Pragmatic Study: Association Between Physical Activity Intervention and Quality of Life Perception Among People With Type II Diabetes

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Abstract

Background: It has been common issue that the prevalence of diabetes type II has significantly increased over the past decade (WHO, 2003). Diabetes mellitus is a metabolic disorder characterised by chronic hyperglycemia with disturbance of carbohydrate, fat, and protein metabolism caused by defects in insulin secretion and/or action (Maritim et al, 2003). Diabetes type II, however, should be tackled by several treatment. Lifestyle intervention strongly recommended to seize diabetes disease (Steven et al, 2005; Rosas et al, 2016; Chen et al, 2015) such as physical activity intervention. Community-based approach to change lifestyle and reduce diabetes risk was modestly improved some diabetes risk factors.

Objective: The objectives of the project will evaluate the benefits of increase in physical activity among people with diabetes type II towards their perceive of quality of life in Oxfordshire. By synthesize the current literature and evidence in order to seek the correlation between diabetes, physical activity, and people’s perceived of quality of life. It also determine, whether it is significantly correlated between physical activity improvement towards peoples’ quality of life perception with type II diabetes or vice-versa.

Method: Pragmatic study design and secondary data analysis was conducted to explore the correlation between physical activity and quality of life perception among people with type II diabetes. The data extracted from OXSPA ‘Go Active, Get Healthy’ project, which starting from June 2017 until May 2018. The eligible participants were (n=157) and meet the criteria for this project. The physical activity (IPAQ score) and EQ-5D-5L baseline was captured (n=87) and the three months follow-up with (n=31) participants. Then, comparative models were used to examine the differences median between the baseline of physical activity-minutes per-week (METs) compared to its’ 3 month follow-up. As well as the quality of life perceived on the baseline compared to 3 month follow-up. The last, the project would examine the correlation between physical activity-minutes per-week (METs) and the quality of life perception whether it is significant or vice-versa.

Findings: The ELIGIBLE criteria of the sample was (n=157). The proportion of gender just slightly different between male by 78 (49.7%) participants and female with 75 (47.8%) participants. Also the participants came from (17.5%) of 35-54 age band, (16.8%) came from 55-64 age band, and (12.9%) participants came from 65-74 age band. Most of participants were referred by GP/Health referrals with 122 (42.7%) participants. Moreover, there were 5 participants (5.74%) from vigourous minutes-week and 12 participants (13.7%) from moderate minutes-week and 27
participants (31.03%) from walking minutes-week has meet UK government recommendation of minimum Physical Activity guidelines for adults which is ≥ 150 minutes a week (n=87). EQ-5D-5L scores indicates the severity and impacts of impairments were varies among the group (n=87). With the mean 63.68 ((± 19.38) and was not normally distributed (p<0.01). At 3 month follow up (n=31), physical activity-minutes per-week mean was 528.44 (± 623.47) and EQ-5D-5L score mean was 43.42 (± 34.46). Although the comparison between 3 month follow-up and its baseline were different among physical-activity-minutes per week and participants’ quality of life perceived, the study found the correlation test established the strong association between physical activity intervention towards people’s perceived of quality of life (p<0.01).

Conclusion: The finding of the study indicates that the strong association between physical activities intervention towards their perceived of quality of life (p<0.01, 1-tailed). The relationships approved several articles within the topic and may change the course of intervention. However, there was a significant gap found in the study, such as several factors may affecting the quality of life and physical activity. Also, relationship changes between perception of quality of life by five dimensions of health over physical activity interventions such as a motivational aspect which may influence the results and perceived. Thirdly, the bigger sample size should be conducted to synthesis a higher power of evidence around the topic in the future.
Acknowledgements

I would first like to thank my dissertation supervisor, Johnny Collett of the Oxford Brookes University, Department of Sport and Health Sciences. The door to Mr. Collett's office was always open whenever I ran into a trouble spot and He consistently allowed this paper to be my own work; yet still directed me in the right track. Also, his advise inspired me to be 'never crashed under the pressure'.

I would also like to acknowledge the OXSPA institutions whose grant me a permission to investigate their data project. And I am gratefully indebted to their valuable input on this project.

Thirdly, I would like to express my gratitude to my parents, siblings, friends, and all people around me for their unfailing support and encourage me to hop out from my comfort zone. Therefore, this accomplishment would not have been possible without them.

Finally, I would show my grateful to Almighty God for all privilege that Thee gave to me. And His present Who calms me whenever I scared and don’t even know what to do. He always lead me to find the way out. "So do not fear, for I am with you; do not be dismayed, for I am your God. I will strengthen you and help you; I will uphold you with my righteous right hand." Isaiah 41:10

Author

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Abbreviations

CLEAR= Clinical Exercise and Rehabilitation Research Group
GP= General Practitioner
HCPC= Health and Care Professional Council
HRQoL= Health-Related Quality of Life
IPAQ= Physical Activity Questionnaire
METs= Metabolic Equivalents (multiples of resting oxygen uptake)
MI= Motivational Interview
NICE= National Institute for Clinical Excellence
OBU= Oxford Brookes University
OXSPA= Oxfordshire Sport and Physical Activity
PA= Physical Activity
PRE CIS= Pragmatic-Explanatory Continuum Indicator Summary
PRISMA= Preferred Reporting Items for Systematic Review and Meta-Analysis
PT/PCTs= Pragmatic Clinical Trials
RCTs= Randomised Control Trial
RT= Resistance Training
WHO= World Health Organisation
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Heading of Chapters

Chapter 1: Background

Chapter one would provide an overview to introduce the contemporary issue under the project. A description of the importance and a justification for carrying out the study is provided. In addition, the outlines the study aim and objectives are set in order to acquire the answer of research questions.

Chapter 2: Literature review

The chapter provides a holistic understanding of type II diabetes approaches and the evidence around the project such as increasing physical activities along with their quality of life. Also, it explores the work that has been done in specific study; providing a critical review on the current literature relating to diabetes people and their quality of life. Moreover, It will discovers the knowledge gap related to the principle research question above.

Chapter 3: Methodology

The chapter will describes the systematic approach undertaken in order to answer the research question. Deliver the rational behind the methodological approach and design, as well as philosophical concept which may underpin this study.

Chapter 4: Method

The chapter is integration part of study such as data collection, process, and analysis methods which commonly used in research projects. It also illustrate how the data was prepared for analysis, statistically test. Also the reason behind the method.

Chapter 5: Results

The chapter provide the analysis that have been identified from the data set of the research. It outlines all the relevant findings which includes graphs, tables, charts. It also test the hypothesis and discover the answer of the research questions.

