higher institutions of learning, the lower grades for PWDs had the ability to influence graduate admission and employment in competitive institutions. Given that the attainment of higher education affects employment outcomes, PWDs are therefore less likely to be employed because of their low participation rates in post-secondary education.

2.2.2.5 Disability and depression

Depression has a negative impact on employment and earnings because people with depression have higher absenteeism and deficits in work performance which affects productivity. A study on work performance of employees with depression found absenteeism to be three times higher in people with depression, while work limitations were found to be four times higher for those with depression than those without (Lerner et al., 2010). Lerner & Henke (2008) similarly found higher rates of unemployment and high absenteeism costs amongst people with depression that cost between $36.6 billion and $51.5 billion at national level when studying depression, job performance and work productivity. In terms of earnings and number of hours worked, individuals suffering from depression were found to earn less and work fewer hours, but even when present at work, their performance and at-work productivity was affected by depression (Lerner & Henke, 2008).

Evidence suggests that people with physical disabilities are more likely to suffer from depression than people without disabilities because disability creates stress which is a high-risk factor for depression. Noh et al., (2016) argue that new onsets of disability force individuals to adjust their daily activities which causes them strain and increases their risk for depression. Turner & Noh

(1988) agree with these findings as their study indicated that physical disability was a high-risk factor for depression regardless of age, gender, education, marital status, income level or area of residence. Those with physical disabilities were also found to be three times more likely to suffer from depression than people without disabilities. Given that depression has a negative impact on employment and earnings, and that people with physical disabilities are more likely to suffer from depression than those without disabilities, then PWDs are more likely to experience negative labour market outcomes. Lerner et al. (2010) suggest vocational interventions as a means of reducing work stress for persons suffering from depression but further considerations need to be given to PWDs because their depression stems from functional limitations. More accommodative workspaces are therefore likely to reduce stress inducing factors for people with disability and reduce their risk of depression.

2.2.2.6 Disability and marital status

An individual's marital status has the potential to influence the employment decisions of an employer in both negative and positive aspects, depending on the employer's perception towards marriage and productivity. Some employers perceive that single people are willing to work for longer hours because they have fewer responsibilities, while other employers prefer married people because being single is associated with less responsibility, less maturity and less stability (Morris, Sinclair & DePaulo, 2007; Spence, 1987). Married women with children are at an even greater disadvantage because evidence suggests that they are likely to earn less than women without children (Anderson, Binder & Krause, 2002). For PWDs, the probability of getting married is lower than it is for people without disabilities because of the aversion and prejudice PWDs face from persons without disabilities. Hahn (1981) found that individuals with visible physical disabilities found it harder to find marital partners because of the stigma attached to disability which may have been influenced by cultural taboos or not being able to fit into the idea of what society considered to be attractive.

The fear of rejection by non-disabled persons when PWDs showed interest in building relationships beyond friendship, also significantly reduced the chances of PWDs getting married, and for those that were able to form relationships, the non-disabled partners were sometimes thrown off balance when tested by unforeseen obstacles especially when the relationship was

conducted as if disability did not exist (Hahn, 1981). Meyer & Mok (2014) similarly found that women with early onsets of disability were less likely to marry than those without and that women with disabilities fared poorly in marriage than did their male counterparts because their disability was associated with higher divorce rates. All these factors affect the social acceptability of PWDs in a negative way and the economic loss suffered by those with work limiting conditions further prevents them from getting married as they are not able to support a family (Hahn, 1981). Given that PWDs are less likely to marry than their non-disabled counterparts, their labour market outcomes are affected in instances where employers prefer married individuals over unmarried individuals. Also, in instances where employers prefer unmarried individuals over those who are married, PWDs are still at a greater disadvantage because of the barriers that prevent them from getting into the job market such as discrimination, the level of skill, the physical environment and legislation (Baldwin & Johnson, 2000; Hum & Simpson, 1996; Park, Yoon & Henderson, 2007; Acemoglu & Angrist, 1998).

2.2.3 International studies

Studies both locally and abroad have found negative effects of disability, disability type and disability grants on labour market outcomes as PWDs were found to have lower participation rates, employment rates and earnings. Kidd et al., (2000) found a participation rate of 34% for PWDs compared to 84% for persons without disabilities when anlaysing the effects of disability on British males. This study used a probit model to determine the difference in labour force participation between the disabled and able-bodied using survey data from the British Labour Force Survey. The traditional Blinder method was also used to decompose differences in wages between PWDs and able-bodied individuals and found that PWDs earned 13% less than persons without disabilities. Goldstone & Meager (2002) also found that the unemployment rate for PWDs was more than double that of non-disabled persons at 9% and 4% respectively despite the legalization of the Disability Discrimination Act and the implementation of several disability programmes in the UK. This difference in labour market outcomes was also found in Canada where labour force participation was estimated to be 30% lower for PWDs relative to persons without disabilities and that the penalties of earnings for PWDs was 21% to 50% lower than for persons without disabilities (Brown & Emery, 2008). Data from the Participation and Activity Limitation Survey was used

and a probit model, an OLS regression model and a Heckman two-stage estimation model were applied to determine the impact of disability on earnings and labour force participation.

The United States Bureau of Labor Statistics also found that only 17.9% of PWDs were employed compared to 65.3% of persons without disabilities, which is consistent with data from as early as 1990, where a decline in employment rates for PWDs was observed amidst remarkable economic growth (United States Department of Labor, 2017; Stapleton, Burkhauser & Houtenville, 2004). In addition to the low employment rates faced by PWDs, evidence further suggests that PWDs are most likely to be employed in part time positions as a study on the factors affecting employment among people with mobility disabilities in South Korea revealed that only 13.2% of the disabled had full time positions (Park, Yoon & Henderson, 2007). Hum & Simpson (1996) provide further evidence of work limitations for PWDs compared to their non-disabled counterparts as it was estimated that on average persons without disabilities worked for 38.6 weeks per year while those with disabilities worked for only 25.5 weeks. In terms of unemployment, the average period of unemployment for PWDs was 22.9 weeks while that of persons without disability was 15.7 weeks which indicated that it was more difficult for PWDs to find employment. PWDs were also found to earn less by 37% compared to persons without disabilities. Evidence further suggests that PWDs are underrepresented in high paying managerial and professional jobs but overrepresented in low paying manual jobs, and the manufacturing sector, which explains the existence of low wages amongst PWDs (Kidd et al., 2000). The existence of low wages explains the inability of PWDs to own assets compared to their non-disabled counterparts, which places them at the lower end of the economic ladder.

Studies have indicated that the type and severity of disability influence the probability of employment for PWDs. Persons with psychological disabilities bear the least likelihood of employment while those with hearing and physical disabilities are more likely to be employed. A study on employment opportunities for persons with different types of disability found that the probability of employment was higher for persons with hearing disabilities while those with psychological disabilities were least likely to be employed (Boman et al., 2015). The study controlled for differences in gender, age, ethnic background, level of education, self-related workability and residential region, whilst applying logistic regression to calculate odd ratios. The

high likelihood of employment for persons with hearing disabilities was attributed to the fact that hearing loss progressed with age and as such, people with hearing disabilities were not hindered from entering the labour market earlier in life (Boman et al., 2015). Jensen et al., (2005) also found the effect on employment to be smaller for persons with hearing disabilities compared to other disability types and the total employment effect did not vary with the severity of their hearing disability.

Kidd et al., (2000) similarly found that individuals with physical disabilities were more likely to be employed than those with psychological or learning difficulties when analysing labour market participation of British males. Individuals with psychological disabilities were less likely to be employed because of the perception employers had towards different types of disability. Employers perceived it easier to employ those with physical disabilities than those with psychological disabilities (Boman et al., 2015). Given that investments in education have the potential to counter the negative effects of the type of disability on employment, the same did not apply to persons with psychological disabilities because their likelihood of employment remained low even after differences in the level of education were accounted for. Furthermore, there was no significant difference in employment outcomes between persons with a high school qualification and those with higher education which meant that other factors such as the physical environment, the lack of support from education providers and a different labour market policy programme did not prepare PWDs with the necessary transition into the labour market (Boman et al., 2015).

In relation to wages, the type of disability was also found to have an impact on the differences in wages as a study in the US on labour market discrimination against men found lower wages in workers who had more functional limitations compared to those with fewer limitations. Baldwin & Johnson (2000) in estimating the effects of wage discrimination by partly attributing differences to productivity and partly to discrimination and residual effects, found large productivity wage differentials between disabled and non-disabled men while also finding physical limitations to be significant in explaining wage differentials. These physical limitations were taken into consideration to avoid overestimating the effect of disability on wages. Hum & Simpson (2015) also found that the earnings gap further widened as the severity of disability increased after earnings were found to decline when the level of severity of disability increased.

The severity of disability also has an influence on the probability of employment as studies indicate that the probability of employment decreases with the greater the severity of disability. A study in New Zealand found that individuals with disabilities had a lower likelihood of full-time employment with the probability of employment diminishing as the severity of disability increased, when controlling for age, gender, marital status, parental status and level of education (Jensen et al., 2005). The study estimated a counterfactual which was compared to the actual employment outcomes of PWDs and the severity of disability was measured by asking respondents whether they could do an action easily, with difficulty or not at all and assigned scores of 0, 1 and 2. Results indicated that as the severity of disability increased, the gap between the expected level of employment and actual employment widened. Park, Yoon & Henderson (2007) similarly found a higher probability of employment in people with less severe disabilities while assessing factors that affected employment among people with mobility disabilities in South Korea. Hum & Simpson (1996) found that earnings, the number of hours worked, and hourly wages decreased as the severity of disability increased while Meyer & Mok (2014) found that a drop in the number of annual hours worked in the severely chronic group after disability onset was four times that of the average disabled group.

2.2.4 South African studies

Striking similarities exist in South Africa albeit the situation being more severe as a study on the employment of people with disabilities found that out of 19 organisations in South Africa's top 100, 13 of them had below 1% PWD representation (Gida & Ortlepp, 2007). Despite the introduction of several labour market policies to favour the employment of PWDs, the actual numbers of those employed do not correlate. In the hospitality sector, the lack of awareness on disability contributed to the poor implementation of legislation that governed the employment of PWDs (Smit, 2012). The Commission for Employment Equity also reported that only 1% of PWDs were employed in 2017, a stark revelation of the status of employment for PWDs in South Africa. Reports further indicate that the degree of disability has greater ramifications on the level of income such that the more severe the disability, the lower the level of income (Statistics South Africa, 2011). PWDs in South Africa generally earn less than persons without disabilities and the

type of disability further influences an individual's income, as those with sight disabilities are reported to earn more than other types of disability (Statistics South Africa, 2011).

2.3 Summary of Literature Review

This chapter highlighted the underlying theories that explain discrimination based on taste and statistics, and explained the challenges faced by researchers in distinguishing the difference between the two. It further highlighted the econometric complications around the measurement of labour market discrimination such as the problems of the omitted variable bias, selection bias and endogeneity, which may in one way or the other affect the estimation of results.

The empirical evidence in this chapter highlighted the barriers to the employment of PWDs which was attributed to the lack of experience and skills, environmental factors, legislation and access to disability grants. Past studies were also reviewed on the relationship between disability and other labour market determinants such as age, gender, race, level of education, marital status and depression. In relation to the effects of disability, disability type and disability grants, there has been compelling evidence from international studies on the inequalities in labor force participation, wages and unemployment, but evidence in relation to the South African labour market remains limited. Studies in South Africa have instead focused on inequalities based on race and gender, and in instances where literature on PWD's exist, this literature has focused on health and educational outcomes or the barriers faced in employment with limited statistical evidence explaining this phenomenon (Burger & Jafta, 2006; Kollamparambil & Razak, 2016; Bosch ,2015; Maja et al., 2011; Gida & Ortlepp, 2007). This means that the effect of having a disability on labour market outcomes relative to persons without disabilities in South Africa is unknown. The effect of disability type on labour market outcomes is also unknown, while the effect of disability grants on labour market outcomes has not been fully explored. This is the gap that this study seeks to fill.

Similarly, past studies have used OLS regression models, probit models and Heckman two-stage estimation models to determine the difference in labour force participation, employment and wages between the disabled and able-bodied. This study is unique in that it attempts to explain the effects of disability, disability type and disability grants on labour market outcomes using a panel dataset

and uses specification tests to determine which model out of a POLS, a random effects model and a fixed effects model best describes the dataset. The use of a POLS model may present the possibility of unobserved heterogeneity but will be addressed by applying a random effects and fixed effects model to eliminate any unobserved heterogeneity. This addresses the challenge of the omitted variable bias which has been cited as a shortcoming of econometric models. To circumvent the problem of selection bias which econometric models have been faulted for and may be present in POLS and random effects models, this study will employ the use of an inverse mills ratio in its regression equations to account for selection bias.

CHAPTER THREE
METHODOLOGY

3.0 Introduction

This chapter discusses the sources of data used for analysis and the methods used to analyse the effects of disability, disability type and disability grants on labour force participation, employment and wages. It also explains the variables used for analysis and how they were coded for purposes of this study.

3.1 Data

This study used data from the National Income Dynamics Study (NIDS) which is a survey on individuals living in South Africa and their households. NIDS data was first collected in 2008 where the total number of individuals successfully interviewed was 28 226. This number increased to 34 085 in the second wave, 37 397 in the third wave and 42 337 in the fourth wave. Data from all four waves was used to compare the effects of disability and disability type on labour market outcomes. This was in line with the broader objectives of NIDS which seeks to understand the changing face of poverty for individuals living in South Africa, which PWDs are particularly susceptible to. Data from the adult, child and proxy questionnaires was appended to increase the sample size and data was dropped for variables where responses were missing or where individuals refused to give information. This was done to ensure a clean dataset by avoiding white noise, and to balance the panel dataset. STATA statistical software was similarly used to perform econometric analysis.

The NIDS questionnaire captures information on disability status by asking the question “Do you have any other major illnesses or disability not mentioned above? Information on disability type is captured by asking a follow up question to the question on disability “If yes, what are they?” The options for the different disability types are captured under the category physically handicapped, problems with sight, hearing and speech, psychological or psychiatric disorder, HIV/AIDS, Epilepsy/fits, Emphysema, Alzheimers disease and other.

3.2 Model specification

This paper estimated three effects of disability on labour market outcomes for individuals over time using panel data analysis from wave 1 to wave 4. The first part measured the effect of disability on labour market outcomes, the second part measured the effect of different types of disability on labour market outcomes and the third part measured the effect of disability grants on labour market outcomes. Labour market outcomes were limited to participation, employment and wages and to determine the effects of disability, disability type and disability grants, three models were estimated; a Pooled Ordinary Least Squares model, a random effects model and a fixed effects model.

3.2.1 Pooled ordinary least squares model (POLS)

Pooled data combines a time series of cross sections where observations are repeated on fixed units and allows one to observe variations in observations over time. It is advantageous because it deals with the problem of few observations that make it difficult to analyse the relationship between dependent and independent variables because of the potential of explanatory variables to exceed the degrees of freedom (Podesta, 2002). This is especially true in the case of disability where the sample size is small given that approximately 10% of the sample population in the NIDS data set was disabled.

The analysis was done in three steps where the first step accounted for the decision of PWDs to participate in the labour market. The second step estimated the effect of disability on employment in recognition of the fact that the decision to participate in the labour market does not necessarily lead to employment especially in the case of South Africa where unemployment rates are high (Commission of Employment Equity, 2017). The third step determined the Mincerian wage regression model to measure the effect of disability on wages.

The model used to measure the effect of disability on labour force participation was represented by the Ordinary Least Squares equation below:

$$Y_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \quad \text{.....(1)}$$

Equation (1) is a binary dependent variable model where Y_i takes the value of 1 if an individual is in the labour force and takes the value of 0 if the individual is not in the labour force. X_1 is a dummy variable which will take the value of 1if an individual is disabled and 0 if they are not disabled, X_2 is a vector of explanatory variables used to determine the probability of participating in the labour market in this case age, gender, race, education, marital status and disability grants, while ε is the error term.

The effect of disability on employment was represented by:

$$Y_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \quad \text{.....(2)}$$

Equation (2) is a binary dependent variable model where y_i takes the value of 1 when an individual is employed and takes the value of 0 if the individual is not employed. X_1 is a dummy variable which will take the value of 1if an individual is disabled and 0 if they are not disabled, X_2 is a vector of explanatory variables used to determine the probability of employment as mentioned in equation (1)

The effect of disability on wages was represented by:

$$\ln Y_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \quad \text{.....(3)}$$

Equation (3) is the Mincerian wage regression model where y_i represents the log of monthly wages, X_1 represents a dummy variable which will take the value of 1 if an individual is disabled and 0 if an individual is not, X_2 is a vector of explanatory variables that determine wages as mentioned in equation (1). The Mincerian Wage regression model was used because of its ability to capture how the labour market rewards productivity attributes and accounts for income inequality (Mincer, 1975)

The effect of disability type on labour force participation, employment and wages was represented by the equation:

$$Y_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon \quad \text{.....(4)}$$

Where X_1 is a dummy variable which will take the value of 1 if the individual is physically handicapped and 0 if the individual is not physically handicapped, X_2 will take the value of 1 if the individual has hearing, seeing and speech disabilities and 0 if not, X_3 will take the value of 1 if the individual is mentally disabled and 0 if they are not mentally disabled, X_4 will take the value of 1 if the individual has epilepsy/fits, emphysema or alzheimers and 0 if they do not. X_5 is a vector of explanatory variables used to determine the probability of participation, employment and wages which in this case represents age, gender, race, education, marital status and disability grants.

3.2.2 Random effects and fixed effects model

There is the possibility of unobserved heterogeneity bias in the POLS model, which is the presence of individual specific unobserved characteristics. This may lead to the study yielding spurious results if the unobserved person specific characteristics are correlated with the explanatory variables, leading to endogeneity bias. For example, given that the onset of disability may vary for different individuals such that some people are disabled from when they are young while others may develop disability after acquiring education and skills, the effects on labour market outcomes will be different. The onset of disability in the NIDS data set is not measured and is over and above correlated with education which explains labour market outcomes. Similarly, some PWDs may have low self-esteem and decide not to participate in the labour market while their counterparts may be more focused and take advantage of opportunities leading to different labour market outcomes. Furthermore, the fact that there exist different types of disability, the effects of these disability types on labour market outcomes may vary which this study seeks to further determine.

To address the possibility of unobserved heterogeneity, this study will apply the random effects and fixed effects model which eliminate unobserved heterogeneity as shown below:

Random effects model

$Y_{it} = \beta X_{it} + \alpha + u_{it} + \varepsilon_{it}$……..……..(5)

Fixed effects model

$Y_{it} = \beta X_{it} + \alpha + u_{it}$……(6)

The problem however with the fixed effects model is that it may omit variables that are consistent over time. This can be corrected by introducing an interaction term between each explanatory variable, and a continuous variable is created as shown below:

$$\varepsilon_{it} = u_i + v_t + w_{it} \quad \text{.....(7)}$$

u_i is the unobservable individual effect of error; v_t is the unobservable time effect of error; w_{it} is the purely random component of error. The unobservable effect of error measures ability, motivation, self-esteem and other innate attributes that are person specific which cause unobserved heterogeneity bias. The unobservable time effect variable accounts for unobservable shocks such as government policies that may affect earning during the observed periods.

3.2.3 Specification tests

To test which model best fit the NIDS data set between pooled, random and fixed effects, specification tests were performed. The Breusch-Pagan test for heteroscedasticity was performed to determine which model was better between the pooled or random effects model. Under this model, the null hypothesis states that variances across entities is zero meaning that there is no significant difference across units. When the p-value is less than 5% the null hypothesis is therefore rejected. The Hausman test was also performed to determine which model between the random effects and the fixed effects best suit the dataset. Under this model, the null hypothesis states that the random effects model is the appropriate model and is rejected when the p-value is less than 5%. This means that in cases where the p-value is less than 5% the fixed effects model would be the most appropriate model.

3.3 Data coding and manipulation

3.3.1 Dependent variables

Labour force participation was represented by individuals who were unemployed discouraged, unemployed strict and those who were employed. A dummy variable was created for labour force participation where 1 represented individuals who participated in the labour market and 0 represented those that did not participate. Employment was represented by an individual's employment status for which a dummy variable was created to indicate 1 for individuals who were employed and 0 for those who were unemployed, while those who were not economically active

were dropped from the sample. Wages were represented by an individual's gross income from their primary occupation and the log of income was created to represent wages.

3.3.2 Independent variables

The variables used to explain the effects of disability and disability type on participation, employment and wages were age, gender, race, education, marital status, disability, disability type and disability grants. The choice of variables was because they had predominantly been mentioned as determinants of employment and income in a wide array of literature (Jensen et al., 2005; Brown & Emery, 2008). These variables also allowed the results of this study to be compared with other studies.

The age of the sample population was individuals between the age of 15 and 64 because they formed the working age population in South Africa. Race included the African, Coloured, Asian and White population.

For the education variable, the years of education were recoded to represent:

- 1 for individuals who had no education to grade seven
- 2 represented individuals who had achieved grade 8 to grade 11
- 3 represented individuals who had achieved grade 12
- 4 represented those who had achieved a diploma
- 5 represented individuals who had attained a degree or higher.

A dummy variable was created for marital status where 1 represented married individuals and 0 represented all those who were living with a partner, widowed, divorced or separated or those who were never married. For disability and disability grants, dummy variables were created where 1 represented those who were disabled while 0 represented those who were not disabled and 1 represented those who received a grant and 0 represented those who did not receive a grant.

The different types of disability were coded into four categories:

- The first category represented 1 for people who were physically handicapped and 0 for those who were not

- The second represented 1 for people with seeing, hearing and speech disabilities and 0 for people without.
- The third category represented 1 for people with psychological/psychiatric disorders and 0 for those without
- The fourth category represented 1 for people with epilepsy/fits, emphysema, Alzheimer's disease and other disabilities while 0 represented those without.

CHAPTER FOUR
RESULTS AND DISCUSSION

4.0 Introduction

This chapter presents findings of the study which had the objective of analysing the effects of disability, disability type and disability grants on labour market outcomes. The discussion includes descriptive statistics, results from the specification tests which determined the model that was the most appropriate, and interpretations of the regression analysis for the panel dataset.

4.1 Descriptive statistics

Descriptive statistics were used to explain the variables under study as summarized on table 1 below.

4.1.1 Summary statistics of regression variables

The average age of the sample population was 34 years old with the oldest being 65 years old and the youngest being 15. Age, gender and education were not significantly skewed as their values were close to zero. Marital status, race, disability and disability grants however appeared to be significantly skewed to the right meaning that half of the variables in the dataset were normally distributed while the other half were not. The distribution of age, gender and education followed a leptokurtic distribution because their kurtosis values were close to 2 or slightly above 2. Overall, there was evidence suggesting that the data set was not relatively symmetrical as one may have expected because of the heavy tailed distributions of race, marital status, disability and disability grants. This is because in the case of race the black population was more dominant than any other race, unmarried individuals were more dominant than married individuals, the non-disabled population was more dominant than PWDs and in the case of disability grants, non-grant recipients were more dominant than grant-recipients.