Chapter 6: Discussion

The chapter deliver the interesting results and key features that may lead to further discussion. Analyse the effectiveness of project or intervention. It might evaluate the delivery of service, best practice or program development. Also, this chapter provides a comprehensive discussion of the findings compared to the other study. It also interprets the findings and summerises the principle
implications of the findings to the current knowledge and related-practice. Moreover, it shall lead to the recommendation, limitation of the study and conclusion of the research project and study.
Background

It has been common issue that the prevalence of diabetes type II has significantly increased over the past decade (WHO, 2003). In addition, (Rowley et al, 2017) describes in his retrospective study, which is diabetes disease will remain a major health crisis which estimated increase by 54% between 2015 to 2030; annual deaths attributed to diabetes will climb by (38%) and total annual medical and societal costs related to diabetes will highly increase to more than ($622) billion by 2030. Therefore, significant action should be taken to tackle those issues around diabetes type II. Current reports express that diabetes type II also affecting children and adolescents (Pulgaron and Delamater, 2014) which most likely will increase further the issue of complication of diabetes globally.

Diabetes mellitus is a metabolic disorder characterised by chronic hyperglycemia with disturbance of carbohydrate, fat, and protein metabolism caused by defects in insulin secretion and/or action (Maritim et al, 2003). Mainly, diabetes type II are combination of genetic and environmental risk factors such as unhealthy lifestyle (e.g obesity, unbalance consumption, alcohol abuse, smoking habit, sedentary lifestyle). Thus, modifying unhealthy lifestyle become healthy lifestyle such as exercise, controlled-diet, sleep-disorder therapy) could control the toll of diabetes disease (Joseph et al, 2017).

Regardless, the biomedical model often primarily focus on treating diabetes by controling glycemic level. Thus, pharmacological intervention play role to sustain glycemic level within normal range. However, diabetes type II should be tackled by several treatment. It should not be rely only on pharmacological treatment. Moreover, the previous measurment appears as single-dimension scores which could not captured multi-dimensions to describe seeveral aspects of health-related quality of life (HRQoL) for group of people with diabetes.

Yet, the pharmacological treatment should be conduct along with appropriate diet and structured physical activity/exercise which may increase the benefits for group of people with diabetes type II (Colberg et al, 2010; Umpierre et al, 2011) to enhance general health status of type II diabetic group people. Therefore, departements of health’s pathway should take an action to aid individuals who has diabetes to meet recommend levels of physical activity and develop the quality of life related to health.

A lot of articles suggest that lifestyle intervention strongly recommended to seize diabetes disease (Steven et al, 2005; Rosas et al, 2016; Chen et al, 2015). Also, Aune et al (2015) discover that increasing physical activity has inverse association to risk of diabetes type II which is beneficial
for people with diabetes. Moreover, although it is not directly affects glycemic level, but it fairly associated to control glycemic control (Quílez and Reig, 2015).

Multidisciplinary approach in communities effectively improved and provide a holistic approach towards diabetes such as improving the quality of care, comprehensive management, and empowering patient-care teams to educate patients and families toward disease (Boyle et al, 2013). According to Kanaya et al (2012) study implies that community-based approach to change lifestyle and reduce diabetes risk was modestly improved some diabetes risk factors. Also, telephone-based models also appears as promising alternative to group-based intervention, since face-to-face treatment would be barrier to some extent.

There are a lot of outcome measure to capture health-related quality of life. Apparently, the current studies suggest that EQ-5D-5L are useful as assessment tool which may holistically capture five-categories of the consequences of diabetes-related complication which may have substantial impact on several dimensions of health-related quality of life (Solli et al, 2010). Moreover, it has been used comprehensively in economy evaluation; recommended to analyse cost-effectiveness by National Institute for Clinical Excellence (NICE) in the UK and Health Care Insurance Board in Netherland.

The objectives of the project will evaluate the benefits of increase in physical activity among people with diabetes type II towards their perceived of quality of life by using EQ-5D-5L assessment tool. It also determine, whether it significantly correlated between physical activity improvement towards peoples’ quality of life perception with type II diabetes or vice-versa.

Furthermore, the project aims will seeking the correlation between physical activity intervention which measured by the numbers of physical activity (MET minutes per week) after following sessions, as well as follow-up 3 month progress and 6 months follow-up by using International Physical Activity Questionnaire (IPAQ). Also, examine the changes score of group people with diabetes type II. The data collection strategy would be extracted from Oxfordshire Sport and Physical Activity (OXSPA) which categorised as secondary analysis and processing the data using statistical application which is IBM SPSS statistics 25 to examine the data set.

Research aim

The aim of the project is to examine and determine the correlation between physical activity among people with diabetes type II towards their perceived of quality of life. Also, to compare whether there are any significant different between the baseline, and three/six months follow-up.
At last, to evaluate the Oxfordshire Sport and Physical Activity (OXSPA) sustainability of its project towards their intervention program to those people with diabetes type II in Oxfordshire.

Objectives

The objectives has been set to achieve the aim such as:

1. To synthesize the current literature and evidence for the correlation between diabetes, physical activity, and people perceive of quality of life.
2. To describes the outcome and withdraw conclusion, as well as answering several research question such as comparison in physical activity changes (MET minutes per week) by using the International Physical Activity Questionnaire (IPAQ).
3. Also, comparing the quality of life perceived by using EQ-5D-5L (telephone version) score changes.

The benefit this study may include:

1. The study will examine whether the physical activity program for those people who has type II diabetes was effective to improve people’s perceive of quality of life among those who diagnosed a type II diabetes or vise versa.
2. The study will finds the connections between physical activity and their perception of quality of life improvement and the evidence surrounding the topics.
3. To evaluate the remaining program which may includes a recommendation to practitioner, stakeholder and researchers to developing the platform to undertake diabetes disease.
Literature Review

Search strategy

A search was undertaken for relevant research studies throughout three databases such as PubMed, Web science, and MEDLINE after following (Ridley, 2012) suggestion which required to comprising at least three databases to attempts a comprehensive literature search. Peer-reviewed chosen on this research as these are academically reliable and proven by expertise in health, medicine, and allied fields. Also search term were attempted with Boolean operators to sensitively recognise the search and included Diabetes “or” Diabetes type II “AND” exercise or physical activity “AND” quality of life. Thus, pooling all the articles into EndNote. Search strategy could be seen on (table 2.1)

Table 2.1: Search Strategy

<table>
<thead>
<tr>
<th>Inclusion</th>
<th>Exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevant studies</td>
<td>Irrelevant studies</td>
</tr>
<tr>
<td>Primary peer reviewed based studies</td>
<td>Co-morbidities</td>
</tr>
<tr>
<td>Meta-analysis</td>
<td>Qualitative and mixed method studies</td>
</tr>
<tr>
<td>Systematic reviews</td>
<td></td>
</tr>
<tr>
<td>Randomised controlled trials</td>
<td></td>
</tr>
<tr>
<td>Published 2014-2018</td>
<td>Published before 2014</td>
</tr>
<tr>
<td>Published in English</td>
<td>Nor published in English</td>
</tr>
</tbody>
</table>

The literature review mainly extracted from meta-analysis, randomised controlled trials and systematic reviews which are quantitative, peer-reviewed studies and provide the highest level of evidence on research studies, due to the focus on the use of objective methods and to avoiding bias through associated methods, such as meta-analysis and randomisation (Robson and McCartan, 2016). Articles older than 2014 years were excluded, event though the selection articles may lead to selection bias (Moher et all, 2009). However, the study may primely focus on the current studies.