Table 1: Summary of regression variables

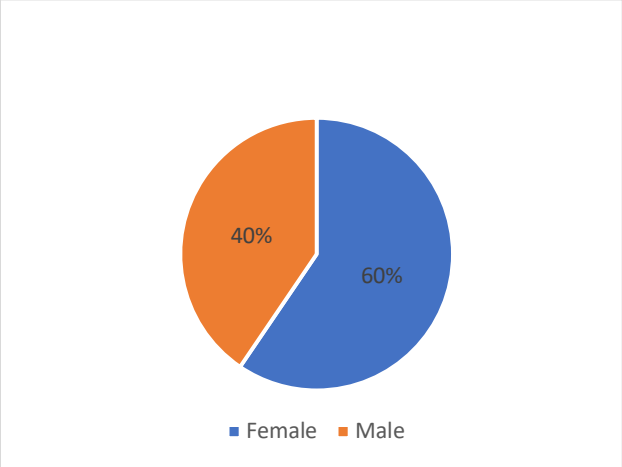
	Age	Gender	Race	Education	Marital Status	Disability	Disability Grants
Mean	33.70	-	-	-	-	-	-
Median	31	-	-	-	-	-	-
Maximum	65	-	-	-	-	-	-
Minimum	15	-	-	-	-	-	-
Std. Dev.	14.15	0.45	0.64	0.96	0.24	0.24	0.20
Skewness	0.51	-0.26	2.92	0.88	3.57	3.60	4.70
Kurtosis	2.08	1.07	11.70	3.49	13.78	13.98	23.06
N	31226	31221	31225	31177	31226	31148	31193

Source: Author's own calculation from Stata

4.1.2 Disability and age, gender, race, education, depression, marital status

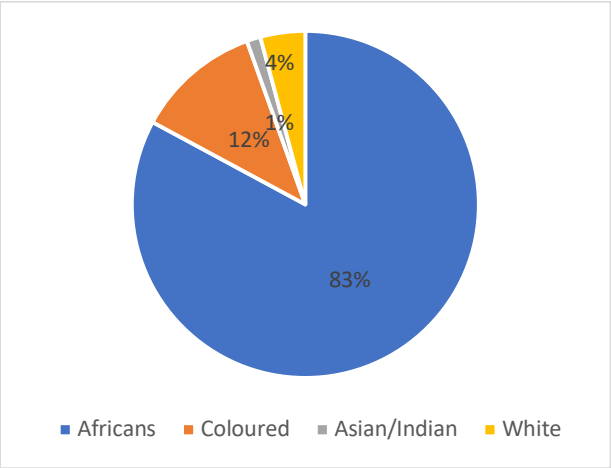
6% of the population reported some form of disability while disability prevalence was higher in women than it was in men as demonstrated in figure 1 below. 60% of the disabled population were female while 40% were male. In terms of race, disability prevalence was highest in the black population than in any other race as 83% of the disabled population was African while only 1% was Asian/Indian. The high prevalence amongst the black population could however be because majority of the population was Black and therefore expected to contribute to a greater share of the disabled population. This therefore required further investigation into within race disability which shows a different picture. The White population had a higher within race disability prevalence of 8% compared to the Black population with 6%.

Figure 1: Disability Prevalence across gender



Source: Author's own calculation from Stata

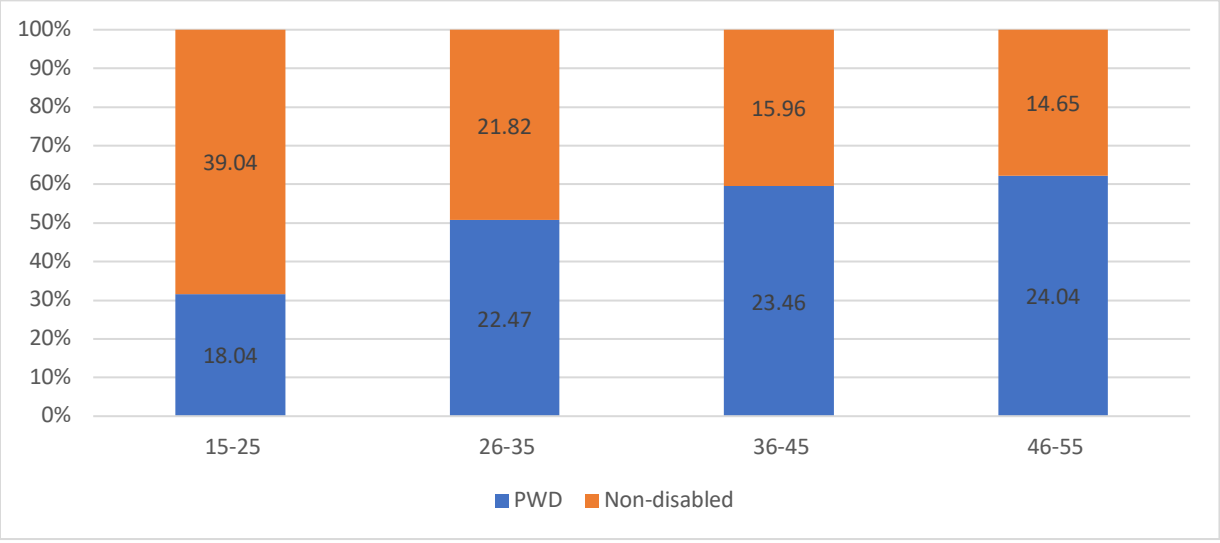
Figure 2: Disability prevalence across race



Source: Author's own calculation from Stata

In relation to disability and age, PWDs were more likely to be between the age of 46-55 as 24% of them reported disability in this age group compared to 18% between the age of 15-25 as seen on figure 3 below. These finding were expected and agree with Gerschick (2000) and Loprest & Maag (2003) who found that disability increased with age.

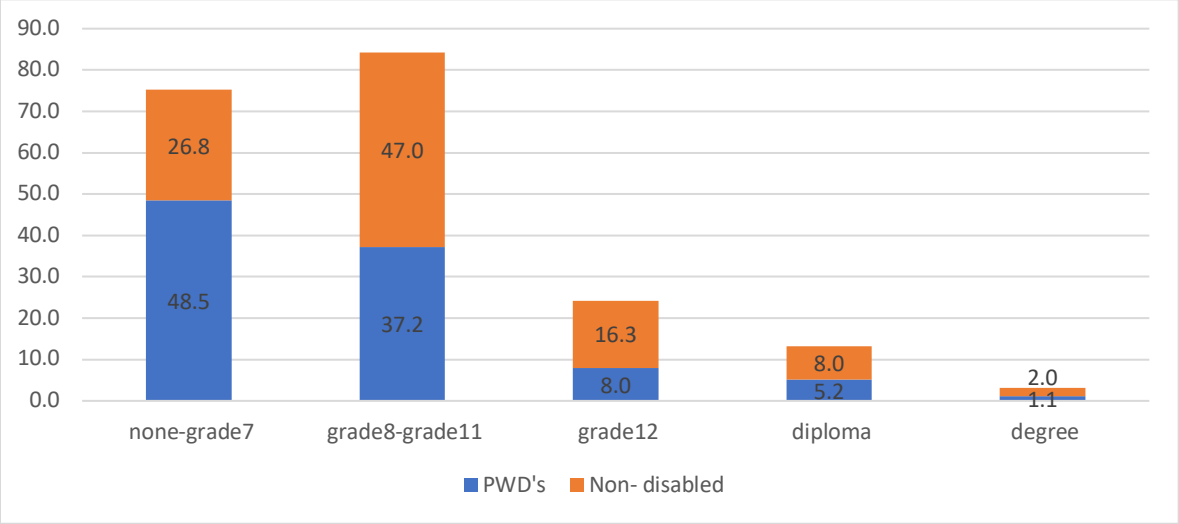
Figure 3: Distribution of age for PWDs and persons without disability



Source: Author's own calculation from Stata

In terms of education, PWDs had low levels of education as most of them had no education or had achieved primary school education as shown on figure 3 below. 49% of the disabled population had either no education or had only attained primary school education, while only 1% of the disabled population had a degree. In comparison to persons without disability, 27% of them had either no education or had attained primary school education while 2% of them had a degree. These findings show that PWDs had attained lower levels of education compared to their non-disabled counterparts, which corresponds to the findings of previous research where PWDs were found to have lower levels of education and negative labour market outcomes (Hum & Simpson, 1996; Elwan, 1999).

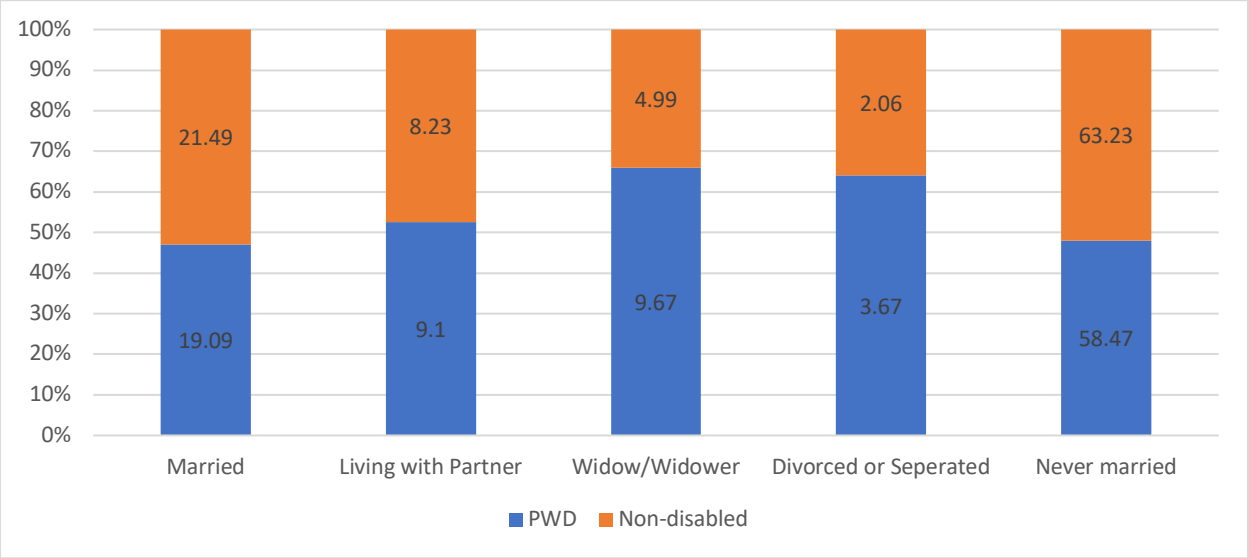
Figure 4: Level of education attained for PWDs and persons without disability



Source: Authors own compilation from stata

In relation to marital status, persons with disabilities were less likely to be married as indicated by figure 5 where 19% were married compared to 21% for persons without disabilities. These findings were expected and are similar to those of Hahn (1981) who found that individuals with visible physical disabilities found it harder to find marital partners because of the stigma attached to disability, and Meyer & Mok (2014) who found that PWDs were less likely to marry than people without disabilities.

Figure 5: Marital status for PWDs and persons without disability



Source: Authors own compilation from stata

4.1.3 Disability and occupation/sector

Results indicated that PWDs were mostly working in elementary occupations as indicated on table 2 below. 43% of the disabled population worked in elementary occupations while only 3% occupied managerial positions. For persons without disabilities, managerial positions were occupied by 4% of the non-disabled population while 34% worked in elementary occupations. This shows that minimal progress has been made towards employment equity as PWDs remain under-represented in high-level jobs. These findings were however expected as studies have previously found that PWDs were under-represented in highly skilled jobs (Maja et al., 2011)

Table 2: Level of occupation for PWD's and non-disabled

Occupation	PWD (%)	Non-disabled (%)
Managers	3.18%	4.18%
Professionals	11.74%	11.98%
Technicians and associate profession	3.73%	4.50%
Clerical support workers	4.01%	5.89%
Service and sales workers	16.30%	17.26%
Skilled agricultural, forestry and farming	0.55%	0.77%
Craft and related trades workers	8.98%	10.94%
Plant and machine operators	8.01%	10.14%
Elementary occupations	43.37%	34.04%
Total	100%	100%

Source: Author's own calculation from stata

In relation to the sectors/industries where PWD's worked, majority of them worked in the community/social and personal services sector while the electricity, gas and water supply sectors were the least represented. The mining and quarrying sector; construction sector and the transport, storage and communication sectors were also underrepresented. The underrepresentation of PWDs in the mining, quarrying and construction sectors can be explained by the labour intensive nature of jobs in these industries while underrepresentation in the transport, storage and communication sectors can be explained by the inability to communicate for those with seeing hearing and speech disabilities, or locomotive shortcomings for those with physical disabilities. This is especially true for PWDs with physical disabilities and those with seeing/ hearing/ speech disabilities which form majority of the population under study.