It also conducted according to the guidelines recommended by Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) using PRISMA checklist (Moher et al, 2009). This project has been eliminated irrelevant studies which has not met the inclusion criteria by sort
the species which is human, five years old journals. Also, by reading through all the title, abstract and full-text reading. Eventually, it led to the selected studies (n=68) and has been extracted for the literature review in this project.

The findings of the literature review would be equally evaluated by assessing the methodological strengths and weakness of each study, also, the validity of the findings (Caldwell et al, 2011). Therefore, it will strongly support the reliable evidence to be determined, which can then be compared with (NICE, 2009) recommendation for special propulation intervention. In this case is type II diabetes.

**Table 2.2 : Search Terms**

<table>
<thead>
<tr>
<th>Database</th>
<th>Search terms (2014-2018)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PubMed</td>
<td>“Diabetes type II” AND “physical activity or exercise” and “quality of life”</td>
</tr>
<tr>
<td>Web science</td>
<td>“Diabetes type II” AND “physical activity or exercise” and “quality of life”</td>
</tr>
<tr>
<td>MEDLINE</td>
<td>“Diabetes type II” AND “physical activity or exercise” and “quality of life”</td>
</tr>
</tbody>
</table>

PRISMA appraisal scheme has been attempt on this study to systematically review the relevant journals. Also, the flow of proses such as identify the databases then screening through the search and define the inclusion and exclusion criteria, otherwise the finding could be specific and potentially contain bias (included eliminated duplication and irrelevant studies).
Figure 2.1  Flow diagram of the literature search
Adapted from Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA; Moher et al., 2009).
Overview of the Current Studies

The majority of studies were of low to moderate quality. Factors associated with poor glycaemic control which related to diabetes include longer duration of diabetes, lower education, neglect of diet and medication, poor attitude towards the disease, poor self-management behavior, anxiety, depression, renal impairment, hypertension, and dyslipidaemia (Weisman et al, 2018; Alramadan et al, 2018).

The evidence base for type II diabetes prevention has progressed rapidly from efficacy trials to real-world translation studies and practical implementation trials over the last 15 years (Aziz et al, 2015). Some trials also shown efficacy of rigorous diet and physical activity promotion program to reduce diabetes incidence and improving cardiometabolic risk factors in persons at increased risk (Balk et al, 2015).

According to Alramadan et al (2018) suggestion, the health care provider need to design an innovative educational and treatment programs to improve patient who diagnosed type II diabetes. It also mentioned about some potential risk factors includes unhealthy behavior such as dietary habits, physical activity, family support, and cognitive function need to be addressed properly in order to tackle the disease.

Campbel et al (2015) implies that one of recommended approach to addressing several chronic problems is by involving external exercise providers which has been develop exercise referral schemes (ERSs). The study shows a small improvement in physical activity changes and the cost-effectiveness of ERSs is subject to considerable uncertainty. Yet, the schemes have been widely rolled out across the UK.

According to Campbell et al (2015) claimed that only 39% of men and 29% of women respectively in England achieve the levels of physical activity that are recommended amount to protect and prevent themselves from long-term conditions such as diabetes. Meanwhile, some people with type II diabetes also reported suffers a muscle atrophy which triggered by various conditions including type II diabetes (Perry et al, 2016) which reduced in muscle quality among people with long-term conditions, ultimately may increase the risk of premature death. Similar study conducted in Nigeria by Fasanmade and Dagogo-Jack (2015) which implies that declining physical activity and poor dietary factors will increase the morbidity and mortality. In addition, insufficient levels of dialy physical activity (PA) and usual repel or abandon to any form of Physical Activity are shown to overweight patient with type II diabetes.
Type II diabetes also widely recognized as a chronic disease that requires long-term, structured, and multidisciplinary management. Obesity has a strong association with type II diabetes (Grover et al, 2015). It also associated with almost 200 metabolic, mechanical, and mental co-morbidities associations (Yuen et al, 2016). Moreover the declining their quality of life (Kolotin and Andersen, 2017). The recent study by Abid et al (2005) have shown promising outcomes for lifestyle change such as dietary control, increase in physical activity, also by increase counseling by health care professional (HCP). People who has BMI ≥30 to ≤35 (kg/m²), according to retrospective study by Crawford, et al (2010), have not received a formal diagnosis from the health care expert. These studies above implies that the health care provider should pay more attention to those people who has BMI ≥30 to ≤35 (kg/m²).

According to Petit Francis et al (2017) reports that significant findings related body mass index (BMI) or weight reduction. The study were successful at aiding participants reduce weight and/or BMI by engaging in health promotion activities, operation within multidisciplinary teams and/or long-term follow-up assessments. Which means that promoting people with type II diabetes to be more active may be promising strategy for healthcare practitioner in order to holistically tackle the diabetes. Often, the excess accumulation of body-fat resulting to obesity which may reduce life expectancy and quality of life (Esmaeilzadeh et al, 2015). In addition, it has been globally accepted that obese individuals will may occurring many problems in health status and participation in the activities of daily living and social life.

Diabetes also has strong connection with frailty which decrease the quality of life especially for older people (Cobo et al, 2016). Besides decreasing vascular and cardiac function during the process of degeneration. As well as a loss of skeletal muscle mass, muscle structure and function which may lead to an increase in falling with impairments of autonomy and quality of life (Donath et al, 2015). Jaul and Barron (2017) suggest that healthy behaviors starting in early childhood can optimize quality of life among the oldest-old as well as prescribing and ordering tests includes a consideration of life expectancy, lag time to benefit, and ultimately patient goals. Also, family-based lifestyle interventions such as dietary modification and increased physical activity, are the cornerstone of weight and disease interventions for both adult and children (Kumar and Kelly, 2017; Mead et al, 2017).

In contrast, not only effecting the adults, but also affecting the younger generation. A retrospective cohort study of people with type II diabetes between 1990 and 2010 reported a substantial increase in proportion of younger people than 40 years old (Holden et al, 2013). According to Global Burden of Disease study by Ng et al (2013) states that the obesity affects 37% of men,
38% of women and approximately 24% of boys and girls globally. Thus, increasing numbers of children, adolescents, and younger adults with type II diabetes also reported across most regions in the world. Childhood obesity commonly caused by positive energy balance due to calories intake in excess of caloric expenditure combined with a genetic basis for their weight gain (Kumar and Kelly, 2017). All those factors are driven by lifestyle changes such as regular consumption of energy-dense foods, sugar-rich drinks, low level of physical activity (Ebbeling et al, 2002).

According to Vina et al (2016) implies the importance to tailoring an intensity, duration, frequency (dosage) and type of exercise program. In order to grasp the effects of exercise for those people with long-term conditions such as type II diabetes. Since exercise is effective in reducing frailty, the study purposed that exercise be considered as a supplement to other treatments. However, it should be shift-minded that exercise should be the primary intervention for tackling several long-term conditions along with physiological supplements and medications to improving their health status and prevent frailty.

Pilot study in South Asian for treating type II diabetes by controlling diet strategy and physical activity in order to measure the glycemic status and adiposity measure. The result was both dietary and physical activity components were similar to general population, although the study has a lack of evidence to support the effectiveness for the interventions (Muilwijk et al, 2018). Nevertheless, according to Cradock et al (2017) study implies that changing the dietary behavior may have more of the effects for people who has type II diabetes. It clinically significant reductions in HbA(1c), although initial reduction in body weight may be diminished over period (Sami et al, 2017; Cradock et al, 2017).

The relatives and partners play role to influence whether increase or decrease of developing type II diabetes. A systematic review conducted by Hemmingsen et al (20017) implies that by targeting diet and physical activity interventions may be positively changes the primary outcomes which is delay or prevent type II diabetes. Also, it may be effects to their relatives or partners of people with type II diabetes. The approaches are advertising in the community, recruiting people through their relatives with diabetes, or by self-screening (Dimova et al, 2017).

Pan et al (2018) recommends that aerobic, resistance, and combined exercise are beneficial for the management of type II diabetes mellitus. Improvements in glycemic control, blood pressure, waist circumference, blood lipids, muscle quality also the impact of performing exercise regularly and increasing the physical activity of people with type II diabetes (Albalawi et al, 2017). Support
A study conducted by Cai et al (2017) also shows a significant benefit by increasing physical activity such as regularly do aerobic exercise and combined exercise to improve the quality of life. Several studies also indicate that low level of physical activity among people with diabetes type II and high levels of sedentary behavior (Kennerly and Kirk, 2018). In addition, the study also reported that adults with diabetes tend to less active and have more sedentary behavior compared to those without type II diabetes. A sedentary lifestyle also considered to be a modifiable risk factor for type II diabetes, refers to Cai et al (2017). Therefore, the healthcare system have to encourage those people with diabetes to be more active throughout lifestyle intervention programs.

Lifestyle intervention program strongly effective intervention to tackle a diabetes type II. Despite, there just a few information about the influence of gender effectiveness of these interventions. The evidence claimed that both men and women has sex hormone imbalance and reproductive disorders which associated with a higher risk of developing diabetes type II (Harreither and Kautzky, 2018). Also, it has at least a two-to-four-fold association to increase coronary artery disease (Fujihara and Sone, 2018) which lead to complication of health issue (Lascar et al, 2017). These health issues could be preventable or can be delayed through a timeless medicine, healthy living. Especially, through increasing in physical activity (PA), healthy nutrition, not smoking and maintaining health body weight (Arena et al, 2017; Sami et al, 2017).

Physical activity (PA) effectively increase the sensitivity to insulin also improved abnormal glucose tolerance when caused by insulin resistance primarily (Charokopou et al, 2016). Secondly, PA also beneficial in preventing the progression of type II diabetes during the early stages, before the insulin therapy is required. Throughout a single prolonged session of physical activity, muscle contraction enhance glucose uptake into the cells which the effects the blood flow in the muscles and boost glucose transport into the muscle cell (Tucker and Palmer, 2011). Thirdly, It has been found to reduce intra-abdominal fat, which has strong association with insulin resistance (Cole et al, 1998).

Physical activity intervention have an undeniable evidence which contributes to the primary and secondary prevention of several long-term conditions such as type II diabetes. Also link to reduce risk of premature death. In order to improve the quality of life by increasing physical activity, Resistance Training (RT) may contributes some positive effects for people with long-term conditions such as type II diabetes. Support studies argue that RT can gain strength performance which affects to health and fitness ability (mentally and physically). Also, increase level in muscle
mass, reducing body fat levels, fatty acids in blood leve, and blood glucose by decreasing insulin sensitivity (Dominguez et al, 2016).

According to Johannsen, et al (2016) supports that the combination of aerobic and resistance training which suggested by most organisations, will improve health-related risk factors accosiated with sedentary behavior which resulting type II diabetes. On top of that, increase in physical activity may deliver some benefits into health-cost in health care system and effective scheme to improve the quality of life of the patients (Di Raimondo et al, 2016). Support evidence also indicates that various strength training regimes provoke preventive and therapeutic effects on type II diabetes (Donath et al, 2015). Additionally, Multimodal and combined strength and balance training would deliver additional improvement of neuromuscular capacity.

Health care provider must aware of those factors and should able to address the issue properly especially for those who has diabetes type II. Innovative education program includes dietary habits, increase in phsycal activity, family support, and cognitive function should considered (Kirk et al, 2018). The benefits from increasing physical activity for peope with type II diabetes may enjoy the improvement of coronary pressure, cardiorespiratory performance, muscle functional capacity, and quality of life such as primary and secondary prevention of cognitive decline among elderly people aged and over 70 years old (Bouaziz et al, 2017).

Psychological, social and occupational function as well as decreasing the quality of life appears as the other issues which may affects people with type II diabetes. According to Naskar et al (2017) implies that depresion has strong correlation with sedentary lifestyle, lack of self-care in a type II diabetes person and vice versa. Cognitive decline also shown to be assiciated with long-term type II diabetes. The study suggest that in order to significantly improved cognitive test, physical activity program may potentially contribute to improve the cognitive issue for people with type II diabetes (Podolski et al, 2017). Similar study by Bauman et al (2016) also states that physical activity improved cognitive function and functional capacity of peope with long-term conditions, and reduced risk of depression, anxiety, and dementia.