Table 3: Sectors occupied by PWD's and non-disabled

Sector	PWDs (%)	Non-Disabled (%)
Private households	16.2	9.6
Agriculture/hunting/forestry/farming	12.9	12.4
Mining and Quarrying	2.1	3.8
Manufacturing	9.2	10.6
Electricity/gas/water supply	1.1	1.1
Construction	4.7	5.6
Wholesale/retail trade	14.4	17.1
Transport/storage/communication	4.3	4.2
Financial intermediation/insurance	5.6	7.8
Community/social/personal service	29.5	27.8
Total	100%	100%

Source: Authors own compilation from stata

4.2 Results

4.2.1 Specification test results

Specification tests were run to determine the most appropriate model in explaining the effects of disability on labour market outcomes using NIDS data. Results from the Breusch-Pagan test which determined the most appropriate model between the pooled OLS and the random effects model found p-values of less than 0.05 as shown on appendix 1. This led to the rejection of the null hypothesis which meant that there were variances across entities and that the random effects model was better than the pooled OLS model at explaining the effects of disability on labour market outcomes. Results from the Hausman test used to determine the most appropriate model between the random effects and the fixed effects model also found p-values of less than 0.05 as shown on appendix 2, which led to the rejection of the null hypothesis. This meant that the difference in coefficients was systematic and that the fixed effects model was the most appropriate model in explaining the effects of disability on labour market outcomes.

It is however important to note that the Hausman test is not an absolute test because it is made under the assumption that significant p-values indicate correlation between explanatory variables and unit effects, when in most applications the true correlation between the covariates and unit effects is not exactly zero (Clark & Linzer, 2014). This means that the test could have insufficient statistical power to reliably distinguish a small correlation from a zero correlation.

4.2.2 Fixed effects

In this model the gender and race variables were omitted because they are time invariant and therefore not expected to change over time as shown on table 4 below. The coefficients for disability, disability type and disability grants were also significantly lower than the coefficients from the pooled OLS and random effects regression models. This was expected because fixed effects models analyse variation within units and control for any unobserved heterogeneity across units. The effects of disability on labour force participation and employment was not statistically significant but the effect on wages was statistically significant at the 10% level. There was also no effect of disability type on participation, employment and wages for all types of disability except those with sight, hearing and speech disabilities which had a significant effect on wages. Wages were likely to decrease by 9% after an individual became disabled and also likely to decrease by 14% after an individual had sight, hearing and speech impairments. The effect of disability grants on labour force participation and employment was however statistically significant as grant recipients were 12% less likely to participate and 8% less likely to be employed than individuals who did not receive a disability grant.

Table 4: Fixed effects model regression results

	Disability			Disability type		
VARIABLES	LFP	EMP	WAGE	LFP	EMP	WAGE
age	0.0784***	0.0717***	0.128***	0.0776***	0.0722***	0.128***
	(0.00844)	(0.00795)	(0.0263)	(0.00843)	(0.00796)	(0.0263)
	-	-	-	-	-	-
age2	0.00111***	0.000821***	0.000991***	0.00110***	0.000819***	0.000998***
	(4.81e-05)	(4.49e-05)	(0.000186)	(4.79e-05)	(4.48e-05)	(0.000185)
non-grade7	-0.0330**	-0.0632***	0.0737	-0.0335**	-0.0614***	0.0713
	(0.0154)	(0.0134)	(0.0773)	(0.0154)	(0.0134)	(0.0768)
grade8-11	0.114***	-0.0592***	0.172*	0.114***	-0.0572***	0.170*
	(0.0223)	(0.0195)	(0.102)	(0.0222)	(0.0194)	(0.101)
grade12	0.175***	0.00303	0.189*	0.174***	0.00460	0.187*
	(0.0254)	(0.0239)	(0.106)	(0.0253)	(0.0237)	(0.104)
degree	0.275***	0.0756	0.214	0.273***	0.0850*	0.218*
	(0.0441)	(0.0464)	(0.133)	(0.0437)	(0.0460)	(0.131)
female	-	-	-	-	-	-
married	-0.0205*	-0.0144	-0.00623	-0.0186*	-0.0128	-0.00496
	(0.0106)	(0.0105)	(0.0286)	(0.0106)	(0.0105)	(0.0285)
coloured	-	-	-	-	-	-
asian/indian	-	-	-	-	-	-
white	-	-	-	-	-	-
disabled	0.00319	0.00454	-0.0887*			
	(0.0135)	(0.0124)	(0.0489)			
grant-recipient	-0.122***	-0.0795***	-0.0174			
	(0.0195)	(0.0165)	(0.0658)			
physc. handicapped				-0.0464	-0.0418	-0.00393
				(0.0382)	(0.0317)	(0.0979)
sight/hear/speech				0.0129	0.0195	-0.142**
				(0.0264)	(0.0244)	(0.0717)
psych. disorders				-0.0542	-0.0316	-0.0111
				(0.0415)	(0.0336)	(0.117)
other disability				-	-	-
_Iyear_2010	-0.154***	-0.0935***	-0.305***	-0.153***	-0.0895***	-0.308***
	(0.0361)	(0.0344)	(0.107)	(0.0361)	(0.0344)	(0.107)
_Iyear_2011	-0.0994***	-0.0676**	-0.330***	-0.0991***	-0.0630**	-0.327***
	(0.0333)	(0.0317)	(0.0927)	(0.0333)	(0.0317)	(0.0926)
_Iyear_2012	-0.0511**	-0.0434**	-0.196***	-0.0502**	-0.0407**	-0.198***
	(0.0216)	(0.0206)	(0.0628)	(0.0216)	(0.0206)	(0.0626)
_Iyear_2014	0.0112	0.0244**	-0.0421	0.0123	0.0264***	-0.0430
	(0.00973)	(0.00967)	(0.0287)	(0.00972)	(0.00966)	(0.0287)
o._Iyear_2015	-	-	-	-	-	-
pweight	-7.33e-06***	-6.08e-06***	-8.05e-07	-6.93e-06***	-5.90e-06**	-7.67e-07
	(2.38e-06)	(2.34e-06)	(6.14e-06)	(2.37e-06)	(2.34e-06)	(6.13e-06)
Constant	-0.565**	-0.845***	4.823***	-0.553*	-0.871***	4.845***
	(0.287)	(0.272)	(0.920)	(0.287)	(0.272)	(0.917)
Observations	40,392	40,392	10,779	40,532	40,532	10,819
R-squared	0.081	0.061	0.223	0.079	0.060	0.224
Number of pid	18,083	18,083	6,617	18,100	18,100	6,629

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.4 Discussion of results

Although the effects of other labour market determinants such as age, gender, race, education and marital status were included in the regression equations, this discussion will focus on the effects of disability, disability type and disability grants on labour market outcomes as these were the main objectives of this study. A general observation from the pooled OLS model as shown on appendix 1, was that the coefficients for disability, disability type and disability grants were higher than those of the random effects and fixed effects models. This was because the pooled OLS model did not account for heterogeneity and therefore had the potential of overestimating the effects on labour market outcomes. Coefficients from the random effects model as shown on appendix 2 were also greater than the fixed effects model which has the tendency to underestimate the coefficients of variables as seen on table 4. In as much as specification tests identified the fixed effects model to be the most appropriate model for explaining this dataset, this study was interested in accounting for between group comparisons which pooled OLS and random effects model explain. A brief explanation on the results from the pooled OLS and random effects model will therefore be discussed.

Results from the pooled and random effects model where PWDs were less likely to participate in the labour market or be employed by 4% and earn 14%-16% less than persons without disabilities were expected. This is because the penalties of having a disability are quite significant in the South African labour market after studies found a 1% representation of PWDs in most of South Africa's top 100 organizations while low rates of labour market participation were reported amongst PWDs (Gida & Ortlepp, 2007; Commission for Employment Equity, 2017). These results also correspond to those of Kidd et al., (2000), Brown & Emery (2008) and Hum & Simpson (1996) who found that PWDs were 30% less likely to participate in the labour market and likely to earn 37% less than persons without disability. The coefficients in this study were however lower in comparison to previous research which can be attributed to the use of different econometric models applied in the analysis of data. Kidd et. al, (2000) used a probit model while Brown & Emery (2008) used a probit model, an OLS regression model and a Heckman two-stage estimation model.

In the fixed effects model, disability did not have a significant effect on labour force participation and employment but had a significant effect on wages as wages were likely to decrease by 8%.

This could mean that the onset of disability did not cause any job loss but significant reduction in the number of hours worked for disabled individuals, leading to a reduction in wages. The reduction in wages was consistent with the results from the pooled OLS and random effects model and is especially true for individuals who become permanently ill which has a negative effect on wages. Pelkowski & Berger (2004) found that permanent health conditions had a negative effect on wages and hours worked for both men and women when analyzing the impact of health on employment, wages and hours worked over an individual's life cycle. The fact that disability did not have a significant effect on labour force participation and employment under the fixed effects model could also mean that the onset of disability did not affect the decision of individuals to participate in the labour market and that the decision to participate was motivated by factors other than disability.

The negative effects of disability grants on labour force participation and employment were consistent in all three models as participation was likely to decrease by 12% to 38% while the likelihood of employment was likely to decrease by 8% to 32%. These findings correspond to previous literature on the disincentive effects of disability grants on labour supply which have been found to serve as an alternative source of income to disability grant holders (Johannsmeier, 2007). This is also true in the case of South Africa where Mutasa (2012) found that the receipt of a disability grant reduced the likelihood of labour force participation by 22.3%.

In relation to the types of disability, the pooled OLS and random effects model found significant effects of disability type on labour force participation and employment but not on wages. Individuals who were physically handicapped, those with sight, hearing and speech disabilities; and those with psychological or psychiatric disorders were less likely to participate in the labour market or be employed than those who did not have these disabilities. These results were expected as Kidd et. al (2000) found that the type of disability did not influence wages but only participation and employment. The effect of sight, hearing and speech disabilities on wages was however statistically significant at the 10% level and can be explained as an outlier as these results were not expected.

Persons who were physically handicapped were 30% to 35% less likely to participate in the labour market and 25% to 32% less likely to be employed than persons who were not physically handicapped. These findings were similar to the findings of Park, Yoon & Henderson (2007) who found that people with mobility disabilities had employment rates that were 34% lower than the general population. The results also confirm the findings of Maja et al. (2011) who reported the lack of disability friendly workspaces as one of the greatest deterrents to the employment of PWDs in South Africa. It could also be that the perception of employers towards people with physical disabilities has not changed as previous studies indicated that this group of individuals faced higher levels of discrimination because their disability is visible (Shier, Graham & Jones, 2009).

Individuals with sight, hearing and speech disabilities were 8% to 9% less likely to participate in the labour market and 5% to 8% less likely to be employed than people without sight, hearing and speech disabilities. In comparison to people with physical disabilities, the penalties of sight, hearing and speech disabilities were lower and can be explained by the active presence of braille literacy training institutions that cater to the blind as well as the presence of special education schools that cater to the needs of individuals with hearing and speech disabilities (Mutanga, 2017). These individuals are therefore better prepared for the labour market and can choose career paths that better align them for the job market.

Individuals with psychological and psychiatric disorders were 19% to 22% less likely to participate in the labour market and 16% to 19% less likely to be employed than individuals without psychological and psychiatric disorders. In comparison to people with physical disabilities, these results were not expected as previous studies indicated that persons with psychological disorders had the least likelihood of employment (Boman et al., 2015). Their better labour market outcomes can be attributed to the growth of mental health awareness programmes which seek to improve the treatment of mental health in South Africa (Lund et al., 2012). Such programmes encourage people with psychological and psychiatric disorders to deal with their mental problems while at the same time reduce the negative perception of employers towards mental disabilities. The overall effect would therefore translate to better labour market outcomes for this group of individuals.