Many study have emphasised the role of PA in retarding or minimising certain aspect of aging which link to various chronic disease and reduce anxiety and depression in the elder people (Whaley et al, 2006). Also, regressing the quality of life in patients with diabetes type II such as mood which is quite importance for the treatment of this disease. Not only essential for the treatment, but also would influence the overall well-being of patients. Therefore, early detection of depression may be important to case of suspected diabetes. The study concludes a greater
emphisis should be pinpointed on improving patient knowledge, early detection, and multidisciplinary approaches to deal with some aspects of diabetes which may affects patients' quality of life (Pozzo et al, 2016)

Systematic review by Anothaisintawee et al (2016) finds that sleep disturbances such as sleeping time, insomnia, obstructive sleep apnea, and abnormal sleep time has been associated with increased diabetes risk. The study report that poor sleep quality, obstructive sleep apnea and shift work strongly linked with diabetes especially with overweight, family history of diabetes, and physically inactive.

Systematic review by Coulter et al (2015) suggest that costumise a personal care treatment may lead to improvements in certain indicators of physical and psychological health status, and their capability to self-manage themselves compared to general care. Although the effects may not significant, however, it appears greater than usual when the intervention is more comprehensive, intensive, and better integrated into routine care (Coulter et al, 2015). It seems applying an innovation intervention in order to attract people with long-term condition’s interest to involve in active lifestyle.

Höchsmann et al, (2016) proposed that active video games (exergames) may be a promising solution to motivate these people to fight their sedentary lifestyle. However, the study showed inconsistency results and the overall poor or moderate methodological quality do not permit judgement on whether exergames are suitable to achieve PA guidelines in specific target group. Although the result still lack of evidence, but the effects of exergames in order to activate people with type II diabetes to increase their level of physical activity need to be conducted in the future.

Another suggestion is technological aid potentially beneficial for critical role in decision support and coaching for promoting physical activity and result in health benefits for both disease and healthy individuals. Also, help healthcare providers to monitor patients more comprehensively (Triantafyllidis et al, 2017). According to Veazie et al (2018) supports that technological assessments may improve diabetes related outcomes. Although it may improve some sort-term, but the study is potentially beneficial in order to improve the care management for type II diabetes.

Summary of Literature Review

To summarise the literature reviews above, there are plenty of studies that support physical activity intervention with or without technological assistance. Sedentary behavior leads to obesity and another health issue for individuals, in this case the investigator mainly focus on type II
diabetes. As the literature has consisted, such as psychological factor such as pain, anxiety, and depression strongly associated with complication of diabetes. Suggestion for physical activity engagement to undertake several long-term conditions such as type II diabetes. Therefore, a verification project regards those several topics should be raise in real-life practice.

In this project, pragmatic study design would be suitable in order to compose research question and systematic way to answer the research question. The research questions are outlined in the further section.

**Research Questions**

- Is there any correlation between physical activity and quality of life perception among people with type II diabetes?
- Is there any different between the baseline of physical activity, compared to the three months follow-up?
- Is there any different between people perceives of quality of life baseline, compared to three months follow-up?

**Research Hypotheses**

The primary hypotheses could be state as:

Null hypotheses is there are no correlation between physical activity and quality of life perception among people with type II diabetes. Also, the accompanying alternatives hypotheses are that there a strong correlation between increase in physical activity and quality of life perception among people with type II diabetes. In order to discover the answer of the project hypotheses, a few statistical test would be conducted and summerised the project.

The secondary hypotheses are there are no different between between people with type II diatetes’ physical activity baseline, compared to three months follow-up and six months follow-up. Alternatively, there are significant different between physical activity baseline, compared to three months follow-up follow-up

Third hypotheses should be state as there are no different between people with type II diatetes’ quality of life perception, compared to three months follow-up and six months follow-up. Alternatively, there are significant different between people with type II diatetes’ quality of life perception, compared to three months follow-up.
Methodology

The methodology section would determine the philosophical approaches which may influences the study. Also, would explain the nature of study design and justification of the sistematical way of conducting the research.

The general aim of the nature of the project is to examine whether physical activity for those people with diabetes type II are associated with their quality of life perceived. In addition, the study also investigate the design used in this research in order to summarised and conclude the study.

Theoretical concepts

Research methods way vary in order to interact and extract the information surrounds the particular topics. However, it is crucial for researcher to recognise value and right conduct which meet the research standarts. Scientific inquires are based on theoretical perspective to conduct research. Framework comes from theoretical perspectives for interpreting observations of the research study (Bowling, 2009). However, Several methods may be suitable for some types of research, and the other may not fit into other research. It may vary and depend on ontology, epistemology, and methodology (Guba, 1990). The ability to deal with evidence and acquiring knowledge are the method of epistemology. On the other hand, ontology be define by reality and how to interpret existances. Then, methodology is the ability to find out philosophical concept underpinning to the chosen research methods. These concepts provide a holistic perspective towards knowledge and the way to deal with research. Regards to find a suitable methodological approach, design and selection may provide the basis for reseach.

Regards to discovering and evaluating intervention, the health care scientist has spent huge number of resources during the past decade. One of study trials is Pragmatic Clinical Trials (PCTs or PTs) are useful framework to examining and evaluating the community health care interventions, treatments, procedures (Patsopoulos, 2011). Schwartz and Lellouch (1967) proposed a distinction between explanatory trials which is confirm a physiological or clinical hypotesis which are the root of the concepts. Moreover, pragmatic trials may inform a clinical or policy decision by providing evidence for adopting specific interventions into daily practice. In term of recruitment, the pragmatic trials required the random participants which may be similar to patients who commonly receive the generic intervention. Then, may have unknown result for new interventions.
PTs are designed to evaluate the effectiveness of interventions in real life routine practice traditions. It also produce results which can be generalised and applied in daily practice. Through the process, robust interventional trial have been developed and used to control for biases or systematic errors which may infiltrate into observational studies (Grimes and Schulz, 2002). On the other hand, Randomised Control Trials (RCTs) were introduced as the ‘gold standard’ of study designs in providing the decisions about the effect of different interventions, minimize systematic errors by randomisation, blinding, allocation concealment, etc. (Meldrum, 2000) This common clinical trials RCTs, are designed as experiments with high interval validity and could be determine the cause-effect relationships. However, RCTs are slow and expensive. Thus, rarely produce findings that easily put into practice and difficult to translate results to the real world or practice.

First of all, more than hundreds to thousands of RCTs conducted and performed every year, yet expression of doubt as to whether these results are translatable and usable in daily practice. Secondly, the systematic reviews stat that results of RCTs still insufficient evidence to support the clinical decision (Patsopoulas, 2011; Treweek and Zwarenstein, 2009; Zwarenstein et al, 2008; Yoong et al, 2014). Moreover, Integrated approach and more practical trials need to be increased in order to producing a high-quality and widely applicable results with a effective cost. Therefore, to answer those conditions, pragmatic concept may deliver an impact in clinical practice.