Under the fixed effects model, the type of disability had no effect on labour force participation, employment or wages except for individuals with sight, hearing and speech disabilities which was likely to cause a decrease in wages by 14%. These results were not expected as previous research indicated that the type of disability did not influence wages but influenced participation and employment (Kidd et. al, 2000). This difference in outcomes can be attributed to the application of different statistical methods and sample sizes which influence the significance of results.

CHAPTER FIVE
CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter summarizes and concludes the findings of this study, provides suggestions for future research and gives recommendations to inform policy.

5.1 Summary

The objectives of this study were to measure the effects of disability, disability type and disability grants on labour market outcomes in South Africa using the NIDS dataset. Data was analysed as a panel for successful interviews from Wave 1 to Wave 4. A pooled OLS regression model, a random effects model and a fixed effects model were applied to the data and specification tests were performed to determine which of the three models was the most appropriate. The Breusch-Pagan test revealed that there were variances across entities and that the random effects model was better than the pooled OLS model in explaining the dataset, while the Hausman test revealed that the fixed effects model was better than the random effects model at explaining the dataset.

Given that the fixed effects model accounted for heterogeneity across units, this study found that disability did not influence labour force participation and employment but influenced wages as wages were likely to decrease by 9% after the occurrence of a disability. Disability type had no effect on labour force participation, employment and wages for all types of disability except for sight, hearing and speech disabilities where wages were likely to decrease by 14% after an individual developed these disabilities. Disability grants had a negative effect on labour force participation and employment as they were likely to decrease participation by 12% and employment by 8% showing the disincentive effects of disability grants on labour supply. The insignificant effects of disability and disability type on labour force participation and employment could be explained by the fact that the decision to participate in the labour market or that of being employed is motivated by unobserved differences across individuals which requires further investigation into the perceptions and attitudes of PWDs.

While taking these results into consideration, it is however important to note that fixed effects models control for heterogeneity across individuals and therefore allow for within group comparisons, but do not account for between group comparisons which this study was also interested in. Fixed effects models also limit results to the sample population which does not allow for the generalization of results beyond the sample and therefore proves difficult when informing policy. The pooled OLS and random effects model on the other hand allow for between group comparisons across the disabled and non-disabled population, but certain assumptions must hold for the results to be effective. The assumption of no correlation between unobserved differences and the independent variables must hold under the random effects model which this study was not able to prove and therefore requires further application of correlated random effects models to simulate unobserved differences into the model. The pooled OLS and the random effects model both showed that disability, disability type and disability grants had negative effects on labour force participation, employment and wages, and because the regression equations used the inverse mills ratio to control for bias, these coefficients were not likely to be biased. Although random effects models have been faulted for bias, they may be preferred if they provide sufficient variance reduction over fixed effects which cannot be estimated by the Hausman test (Clark & Linzer, 2014).

Furthermore, because the random effects model allows for the generalization of inferences beyond the sample and therefore better at informing policy, the less likelihood of PWDs participating in the labour market or being employed by 4%, and their likelihood of earning 14% less than persons without disabilities may be of interest to policy makers. Similarly, the penalties of having a physical disability on labour market outcomes which were greater than all other types of disability may provide insight to policy makers on the priority areas of intervention for the different types of disability when formulating policies. This was after results indicated that individuals with physical disabilities were 30% less likely to participate in the labour market and 25% less likely to be employed compared to 8% and 5% for individuals with sight, hearing and speech disabilities.

5.2 Conclusion

The findings of this study provide evidence of the existence of inequalities in labour market outcomes in relation to disability. Although there were no significant effects of disability and

disability type on labour force participation and employment, PWDs remain economically disadvantaged as the onset of disability shows a reduction in wages by 9%. This could mean that the decision to participate in the labour market and that of being employed is likely to be motivated by unobserved factors, especially because significant effects of disability and disability type were found on participation and employment under the pooled OLS and random effect models. It could also mean that disability onset did not cause the loss of employment but a reduction in the number of hours worked and consequently a reduction in wages. This draws attention to the significance of rehabilitation centres which allow for the transition of PWDs back into the labour market after undergoing permanent illness to allow for the absorption of shocks caused by health on wages. Disability grants were also found to have disincentive effects on labour force supply as they were likely to reduce participation and employment by 12% and 8% respectively. This can be explained by the fact that disability grant recipients have an alternative source of income showing the disincentive effects of disability grants on labour supply.

These findings however only apply to the sample population as fixed effects models limit the generalization of results beyond the population under study. To allow for the generalization of results across the South African population as well as to inform policy, the random effects model provides more appropriate estimates. When compared to persons without disabilities, PWDs experience negative labour market outcomes which can be seen in their lower participation, employment and wage rates. Evidence suggests that they are less likely to participate in the labour market or be employed by 4% and likely to earn 14% less than persons without disabilities. This shows that the enactment of employment equity laws in the Republic of South Africa has not yielded much results and therefore requires the rethinking of policies especially those related to disability. However, because random effects models do not test for the lack of correlation between unobserved characteristics and the independent variables, it could also mean that the perception and attitudes of PWDs may have an influence on their lack of participation and employment thus overestimating the effects. This therefore requires the application of different econometric models such as correlated random effects models to account for unobserved differences.

In relation to the types of disability, people with physical disabilities experienced the highest penalties on labour market outcomes as they were less likely to participate or be employed by 30%

and 25% respectively compared to persons without physical disabilities. This shows that environmental barriers and the lack of disability friendly workspaces remain one of the greatest deterrents to the employment of PWDs in South Africa and should be considered as a priority area for policy makers. This may require strict implementation of disability friendly workspaces at the company level to improve labour market outcomes for persons with physical disabilities. Also, because physical disabilities are visible, it could be that the attitude and perception towards individuals with physical disabilities is negative and therefore leads to their discrimination in the labour market. This however needs further investigation into the perception and attitudes of employers towards people with physical disabilities.

5.3 Recommendations for future research

Future research may apply mixed models in the analysis of data to overcome the underestimation effects of fixed effects models or the overestimation of results from pooled and random effects models. Qualitative research may also be undertaken to understand the perception of PWD's towards labour force participation and employment, as well as the attitudes of employers towards PWDs so as to understand whether there is a correlation between these unobserved characteristics and labour market outcomes. A different dataset may also be used for comparison reasons and cross-sectional data may also be applied to compare results of disability, disability type and disability grants on labour market outcomes. This study may also be replicated in other emerging economies to understand how South Africa's disability policies compare to other emerging economies and the severity of disability should also be analysed to understand its role in influencing labour market outcomes.

The policy implications from this study indicate the need for the enforcement of employment equity laws for PWDs in South Africa because of the negative labour market outcomes they face. Despite the enactment of international laws such as the Convention on the Rights of Persons with Disability (CRPD) and the Code of Good Practice on the Employment of People with Disabilities in South Africa, the implementation of these laws has been rather slow (United Nations, 2006; Republic of South Africa, 2002). According to the CRPD, the lack of an enabling environment far outweighs the incapacity of individuals with disabilities in determining their labour market outcomes because PWDs are defined as people with long-term physical, mental, intellectual or

sensory impairments who are hindered by equal participation in society because of the various barriers they face. The vulnerabilities faced by PWDs because of social exclusion from education systems, and negative perceptions from the stigma of society requires urgent attention in the form of creating awareness, and the implementation of policies that are already in place.

References

Acemoglu, D. & Angrist, J.D. 2001. Consequences of Employment Protection? The Case of the Americans with Disabilities Act. *Journal of Political Economy.* 109(5):915-957. Available: https://www.jstor.org/stable/10.1086/322836.

Altonji, J.G. & Blank, R.M. 1999. Race and Gender in the Labor Market. In *Handbook of Labor Economics.* Elsevier B.V. 3143-3259. 10.1016/S1573-4463(99)30039-0.

Anderson, D., Binder, M. & Krause, K. 2002. The Motherhood Wage Penalty: Which Mothers Pay It and Why? *The American Economic Review.* 92(2):354-358. Available: http://www.ingentaconnect.com/content/aea/aer/2002/00000092/00000002/art00066.

Aron, L. & Loprest, P. 2012. Disability and the Education System. *The Future of Children.* 22(1):97-122. Available: https://www.jstor.org/stable/41475648.

Arrow, K. 1971. "The Theory of Discrimination," Working Papers 403, Princeton University, Department of Economics, Industrial Relations Section.

Asteriou, D. & Hall, S.G. 2016. *Applied Econometrics.* 3rd edition ed. Basingstoke [u.a.]: Palgrave Macmillan.

Baldwin, M.L. & Johnson, W.G. 1995. Labor Market Discrimination against Women with Disabilities. *Industrial Relations.* 34(4):555-577. Available: https://search.proquest.com/docview/222472007.

Baldwin, M.L. & Johnson, W.G. 2000. Labor Market Discrimination Against Men with Disabilities in the Year of the ADA. *Southern Economic Journal.* 66(3):548-566. Available: http://econpapers.repec.org/article/sejancoec/v_3a66_3a3_3ay_3a2000_3ap_3a548-566.htm.

Beegle, K. & Stock, W.A. 2003. The Labor Market Effects of Disability Discrimination Laws. *Journal of Human Resources.* 38(4):806-859. Available: http://www.econis.eu/PPNSET?PPN=37308210X.

Becker, G.S. 1957. *The Economics of Discrimination.* Chicago [u.a.]: Univ. of Chicago Press.

Bell, D. & Heitmueller, A. 2009. The Disability Discrimination Act in the UK: Helping or hindering employment among the disabled? *Journal of Health Economics.* 28(2):465-480. Available: https://www.sciencedirect.com/science/article/pii/S0167629608001367.

Berthoud, R. 2008a. Disability Employment Penalties in Britain. *Water Environment Research.* 81(2):123. Available: http://www.ingentaconnect.com/content/wef/wer/2009/00000081/00000002/art00001.

Berthoud, R. 2008b. Disability Employment Penalties in Britain. *Work, Employment and Society.* 22(1):129-148.

Bhorat, H., Cassim, A. & Tseng, D. 2016. Higher education, employment and economic growth: Exploring the interactions. *Development Southern Africa.* 33(3):312-327. Available: http://www.tandfonline.com/doi/abs/10.1080/0376835X.2016.1161501.

Blau, F.D. 1996. *Where are we in the economics of gender?* Cambridge, Mass: Available: https://www.nber.org/papers/w5664.pdf

Boman, T., Kjellberg, A., Danermark, B. & Boman, E. 2015a. *Employment opportunities for persons with different types of disability.* Available: http://www.sciencedirect.com/science/article/pii/S1875067214000923.

Boman, T., Kjellberg, A., Danermark, B. & Boman, E. 2015b. Employment Opportunities for Persons with Different Types of Disability. *ALTER - European Journal of Disability Research / Revue Européenne De Recherche Sur Le Handicap.* 9(2):116-129. Available: http://www.sciencedirect.com/science/article/pii/S1875067214000923.

Bonoli, G. & Hinrichs, K. 2010. *Statistical Discrimination and Employers' Recruitment Practices for Low-skilled Workers.* Vereinigtes Königreich.

Bosch, A. 2015. *The SABPP Womens Report 2015: Equal Pay for Equal Value.*

Brown, C.L. & Emery, H.J. 2008a. *The Impact of Disability on Earnings and Labour Force Participation in Canada: Evidence from the 2001 PALS.*

Brown, C.L. & Emery, J.C.H. 2008b. *The Impact of Disability on Earnings and Labour Force Participation in Canada: Evidence from the 2001 PALS.*

Burger, R.P. & Jafta, R.C.C. 2006. *Returns to Race: Labour Market Discrimination in Post-Apartheid South Africa.* Available: http://econpapers.repec.org/paper/szawpaper/wpapers18.htm.

Burkhauser, R.V., Daly, M.C., Houtenville, A.J. & Nargis, N. 2002. Self-Reported Work-Limitation Data: What They Can and Cannot Tell Us. *Demography.* 39(3):541-555. Available: https://www.jstor.org/stable/3088331.

Cahuc, P., Carcillo, S., Zylberberg, A. & Mccuaig, W. 2014. Labour Economics Chapter 8.