The PTs are considered as a way of bridging the gap between research and care (Califf and Sugarman, 2015). It may allow the trial to be generalising the population which will be aective in treatment. Also, PTs are designed with consist from health care systems and produce evidence that can be readily publicised and used to improve care. Moreover, it include health care systems, stakeholders, patients will be integrating in research, policy making, and daily practice (Treweek and Zwarenstein, 2009). The trial often start with a pilot phase, and continuing the collaboration until the trial has been completed. Compared to efficacy and explainatory trials, pragmatic trials aim for the results which may apply to daily practice. Therefore, PTs likely to show the improved results of health and care as they adapt the intervention to the local context and test in physical care settings (Patsopoulas, 2011; Treweek and Zwarenstein, 2009).

Pragmatic-Explanatory Continuum Indicator Summary (PRECIS) which is tools that enabling the investigator to assess the degree of the objectives. According to the trial design decision by Thorpe et al (2009) describes that the toll had several dimensions such as 1) Eligibility criteria, 2) Flexibility of the experimental intervention, 3) Practitioner expertise (experimental), 4) Flexibility of the comparison intervention (comparison), 5) Practitioner expertise (comparison), 6) Follow-up
intensity, 7) Outcomes, 8) Participant compliance, 9) Practitioner adherence, 10) Primary outcomes. These dimensions aid in finding out the inconsistencies as to how the researcher are managed in a trial. However, the appraisal does not address the point of how and what way a trial is pragmatic (Karanicolas et al, 2009). Therefore, both perspective and context are required for interpreting a trial result.

Pragmatic trials appears as promising tools for policy maker, since these type of research are designed to answer the most relevant question for making decisions. Along with the implementation of cost-effectiveness analyses, it also provide an essensial information in real-life situations (Tunis et al, 2003; Maclure, 2009). The advantages of PTs for health care system are actionable, patient-centred and relevant. However, certain aspects of PTs design slightly different from RCTs. The inclusion and exclusion criteria for PTs are not very selective reckon it should be apply in routine clinical environment.

In order to reach the generalisability for the study, the intervention should enroll participants from heterogeneous population, recruit from several area of communities, measure broad range of outcomes to estimate all anticipated effects of specific intervention with long-term follow-up, generate evidence that suggests the intervention of the study to be adapted to local context. Moreover, placebos are not given as a part of routine clinical environment, therefore PTs do not include placebo in study design. In PTs study, the investigator may compare different intervention approaches available againts a new intervention.

Blinding process in PTs study may be difficult to perform. Consequently, tendency of biases of physicians can be accepted quite often in PTs, because in dialy practice, patients and therapists' expectations may be influence the size of the treatment effect. In PTs, if the participants do not follow the recommended treatment are also included in the analysis regards non-compliant patients are also part of study population. Thus, to prove that the intervention is effective in dialy practice, the invetigator may suggests more trials with pragmatic design to be conducted.

The adventages of adopting pragmatic approach is practical in nature which known as suitable as everyday care. Partnership among physicians, patiens, health care practitioners may help in altering the research and eventually improve the quality of health status of the individuals. Also, it may boost up the scientific discoveries from lab to clinics, and gain evidence practically on developing health care system and patient satisfaction (Treweek and Zwarenstein, 2009). Well-designed pragmatic trials should be increased in number to aid health care systems and providers in designing a study to that helps in daily practice. Also, it also developing research questions and
goals, which may focus on patient-centred research. Moreover, the results of the study will aid in transparency which may dedicated on the specific issues and data that are relevant for making decisions and actions (Eldridge, 2010).

Positivist paradigm is based on this project which is an objective, formal, systematic process by measuring the numerical description, statistical test and examines cause and effect relationships (Fraenkel et al, 1993). It considers the interaction of the researcher toward the research itself. Thus, personal values and beliefs may acknowledged and influenced in the project (Bryman, 2012). Empirical and logic methods of this concept may use quantitative study to analyse the data set. Therefore, the positivism is based on assumption that knowledge could be obtained through experience of sense and by observation, and experiments (Guba, 1990). He method may gather the evidence and allows reliable and valid knowledge throughout the experiments (Walliman, 2011). The ontologist which adopt positivism may views reality as an absolute phenomena that can be defined or understood. The positivism epistemologist may defined the research from the researcher. Meanwhile, the positivism methodological approach may put more weight on the experiments finding (Walliman, 2011).

The quantitative approach may be useful in social sciences especially in order to understand human problems, although it may not answering why the phenomenon occurs or how it occurs (Denzin & Lincoln, 200; Silverman, 2000). The scientific approach focus on logic, measurements and quantification. It allows replicable procedures which could be cross-checking the project. According to Collis et al (2003) argue that qualitative research provides a strong basis for analysis and interpretation because it is grounded in the natural environment of the phenomenon. Even though qualitative may deeply examine the topic surround, quantitative methodology seems to be the most effective and suits to answer the research question. Therefore, it may not deeply investigated the phenomenon like qualitative methodology, but regards to evaluate the quality of life perception among people with type II diabetes and their physical activity (METs-minutes/week) would suitable and enables the researcher to analyse the data set properly.

A study by Green et al (2013) used an particular experimental methodological approach, using a within and between subjects, single-blinded design. The data was originally obtained through the methods of questionnaires and intervention assessment is used for secondary analysis. This project also used secondary analysis of data as part of a qualitative research design to answer the research question as part of a full-time MSc study and maximised the quality of this project. However, the investigator also considered the act of recognising limitations and error in the data due to the methodological and chosen methods of the original study will aid to enhance the
possibility of negative effects in it would be explored and discussed in further section (Discussion section).

**Research approach**

Regards to chose a suitable method for this project, it is crucial to find out the way to answer the research question. A deductive logic seems to provide a better way than inductive method. Build up the conclusion based on observation or measurement is one of inductive method works (Robson, 2011). Chosing pragmatic study design for this project seems appropriate, in order to investigate the efficacy of intervention in clinical practice and real-life settings that encompass the full spectrum of population to which an intervention is applied.

**Strategy and research design**

The secondary analysis has been used and the main tools to answer the research question. It also could prevent the data from being wasted (Sim & Wright, 2000). Regards to ethical purpose, the researcher is required to use the massive numbers of data. The primary data from OXSPA participants who has diabetes type II has been gathered and extracted to examine the trends and overall results for the dissertation project.

A within-sample group repeated measures design was used in the project. The design appears appropriate due to the heterogeneity of samples which may be problematic to match a control group. Therefore, the study may seeking the difference mean between the baseline, three month follow-up for both METS minutes/week and EQ-5D-5L.