Cain, G.G. . 1986. Chapter 13 The economic analysis of labor market discrimination: A survey. In *Handbook of Labor Economics.* Elsevier B.V. 693-785. 10.1016/S1573-4463(86)01016-7.

Carlsson, M. & Rooth, D. 2011. Revealing Taste-based Discrimination in Hiring: A Correspondence Testing Experiment with Geographic Variation. *Discussion Paper Series, Forschungsinstitut Zur Zukunft Der Arbeit.* 6153 Available: https://www.econstor.eu/handle/10419/58946.

Clark, T.S. & Linzer, D.A. 2015. Should I Use Fixed or Random Effects? *Political Science Research and Methods.* 3(2):399-408. Available: https://search.proquest.com/docview/1951414857.

Commission for Employment Equity. 2017. *Commission for Employment Equity Annual Report 2016-2017.*

Commission for Employment Equity. 2018. *Commission for Employment Equity Annual Report 2017-2018.* Pretoria: Department of Labour South Africa.

Cook, C.D. & Beaujot, R.P. 1996. Labour Force Interruptions: The Influence of Marital Status and Presence of Young Children. *The Canadian Journal of Sociology / Cahiers Canadiens De Sociologie.* 21(1):25-41. Available: https://www.jstor.org/stable/3341431.

Dunlop, D.D., Song, J., Manheim, L.M., Daviglus, M.L. & Chang, R.W. 2007. Racial/Ethnic Differences in the Development of Disability Among Older Adults. *American Journal of Public Health.* 97(12):2209-2215. Available: http://ajph.aphapublications.org/cgi/content/abstract/97/12/2209.

Dustmann, C. & Meghir, C. 2005. Wages, Experience and Seniority. *The Review of Economic Studies.* 72(1):77-108. Available: https://www.jstor.org/stable/3700685.

Elwan, A. 1999. *Poverty and Disability: A Survey of the Literature.* Bristol: Policy Press.

Eskay, M., Onu, V., Igbo, J., Obiyo, N. & Ugwuanyi, L. 2012. Disability Within the African Culture. *US-China Education Review B.* 2(4):473-484. Available: http://lib.cqvip.com/qk/71214X/201204/42661767.html.

Fang, H. & Moro, A. 2011. Theories of Statistical Discrimination and Affirmative Action: A Survey Chapter 5. In *Handbook of Social Economics.* North-Holland. 133-200. 10.1016/B978-0-444-53187-2.00005-X.

Fields, G.S. 1981. Poverty, inequality, and development: A distributional approach. *Journal of Policy Modeling.* 3(3):295-315. Available: https://www.sciencedirect.com/science/article/pii/0161893881900132.

Gerschick, T.J. 2000. Toward a Theory of Disability and Gender. *Signs.* 25(4):1263-1268. Available: https://www.jstor.org/stable/3175525.

Gida, P. & Ortlepp, K. 2007. Employment of people with disabilities : implications for HR management practices. *Acta Commercii.* 7:135-150. Available: http://reference.sabinet.co.za/sa_epublication_article/acom_v7_a11.

Goldstone, C. & Meager, N. 2002. *Barriers to Employment for Disabled People.* London: Crown Copyright.

Gruber, J. 1996. *Disability Insurance Benefits and Labor Supply.* Cambridge, Mass: Available: .

Guryan, J. & Charles, K.K. 2013. Taste-based or statistical discrimination. *The Economic Journal.* 123(572):417-432. Available: http://www.econis.eu/PPNSET?PPN=782438555.

Hahn, H. 1981. The social component of sexuality and disability: Some problems and proposals. *Sexuality and Disability.* 4(4):220-233.

Hahn, H. 1988. The Politics of Physical Differences: Disability and Discrimination. *Journal of Social Issues.* 44(1):39-47.

Hollenbeck, K. & Kimmel, J. 2008. Differences in the Returns to Education for Males by Disability Status and Age of Disability Onset. *Southern Economic Journal.* 74(3):724.

Available: http://www.fachportal-paedagogik.de/fis_bildung/suche/fis_set.html?FId=813237.

Hum, D. & Simpson, W. 1996. Canadians with Disabilities and the Labour Market. *Canadian Public Policy / Analyse De Politiques.* 22(3):285-299. Available: https://www.jstor.org/stable/3551506.

Jensen, J., Krishnan, V., Rochford, M., Sathiyandra, S., McLeod, K. & Jones, D. 2005. Work participation among people with disabilities: does the type of disability influence the outcome? *Social Policy Journal of New Zealand.* (24):134. Available: http://www.msd.govt.nz/publications/journal/24-April-2005/24-pages134-159.html.

Jensen, J., Sathiyandra, S., Rochford, M., Jones, D., Krishnan, V. & McLeod, K. 2005. Work Participation among People with Disabilities: Does the Type of Disability Influence the Outcome? *Social Policy Journal of New Zealand.* (24):134.

Johannsmeier, Christa. "*The social and economic effects of the disability grant for people with disabilities and their households: a qualitative study in KwaZulu-Natal Province*." (2007). Available: https://pdfs.semanticscholar.org/caac/b7557bd26a6f1efa2b37e5a2b3bb25545ecd.pdf?_ga=2.190881837.680854668.1571582081-2118986292.1571076715

Jones, M.K. 2008. Disability and the Labour Market: A Review of the Empirical Evidence. *Journal of Economic Studies.* 35(5):405-424. Available: http://www.emeraldinsight.com/doi/abs/10.1108/01443580810903554.

Kelly, G. 2013. *Regulating Access to the Disability Grant in South Africa, 1990-2013.* Centre for Social Science Research. Available: http://www.cssr.uct.ac.za/sites/default/files/image_tool/images/256/files/WP%20330.pdf

Kidd, M.P., Sloane, P.J. & Ferko, I. 2000a. Disability and the Labour Market: An Analysis of British Males. *Journal of Health Economics.* 19(6):961-981. Available: https://www.sciencedirect.com/science/article/pii/S0167629600000436.

Kidd, M.P., Sloane, P.J. & Ferko, I. 2000b. Disability and the Labour Market: An Analysis of British Males. *Journal of Health Economics.* (19):961-981.

Kollamparambil, U. & Razak, A. 2016. Trends in Gender Wage Gap and Discrimination in South Africa: A Comparative Analysis across Races. *Indian Journal of Human Development.* 10(1):49-63. Available: http://journals.sagepub.com/doi/full/10.1177/0973703016636446.

Lazarus, S. & Howell, C. 2003. Access and Participation for Students with Disabilities in South African Higher Education : Challenging Accepted Truths and Recognising New Possibilities. *Perspectives in Education.* 21(3):59-74. Available: http://reference.sabinet.co.za/sa_epublication_article/persed_v21_n3_a7.

Leibbrandt, M. & Woolard, I. 2010. *The Evolution and Impact of Unconditional Cash Transfers in South Africa.* Available: http://econpapers.repec.org/paper/ldrwpaper/51.htm.

Lerner, D., Adler, D.A., Rogers, W.H., Chang, g., Lapitsky, L., McLaughlin, T. & Reed, J. 2010. Work Performance of Employees with Depression: The Impact of Work Stressors. *American Journal of Health Promotion.* 24(3):205-213. Available: http://journals.sagepub.com/doi/full/10.4278/ajhp.090313-QUAN-103.

Lerner, D. & Henke, R. 2008. What Does Research Tell Us About Depression, Job Performance, and Work Productivity? *Journal of Occupational and Environmental Medicine.* 50(4):401-410. Available: http://ovidsp.ovid.com/ovidweb.cgi?T=JS&NEWS=n&CSC=Y&PAGE=fulltext&D=ovft&AN=00043764-200804000-00005.

Loprest, P. & Maag, E. 2003. *The Relationship Between Early Disability Onset and Education and Employment.* Washington DC: The Urban Institute.

Lund, C., Tomlinson, M., De Silva, M., Fekadu, A., Shidhaye, R., Jordans, M., Petersen, I., Bhana, A. et al. 2012. PRIME: A Programme to Reduce the Treatment Gap for Mental Disorders in Five Low- and Middle-Income Countries. Available: http://researchonline.lshtm.ac.uk/2064771/.

Luong, M. & Hebert, B. 2009. Age and Earnings. *Perspectives on Labour and Income.* 21(1):19-25. Available: https://search.proquest.com/docview/213990329.

Macias, C., DeCarlo, L., Wang, Q., Frey, J. & Barreira, P. 2001. Work Interest as a Predictor of Competitive Employment: Policy Implications for Psychiatric Rehabilitation. *Administration and Policy in Mental Health.* 28(4):279-297. Available: http://www.ncbi.nlm.nih.gov/pubmed/11577655.

Maja, P.A., Mann, W.M., Sing, D., Steyn, A.J. & Naidoo, P. 2011. Employing People with Disabilities in South Africa. *South African Journal of Occupational Therapy.* 41(1):24-32.

Meyer, B.D. & Mok, W.K. Oct, 2014. Disabled Women and their Economic Well-Being. Washington DC: .

Mincer, J. . 1975. Education, Experience, and the Distribution of Earnings and Employment: An Overview. In *Education, Income, and Human Behavior.* National Bureau of Economic Research, Inc. 71-94.

Moodley, J. & Graham, L. 2015. The importance of intersectionality in disability and gender studies. *Agenda.* 29(2):24. Available: http://www.tandfonline.com/doi/abs/10.1080/10130950.2015.1041802.

Morris, W.L., Sinclair, S. & DePaulo, B.M. 2007. No Shelter for Singles: The Perceived Legitimacy of Marital Status Discrimination. *Group Processes & Intergroup Relations.* 10(4):457-470. Available: http://journals.sagepub.com/doi/full/10.1177/1368430207081535.

Moser, P. 2008. *An Empirical Test of Taste-based Discrimination Changes in Ethnic Preferences and their Effect on Admissions to the NYSE during World War I.* (w14003).

Mutanga, O. 2017. Students with Disabilities' Experience in South African Higher Education – A Synthesis of Literature. *South African Journal of Higher Education.* 31(1).

Mutasa, G. 2012. *Disability Grant and Individual Labour Force Participation: The Case of South Africa.* University of Cape Town, Development Policy Research Unit. Available: .

Mutedi, A. 2003. *Marital Status and the South African Labour Market.*

Neumark, D., Bank, R.J. & Van Nort, K.D. 1996. Sex Discrimination in Restaurant Hiring: An Audit Study. *The Quarterly Journal of Economics.* 111(3):915-941. Available: https://www.jstor.org/stable/2946676.

Newacheck, P.W., Stein, R.E.K., Bauman, L. & Hung, Y. 2003. Disparities in the Prevalence of Disability Between Black and White Children. *Archives of Pediatrics & Adolescent Medicine.* 157(3):244-248. Available: http://dx.doi.org/10.1001/archpedi.157.3.244.

Noh, J., Kwon, Y.D., Park, J., Oh, I. & Kim, J. 2016. Relationship between Physical Disability and Depression by Gender: A Panel Regression Model. *Plos One.* 11(11):e0166238. Available: http://www.narcis.nl/publication/RecordID/oai:pure.rug.nl:publications%2F36bdef85-0bb5-4a92-9c55-22a9b94132b7.

Office of the Deputy President. 1997. *Integrated national disability strategy White Paper.* Available: http://data.theeuropeanlibrary.org/BibliographicResource/3000091454687 .

Oliver, M. 2013. The Social Model of Disability: Thirty Years On. *Disability & Society.* 28(7):1024-1026. Available: http://gateway.proquest.com/openurl?ctx_ver=Z39.88-2003&xri:pqil:res_ver=0.2&res_id=xri:ilcs-us&rft_id=xri:ilcs:rec:abell:R05044206.

Organisation for Economic Co-operation and Development. 2003. *Transforming Disability into Ability: Policies to Promote Work and Income Security for Disabled People.* Paris: Organisation for Economic Co-operation and Development. DOI:10.1787/9789264158245-en.

Organisation for Economic Co-operation and Development. 2012. *Education at a Glance 2012: Highlights.* FR: OECD Publishing. Available: http://www.oecd.org/education/highlights.pdf.

Oscar, T. 2007. *Panel Data Analysis Fixed and Random Effects using Stata.* Princeton University. Available: https://www.princeton.edu/~otorres/Panel101.pdf

Park, S., Yoon, J. & Henderson, T. 2007. Factors affecting employment among people with mobility disabilities in South Korea. *International Journal of Rehabilitation Research.* 30(1):19-25.

Pelkowski, J.M. & Berger, M.C. 2004. The impact of health on employment, wages, and hours worked over the life cycle. *Quarterly Review of Economics and Finance.* 44(1):102-121. Available: https://www.sciencedirect.com/science/article/pii/S1062976903000760.

Podesta, F. 2002. *Recent Developments in Quantitative Comparative Methodology: The Case of Pooled Time Series Cross-Section Analysis.*

Republic of South Africa. 1997. *Integrated National Disability Strategy White Paper.*

Republic of South Africa. 1998. *The Employment Equity Act.*

Republic of South Africa. 2002. *Code of Good Practice on the Employment of People with Disabilities.* Pretoria: State Library.

Republic of South Africa. 2011. *South African National Standard 10400: The application of the National Building Regulations Part S: Facilities for persons with disabilities.*

Republic of South Africa. 2015a. *White Paper on the Rights of Persons with Disabilities.*

Republic of South Africa. 2015b. *White Paper on the Rights of Persons With Disabilities.*

Sachs, D. & Schreuer, N. 2011. Inclusion of Students with Disabilities in Higher Education: Performance and participation in student's experiences. *Disability Studies Quarterly.* 31(2).

Shier, M., Graham, J.R. & Jones, M.E. 2009. Barriers to Employment as Experienced by Disabled People: A Qualitative Analysis in Calgary and Regina, Canada. *Disability & Society.* 24(1):63-75.
Available: http://www.tandfonline.com/doi/abs/10.1080/09687590802535485.

Silver, R. & Koopman, B. 2002. *Successfully Employing People with Disabilities.* Knowledge Resources Publishing Pty Ltd

Smit, S. 2012. *Employment of People With Disabilities in the Hospitality Sector, A Multiple Case Study.* University of Stellenbosch.

South Africa Social Security Agency. 2018. *A Statistical Summary of Social Grants in South Africa.* Available: https://www.sassa.gov.za/Statistics/Documents/Fact%20sheet%20-%20Issue%20N0.2%20-%20February%202018.pdf

South African Human Rights Commission. 2017. *Research Brief on Disability and Equality in South Africa 2013-2017.* Available: https://www.sahrc.org.za/home/21/files/RESEARCH%20BRIEF%20ON%20DISABILITY%20AND%20EQUALITY%20IN%20SOUTH%20AFRICA%202013%20to%202017.pdf

Spence, M. 1973. Job Market Signaling. *The Quarterly Journal of Economics.* 87(3):355-374.

Stapleton, D.C., Burkhauser, R.V. & Houtenville, A.J. 2004. *Has the Employment Rate of People with Disabilities Declined?* (27). Cornell University, Human Ecology.

Statistics Canada. 1999. *Participation, unemployment and employment rates by marital category, sex and age group.*

Statistics South Africa. 2011. *Profile of persons with disabilities in South Africa: Census 2011.*

Statistics South Africa. 2016. *Community survey 2016, Statistical Release*

Statistics South Africa. 2017. *Living Conditions of Households in South Africa: An Analysis of Household Expenditure and Income Data Using the LCS 2014/2015.*

Stuart, >.W. 1992. Race and Disability: Just a Double Oppression? *Disability, Handicap & Society.* 7(2):177-188. Available: https://search.proquest.com/docview/1302604972.

Swartz, L. 2014. Five Challenges for Disability-related Research in sub-Saharan Africa. *African Journal of Disability.* 3(2):e6. Available: https://search.proquest.com/docview/1738751280.

Turner, J.R. & Noh, S. 1988. Physical Disability and Depression: A Longitudinal Analysis. *Journal of Health and Social Behavior.* 29(1):23-37. Available: https://www.jstor.org/stable/2137178.

United Nations. 2011. *Disability and Economics: The nexus between disability, education, and employment.* Available: http://www.un.org/disabilities/documents/events/1July2011_economics_panel_nexus.pdf.

United Nations. 2006. *Convention on the Rights of Persons with Disability*. Availabele: https://www.un.org/disabilities/documents/convention/convoptprot-e.pdf

United States Department of Labor. 2017. *Persons with a Disability: Labor Force Characteristics*
Summary. Available: https://www.bls.gov/news.release/disabl.nr0.htm [19/03/2018].

Visagie, S., Eide, A.H., Dyrstad, K., Mannan, H., Swartz, L., Schneider, M., Mji, G., Munthali, A. et al. 2017. Factors Related to Environmental Barriers Experienced by Persons with and without Disabilities in Diverse African Settings. *PLoS One.* 12(10):e0186342. Available: https://www.ncbi.nlm.nih.gov/pubmed/29023578.

Wasserman, D., Asch, A., Blustein, J. & Putnam, D. 2016. *Disability: Definitions, Models, Experience.*

Wolfe, B.L. & Haveman, R.H. 1990. The Economic Well-Being of the Disabled: 1962-84. *Journal of Human Resources.* 25(1):32-54. Available: http://econpapers.repec.org/article/uwpjhriss/v_3a25_3ay_3a1990_3ai_3a1_3ap_3a32-54.htm.

Appendix 1: Pooled OLS regression results

	Disability			Disability type		
VARIABLES	LFP	EMP	WAGE	LFP	EMP	WAGE
age	0.0920***	0.0730***	0.0404***	0.0900***	0.0713***	0.0387***
	(0.000943)	(0.000992)	(0.00581)	(0.000961)	(0.000999)	(0.00583)
age2	-0.00114***	-0.000865***	-0.000244***	-0.00112***	-0.000848***	-0.000228***
	(1.29e-05)	(1.35e-05)	(7.59e-05)	(1.32e-05)	(1.37e-05)	(7.63e-05)
non-grade7	0.0595***	0.0459***	0.515***	0.0701***	0.0548***	0.519***
	(0.00672)	(0.00695)	(0.0267)	(0.00692)	(0.00708)	(0.0268)
grade8-11	0.168***	0.129***	1.006***	0.184***	0.143***	1.012***
	(0.00879)	(0.00918)	(0.0327)	(0.00892)	(0.00925)	(0.0328)
grade12	0.238***	0.260***	1.583***	0.260***	0.278***	1.591***
	(0.00933)	(0.0108)	(0.0341)	(0.00943)	(0.0109)	(0.0341)
degree	0.289***	0.369***	2.257***	0.313***	0.390***	2.263***
	(0.0140)	(0.0163)	(0.0468)	(0.0139)	(0.0161)	(0.0470)
female	-0.129***	-0.154***	-0.475***	-0.130***	-0.155***	-0.482***
	(0.00476)	(0.00504)	(0.0193)	(0.00487)	(0.00513)	(0.0193)
married	-0.0362***	-0.000741	0.140***	-0.0281***	0.00643	0.145***
	(0.00850)	(0.00895)	(0.0284)	(0.00863)	(0.00905)	(0.0285)
colored	0.104***	0.130***	0.135***	0.102***	0.128***	0.138***
	(0.00697)	(0.00750)	(0.0235)	(0.00724)	(0.00769)	(0.0236)
asian/indian	-0.0261	0.0143	0.473***	-0.0370	0.00495	0.479***
	(0.0237)	(0.0239)	(0.0940)	(0.0240)	(0.0244)	(0.0940)
white	0.0243	0.0941***	0.601***	0.0243	0.0942***	0.604***
	(0.0156)	(0.0164)	(0.0486)	(0.0157)	(0.0165)	(0.0483)
disabled	-0.0423***	-0.0476***	-0.164***			
	(0.0108)	(0.0107)	(0.0408)			
grant-recipient	-0.382***	-0.323***	-0.617***			
	(0.0137)	(0.0118)	(0.0956)			
_Iyear_2010	-0.102***	-0.112***	-0.0792**	-0.0558***	-0.0473***	-0.0849**
	(0.00781)	(0.00793)	(0.0395)	(0.0109)	(0.0107)	(0.0395)
_Iyear_2011	-0.0493***	-0.0676***				
	(0.0121)	(0.0121)				
_Iyear_2012	-0.0442***	-0.0757***	0.0483	0.00180	-0.0119	0.0403
	(0.00714)	(0.00727)	(0.0362)	(0.0107)	(0.0103)	(0.0362)
_Iyear_2014	-	-				
_Iyear_2015	-0.0346***	-0.0450***	0.150***	0.00859	0.0161	0.137***
	(0.00741)	(0.00774)	(0.0379)	(0.0111)	(0.0109)	(0.0378)
pweight	5.63e-06***	5.53e-06***	2.39e-05***	5.88e-06***	5.72e-06***	2.41e-05***
	(9.67e-07)	(1.08e-06)	(3.25e-06)	(9.94e-07)	(1.10e-06)	(3.26e-06)
o._Iyear_2011			-	-	-	-
_Iyear_2014			0.195***	0.0470***	0.0649***	0.182***
			(0.0419)	(0.0122)	(0.0122)	(0.0420)
physc. handicapped				-0.353***	-0.316***	-0.187
				(0.0307)	(0.0254)	(0.209)
sight/hear/speech				-0.0900***	-0.0761***	-0.159
				(0.0250)	(0.0244)	(0.107)
psych. disorders				-0.220***	-0.193***	0.0159
				(0.0381)	(0.0331)	(0.157)
other disability				-	-	-
Constant	-1.006***	-0.856***	6.204***	-1.031***	-0.902***	6.237***
	(0.0169)	(0.0170)	(0.114)	(0.0186)	(0.0185)	(0.114)
Observations	40,392	40,392	10,779	40,532	40,532	10,819
R-squared	0.298	0.264	0.460	0.282	0.252	0.457

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix 2: Random effects model results