**Ethical Considerations**

A research conduct may always influenced by ethics and code of conducts by researchers’ ethical beliefs (Hard, 2005). Refers to Robson (2002) states that ethics usually refers to general principles of what a person constantly do, either is honourable or immoral. Moral ethics also considered with what is appropriate and generally accepted as concered with specific acts. The researcher has designed and conducted the study following several ethic codes such as The Health and Care Professional Council Standards of conduct, performance and ethics (HCPC, 2012).

Ethical issues are important to addressed when conducting a research project which involves human participants. Therefore, the project had been through the ethical theories and principles. I could provide a firm ground to work on ethical issues (Naele, 2009). Moreover, secondary analysis contain one of the crucial aspects which is informed consent from the participants. Ethics could
be define as a patients’ voluntary decision to participate in specific study and understand to all
decision related the information (Naele, 2009). It includes the autonomy in decision-making, which
means the participants has made the decision without interference from others (Schermer, 2002).
The implication of informed consent for the secondary analysis is quite different from the primary
data collection. However, there was no obligation for requesting the consent from an ethical
committee for this project. All the participants had previously given their consent for the access to
their details, for and suitable study and research by the chief investigator. Anonymised primary
raw data from OXSPA study was accessed by the kind permission of its principal investigator.
Additionally, the data was already coded when the investigator of this research was accessing
the data.

Confidentiality has been considered when conducting the study, and should be preserved at all
time. Although the data was already anonymised, it is important to ensure data confidentially well-
maintained. Therefore, the researcher should ensure that all the data used for analysis was kept
in personal’s device and coded. In addition, an unauthorised access to the laptop to open and view
the study folder was restricted to those involved in the study. Although, the head investigator who
has access to primary data, already anonymised and the participants data information. Thus, the
researcher should ensure all the further data extraction has been anonymised before carry on
the projects. Data obtain from OXSPA would not be able to tracked back to their respective
participants.

**Ethical approval**

The ethical approval may access the data from Clinical Exercise and Rehabilitation (CLEAR)
Research Group was obtained as per the Oxford Brookes University (OBU) ethics guidance. In
order to enable the researcher to conduct the study, the HLS E2U form should have been
completed and submitted to the faculty of health and life science research ethics committee (see
Appendix 1). In addition, the approval was granted for those researcher without any further
request for modification.

The permission to use OXSPA data was granted by Leila Javadi-Babreh (Physical Activity and
Health Officer Oxfordshire Sport and Physical Activity) and supervised by Johnny Collet (Senior
Clinical Research Fellow and leader of the Clinical Exercise and Rehabilitation Research Group,
MORes, OxINMAHR) at Oxford Brookes University. Data contracts are in place between OXSPA
and OBU determining data ownership and rights to analyses and publish findings related
intervention projects (*Go active, Get Healthy*).
Ethical risk

The study did not involve the recruitment process of all participants. The primary data may be accessed throughout the OBU, Clinical Exercise and Rehabilitation (CLEAR) Research Group. Therefore, no adverse effect may associated with the secondary analysis. Moreover, the researcher did not predict any risks to all participants of the OXSPA project as the current study has no physical contact to all participants. The results of this research should be reported back to OBU, Movement Science Research Group and Oxfordshire Sport and Physical Activity (OXSPA) whereby in all cases, anonymity will be re-assured with regards to data analysis.
Methods

Detail of Oxfordshire Sport and Physical Activity (OXSPA) study

Departement of Health in 2009 was launched ‘Let’s Get Moving (LGM)’ which is a care pathway for physical activity in primary care. It provides a systematic way to recruit individuals and screen for those who are inactive, and deliver brief intervention in order to support behavior change, centred on motivational intervention (Foster et al, 2012). The Oxford project was developed a ‘Go active, Get Healthy’ program which is designed for individual level physical activity intervention based on LGM pathway and incorporates recommendations from feasibilities studies that have evaluated LGM delivery. Also, the project was to provide the evidence and evaluation for the effectiveness of the pathway.

The program was recruited potential participants through a marketing and promotion of the program. Screened participants, performed assessments and delivered the motivation intervention via contracted MI professionals. OXSPA also facilitated through a tailored web based data capture and management system commissioned for the project. The system managed recruitment, screening, registration, motivational interviewing and assesment data and also timelining and scheduling the participants. The system provided different user interfaces and permission levels for different users such as central administration, motivational interviewer and evaluation teams.

Oxfordshire Sport and Physical Activity (OXSPA) participants’ information

Recruitment

Multiple entry points were used to recruit people from Oxfordshire to Go active, Get Health according to (Let’s Get Moving Essex) Departement of Health report and evaluation (2012) recommendation such as self-referral, health referral and non-heath referral.

First of all, self-referral inviduals were sign up throughout OXSPA website or by returning referral card. Referral cards (appendix 2) provided demographic information and current PA levels. Moreover, OXSPA used several type of marketing and promotional tools to raise public awareness of the program and to encourage people to refer themselves. Including distributed posters and displayed at wide-range of locations (collages, coffee shops, libraries, workplaces). Video promotion and case studies on OXSPA website, new articles and community events, where ‘fitness MOTs’ were used to attract the public attention.
Secondly, OXSPA promoted the program to potential referrers and offered half day training sessions on the Health benefits of Physical activity, raising the issue of PA with patients and providing support to people shifting behavior. The program focused on primary care providers (GP surgeries/health centres), and few hospital based services and pharmacies were also included. After referrers signed up, they were provided with referral cards and information on the referral and payment process (referrers were paid £30 for every successful referral). Third, non-health referral were targeted employers, community enterprises and service providers.

**Inclusion criteria of Oxfordshire Sport and Physical Activity (OXSPA) study**

OXPA was recruited inactive people for the program by the above means were confirmed eligible at the baseline assessment performed over the phone. The eligibility criteria were set such as:

- Adult (≥ 16 years old)
- Has a Scoring ‘0’ (<1 session of 30 mins exercise/week)

*The scoring was adjusted after 8th October 2014 to scoring either 0 or 1 which was standard by all Sport England Commissioned ‘Get Healthy, Get Active’ programs.*

Individuals who is meeting eligibility criteria and choosing to take up the program were provided with information about the program and possible activities at the baseline assessment by sports development officer. Information pack was given to all participants which included vouchers for subsidised activities provided by their local leisure provider. Participants were able to choose to receive up to three Motivational Interview (MI) sessions over a 3 month period. Then motivational interview was assigned to participants and asked for their preference for MI session timing by telephone.

The participants chose the suitable way to increase physical activity which may have included unstructured and/or structured activities. Information on preference activities provided local leisure providers were included in the information pack, along with vouchers for subsidised activities. The type of activities and subsidies varied over period and according to local provision.