	Disability			Disability type		
VARIABLES	LFP	EMP	WAGE	LFP	EMP	WAGE
age	0.0921***	0.0728***	0.0550***	0.0902***	0.0713***	0.0543***
	(0.000923)	(0.000953)	(0.00549)	(0.000935)	(0.000955)	(0.00549)
	-	-	-	-	-	-
age2	0.00114***	0.000864***	0.000447***	0.00112***	0.000849***	0.000440***
	(1.26e-05)	(1.30e-05)	(7.16e-05)	(1.28e-05)	(1.31e-05)	(7.18e-05)
non-grade7	0.0564***	0.0441***	0.520***	0.0656***	0.0517***	0.523***
	(0.00650)	(0.00651)	(0.0260)	(0.00665)	(0.00659)	(0.0261)
grade8-11	0.170***	0.125***	1.021***	0.185***	0.137***	1.026***
	(0.00867)	(0.00879)	(0.0313)	(0.00877)	(0.00882)	(0.0314)
grade12	0.238***	0.249***	1.452***	0.258***	0.264***	1.455***
	(0.00919)	(0.0105)	(0.0339)	(0.00926)	(0.0105)	(0.0340)
degree	0.290***	0.361***	2.133***	0.312***	0.380***	2.133***
	(0.0138)	(0.0161)	(0.0457)	(0.0137)	(0.0160)	(0.0457)
female	-0.128***	-0.151***	-0.481***	-0.129***	-0.152***	-0.486***
	(0.00471)	(0.00494)	(0.0186)	(0.00482)	(0.00501)	(0.0187)
married	-0.0301***	0.000904	0.0490**	-0.0228***	0.00607	0.0495**
	(0.00822)	(0.00839)	(0.0237)	(0.00829)	(0.00844)	(0.0237)
coloured	0.104***	0.127***	0.147***	0.101***	0.125***	0.149***
	(0.00692)	(0.00735)	(0.0226)	(0.00716)	(0.00752)	(0.0227)
asian/indian	-0.0231	0.0210	0.543***	-0.0325	0.0135	0.549***
	(0.0232)	(0.0233)	(0.0900)	(0.0234)	(0.0238)	(0.0900)
white	0.0275*	0.103***	0.711***	0.0277*	0.104***	0.719***
	(0.0153)	(0.0160)	(0.0494)	(0.0154)	(0.0160)	(0.0494)
disabled	-0.0405***	-0.0412***	-0.138***			
	(0.0105)	(0.0101)	(0.0346)			
grant-recipient	-0.349***	-0.275***	-0.378***			
	(0.0134)	(0.0114)	(0.0748)			
physc. handicapped				-0.301***	-0.248***	-0.130
				(0.0294)	(0.0239)	(0.133)
sight/hear/speech				-0.0754***	-0.0543**	-0.135*
				(0.0235)	(0.0222)	(0.0795)
psych. disorders				-0.194***	-0.158***	-0.0220
				(0.0357)	(0.0296)	(0.0993)
other disability				-	-	-
_Iyear_2010	-0.0705***	-0.0687***	-0.313***	-0.0679***	-0.0661***	-0.311***
	(0.00593)	(0.00580)	(0.0193)	(0.00595)	(0.00580)	(0.0194)
_Iyear_2011	-0.0175	-0.0276***	-0.272***	-0.0131	-0.0230**	-0.261***
	(0.0108)	(0.0103)	(0.0289)	(0.0108)	(0.0103)	(0.0288)
_Iyear_2012	-0.0106*	-0.0321***	-0.195***	-0.00831	-0.0302***	-0.194***
	(0.00542)	(0.00529)	(0.0145)	(0.00543)	(0.00530)	(0.0145)
_Iyear_2014	0.0301***	0.0382***	-0.00291	0.0327***	0.0408***	-0.00513
	(0.00725)	(0.00743)	(0.0218)	(0.00728)	(0.00745)	(0.0218)
o._Iyear_2015	-	-	-	-	-	-
pweight	5.24e-06***	4.95e-06***	2.16e-05***	5.40e-06***	5.07e-06***	2.16e-05***
	(9.49e-07)	(1.04e-06)	(3.00e-06)	(9.70e-07)	(1.05e-06)	(3.02e-06)
Constant	-1.041***	-0.893***	6.166***	-1.024***	-0.879***	6.174***
	(0.0153)	(0.0151)	(0.103)	(0.0155)	(0.0152)	(0.104)
Observations	40,392	40,392	10,779	40,532	40,532	10,819
Number of pid	18,083	18,083	6,617	18,100	18,100	6,629

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix 3: Breusch and Pagan Lagrangian multiplier test for random effects on disability

```
lfp[pid,t] = Xb + u[pid] + e[pid,t]

Estimated results:
                    |       Var     sd = sqrt(Var)
--------------------+------------------------------
                lfp |    .2490129       .4990119
                  e |    .1435942       .3789382
                  u |    .0230242       .1517372

Test:   Var(u) = 0
                          chibar2(01) =  1274.62
                      Prob > chibar2 =   0.0000
```

```
employ[pid,t] = Xb + u[pid] + e[pid,t]

Estimated results:
                    |       Var     sd = sqrt(Var)
--------------------+------------------------------
              employ |    .2358074          .4856
                  e |    .1275144       .3570916
                  u |    .0360198       .1897888

Test:   Var(u) = 0
                          chibar2(01) =  2790.67
                      Prob > chibar2 =   0.0000
```

```
lincome2[pid,t] = Xb + u[pid] + e[pid,t]

Estimated results:
                    |       Var     sd = sqrt(Var)
--------------------+------------------------------
            lincome2 |    1.164191       1.078977
                  e |    .2289803       .4785189
                  u |    .3968949       .6299959

Test:   Var(u) = 0
                          chibar2(01) =  1703.55
                      Prob > chibar2 =   0.0000
```

Appendix 4: Hausman test for fixed vs random effects model on disability

a) Hausman Test lfp

	Coefficients (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
age	.0783973	.0920607	-.0136634	.0083772
age2	-.0011058	-.0011395	.0000338	.000046
_Ieducatio~2	-.0329941	.0564082	-.0894023	.0167989
_Ieducatio~3	.1136287	.1701851	-.0565564	.0220994
_Ieducatio~4	.1748701	.2383688	-.0634987	.0252483
_Ieducatio~5	.2751331	.2895946	-.0144615	.0481072
_Imarried_1	-.0204879	-.0301189	.009631	.0068259
_Idisabled_1	.003193	-.0405035	.0436965	.0088985
_Igrantrec~1	-.1218632	-.3487375	.2268743	.013256
_Iyear_2010	-.1535129	-.0704563	-.0830566	.0358167
_Iyear_2011	-.0994	-.0175353	-.0818647	.0319973
_Iyear_2012	-.0510932	-.0106087	-.0404846	.0210281
_Iyear_2014	.0111622	.0301409	-.0189788	.0063571
pweight	-7.33e-06	5.24e-06	-.0000126	2.32e-06

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(13) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 436.16
Prob>chi2 = 0.0000

.

b) Hausman test emp

	Coefficients (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
age	.0716965	.0727618	-.0010653	.0078851
age2	-.0008214	-.0008636	.0000423	.0000431
_Ieducatio~2	-.063178	.0441094	-.1072874	.0156499
_Ieducatio~3	-.0591855	.1246935	-.183879	.020597
_Ieducatio~4	.0030265	.2489045	-.2458779	.0235164
_Ieducatio~5	.0755761	.3609989	-.2854228	.0448507
_Imarried_1	-.0143655	.000904	-.0152694	.0061533
_Idisabled_1	.004536	-.0412499	.0457859	.0079461
_Igrantrec~1	-.0794934	-.2750215	.1955281	.0119233
_Iyear_2010	-.093513	-.0687376	-.0247755	.0337313
_Iyear_2011	-.0675881	-.0276304	-.0399577	.0300535
_Iyear_2012	-.0434001	-.0321191	-.011281	.0197938
_Iyear_2014	.024447	.0381631	-.0137161	.0057192
pweight	-6.08e-06	4.95e-06	-.000011	2.16e-06

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(13) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 443.30
Prob>chi2 = 0.0000

c) Hausman test wages

	(b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
age	.1283335	.0549746	.073359	.0255852
age2	-.0009912	-.0004471	-.0005441	.0001652
_Ieducatio~2	.0737071	.5199288	-.4462217	.0852023
_Ieducatio~3	.1717381	1.021469	-.8497305	.1045049
_Ieducatio~4	.1889036	1.452356	-1.263452	.1040509
_Ieducatio~5	.2136676	2.13322	-1.919552	.1331422
_Imarried_1	-.0062314	.0490117	-.0552432	.0155939
_Idisabled_1	-.0886611	-.1382044	.0495433	.0264175
_Igrantrec~1	-.0174173	-.3776076	.3601903	.0751686
_Iyear_2010	-.3053219	-.313411	.0080891	.103774
_Iyear_2011	-.3303212	-.2717057	-.0586155	.090401
_Iyear_2012	-.1960799	-.1945389	-.001541	.0616371
_Iyear_2014	-.0420618	-.0029095	-.0391523	.0173358
pweight	-8.05e-07	.0000216	-.0000224	5.31e-06

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(13) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 468.69
Prob>chi2 = 0.0000

Appendix 5: Breusch and Pagan Lagrangian test for random effects on disability type

```
lfp[pid,t] = Xb + u[pid] + e[pid,t]

Estimated results:
                    |       Var     sd = sqrt(Var)
--------------------+-----------------------------
                lfp |    .2490073       .4990063
                  e |    .1438534       .3792801
                  u |    .0271039       .1646326

Test:   Var(u) = 0
                          chibar2(01) =  1557.98
                      Prob > chibar2 =   0.0000
```

```
employ[pid,t] = Xb + u[pid] + e[pid,t]

Estimated results:
                    |       Var     sd = sqrt(Var)
--------------------+-----------------------------
              employ |    .2358525       .4856465
                  e |    .1277313       .3573952
                  u |    .0388915       .1972092

Test:   Var(u) = 0
                          chibar2(01) =  3092.25
                      Prob > chibar2 =   0.0000
```

```
lincome2[pid,t] = Xb + u[pid] + e[pid,t]

Estimated results:
                    |       Var     sd = sqrt(Var)
--------------------+-----------------------------
            lincome2 |   1.164341       1.079046
                  e |    .2282912       .4777982
                  u |    .4014518       .6336022

Test:   Var(u) = 0
                          chibar2(01) =  1727.82
                      Prob > chibar2 =   0.0000
```

Appendix 6: Hausman test for fixed vs random effects model on disability type

a) Hausman test lfp disability type

	Coefficients (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
age	.0776013	.0901802	-.0125789	.008363
age2	-.0010984	-.0011206	.0000222	.0000459
_Ieducatio~2	-.0335263	.0655838	-.0991101	.0166893
_Ieducatio~3	.1143873	.1852156	-.0708284	.021976
_Ieducatio~4	.1741954	.2578326	-.0836372	.0250903
_Ieducatio~5	.2725955	.3117121	-.0391166	.0476396
_Imarried_1	-.0185776	-.022794	.0042165	.0067554
distype1	-.046358	-.3013398	.2549818	.0251653
distype2	.0129141	-.075409	.0883232	.0183267
distype3	-.0542051	-.1938255	.1396204	.027358
_Iyear_2010	-.1527518	-.0679132	-.0848386	.0357386
_Iyear_2011	-.0991317	-.0130509	-.0860808	.0319091
_Iyear_2012	-.0502374	-.008307	-.0419305	.0209799
_Iyear_2014	.0123454	.032726	-.0203806	.0062942
pweight	-6.93e-06	5.40e-06	-.0000123	2.31e-06

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(14) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 259.17
Prob>chi2 = 0.0000

b) Hausman test emp disability type

	Coefficients (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
age	.0721918	.0712535	.0009384	.0078718
age2	-.0008195	-.0008486	.0000292	.0000429
_Ieducatio~2	-.061367	.0517282	-.1130953	.015556
_Ieducatio~3	-.0572339	.1365432	-.1937771	.0204932
_Ieducatio~4	.004597	.2638372	-.2592402	.0233826
_Ieducatio~5	.0850347	.3796889	-.2946542	.0444345
_Imarried_1	-.0128391	.0060667	-.0189058	.0061071
distype1	-.0418093	-.2483468	.2065375	.0226354
distype2	.019498	-.0543444	.0738424	.0163891
distype3	-.0315545	-.1580125	.126458	.0245472
_Iyear_2010	-.0894543	-.0660816	-.0233727	.0336572
_Iyear_2011	-.0630445	-.0230478	-.0399967	.0299766
_Iyear_2012	-.0407053	-.0301956	-.0105097	.0197486
_Iyear_2014	.0263942	.0408033	-.0144091	.0056793
pweight	-5.90e-06	5.07e-06	-.000011	2.14e-06

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(14) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 286.63
Prob>chi2 = 0.0000

c) Hausman test wages disability type

	Coefficients (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
age	.1280501	.0542567	.0737934	.0254904
age2	-.0009984	-.0004405	-.0005579	.0001642
_Ieducatio~2	.0712893	.5230982	-.4518088	.0847445
_Ieducatio~3	.170111	1.026413	-.8563022	.1036311
_Ieducatio~4	.1873251	1.4548	-1.267475	.1031304
_Ieducatio~5	.2176884	2.132747	-1.915058	.1315395
_Imarried_1	-.0049581	.0494721	-.0544302	.015477
distype1	-.0039348	-.1296531	.1257183	.1314733
distype2	-.1422958	-.1348943	-.0074015	.0647201
distype3	-.011134	-.0219502	.0108162	.0685793
_Iyear_2010	-.3077449	-.3112495	.0035046	.1033763
_Iyear_2011	-.3270647	-.2613429	-.0657218	.0900936
_Iyear_2012	-.197945	-.1939057	-.0040393	.0614114
_Iyear_2014	-.0430297	-.0051339	-.0378958	.0172155
pweight	-7.67e-07	.0000216	-.0000224	5.28e-06

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(14) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 462.16
Prob>chi2 = 0.0000