**Oxfordshire Sport and Physical Activity (OXSPA) study measurements**

The Outcome Measurement by Oxfordshire Sport and Physical Activity (OXSPA)

The participants were reviewed after 3 months and 6 months and 12 months. No further intervention was offered at the last review sessions, in term of Motivational Interview (MI) sessions or subsidised activities. The inform consent were provided to extract the data from all participants were used for monitoring and evaluation purposes were included in the analysis. The evaluation
aimed to follow up all participants that decided to follow through the program and used the following approaches to maximize follow up response rate:

- Participants were offered a £20 gift voucher or donation to charity on their behalf for completing a follow up assessment
- Motivational interviewers reminded participants at their last motivational interview session to expect a telephone call for evaluation
- The data capture and management system generated automatic emails reminding people that assessment was due and if there was no response after 3 call attempts
- A minimum of 3 telephone call attempts were made at each assessment point unless they had previously decided to ‘opt out’ of further evaluation. If unsuccessful a message was left with details of how the participant can get in contact.
- A paper version of the assessment was available if people did not wish to complete the assessment over the telephone.

OXSPA assessment demographic data such as age, sex, ethnicity, long-term health conditions and disability, and postcode (social-economic proxy) were extracted via referral cards and/or on-line sign ups (see figure 3.1). A baseline assessment was offered to all participants; those who were eligible and enrolled on the program were then followed up to 3 months, 6 months and 12 months. Initially, the baseline assessment confirmed eligibility and willingness to enroll the program and then be evaluated.

Figure 3.1 Evaluation Flow
All the outcome measures were collected at baseline which entry into program, three mounts was the end of the program, and follow up at 6 months and 12 months. All assessments were carried out over the phone unless a paper version for those people who demanded a special request. Data was accepted up to one month after the scheduled assessment date. The data was carried out by a sports development officer and further assessment carried out by the contracted motivational interviewer.

Motivational interviewer were re-assigned all participants for assessments for those not perform assessment on individual that they provided Motivational Interviewer for. Data was directly pooled into data capture and management system. Viable data ranges, compulsory field entries and codes for missing data were placed on questionnaire data entry as per standard operating procedures (The IPAQ group, 2002; Sport England, 2013; Oemar and Janssen, 2013). All the assessors received training on administering outcome measure and carrying out assessments.

**Physical Activity Measurement**

The primary outcome for the project was physical activity (total MET-minutes per week) measured using the international Physical Activity Questionnaire (short version) telephone format (IPAQ) and was administered according to guidelines (the IPAQ Group, 2002). Metabolic equivalents were assigned to the amount of time spent in Vigorous (8.0METs x minute), Moderate (4.0 x minute) and Walking (3.3 x minute) domains in the previous 7 days. Time spent sitting and time spent sport activity were also recorded but not included in the calculation of total MET-minutes per week. Sitting minutes was estimated as an average per weekday (not considering weekends) and sport the total amount of time in previous 7 days.

IPAQ short form is an instrument designed primarily for population surveillance of physical activity among adults. It commonly used as an evaluation tool in intervention studies, yet it was not intended purpose of IPAQ. It assesses physical activity undertaken across a comprehensive set of domains such as leisure time physical activity, domestic and gardening activities, work-related physical activity, and transport-related physical activity.

**Heath and Well-Being Perceived**

Heath outcome was measured using the EQ-5D-5L (telephone version, see appendix 2). The EQ-5D-5L is comprised of a descriptive system and an index score. The descriptive system contains the following dimensions such as self-care, usual activities, pain/discomfort and anxiety/depression. Each dimension has 5 levels which are 1) No problem, 2) Slight problems, 3)
Moderate problems, 4) Severe problems, 5) Extreme problems. The index score will determine individuals to rate their health status according to a 0 to 100 scale ('0 worst health they can imagine and 100 best health they can imagine') and used to indicate health related quality of life (Oemar and Janssen, 2013). Furthermore, the score will be categorised by three levels. Low level of METs score which the participants did not achieve the minimum score <600 METs-minutes/week. Moderate level are labeled for those participants whose achieved a minimum of at least 600 METs-minutes/week. At last, high level are for those participants who achieved an accumulative activities at least 3,000 MET-minutes/week.

Process evaluation was on going throughout the project. Yet, formal evaluations took place to capture experience from all participants and referrers and case studies were recorded by OXSPA.

**Data collection for the project**

The dissertation data project will be labeled as ‘Go Active, Diabetes’ which the data was extracted from OXSPA’s project which is ‘Get active, Get healthy’ which has been pooled approximately (n=467) participants. The secondary data extraction and analysis has been used after ethical consideration for the projects has been approved by Oxford Brookes University and granted from OXSPA officer. The project was excluded people without long-term conditions and mainly focused on the people who has diabetes type II.

Although the program still ongoing, yet, all participants data has been captured from June 2017 to June 2018 for this dissertation project. The time periode may reflects when OXSPA study started collecting the information for this study (which is ongoing, yet also still adjustable with the dissertation timeframe). Unfortunately, it means that some of the participants did not reach a 6 months follow up yet. Therefore, the data set may shrunk through the time, six months follow-up, however, did not include in this research. Also, Should be mentioned that this project will only include the participants who has diabetes type II. The data collection was delivered on an excel sheet file and through several protection such as encrypted file in personal device. Backup files were stored in a password protected memory stick and was kept securely by the investigator.

Through obtaining ethical approval from OBU from the primary data collection; 431 participants has been gathered for this study. All participants already agreed and have had the informed consent for using the data for research and study purposes. The participants for the study were diverse by gender, ethnics, social-economic proxy. The data of some participants were not included into analysis process as those people did not meet the inclusion criteria.
Data sampling

All participants who have long-term conditions which is type II diabetes have been extracted for this study. Approximately (n=431) participants diagnosed type II diabetes out of (n=467). Then, (n=157) participants who meet eligible criteria were pooled. The ages range 20 years old up to 75+. Also, it randomised and came from divers of ethnics, social-proxy and baseline.

Data analysis

Processing the data

The collected data from OXSPA was obtained from The Clinical Exercise and Rehabilitation (CLEAR) Unit at Oxford Brookes University. The physical activity measurement was captured by calculating METs – minutes/week. The data mean has been compared and the differences following specific timeframe assessment (3 months and 6 months follow-up). Also, it compared and seek the relationship between physical activity mean changes and a quality of life perceive among people with diabetes type II.

Statistical analysis

In order to reach the meaning of the study, the data should be analysed and tested. The analysis process was performed by using the SPSS (IBM, version 25). The aim of performing statistical test for the data set is to establish the differences mean of the variables. This study also identified the significance of the data changes compared to follow-up assessment (3 months time period).

To determine which statistical tests may be appropriate for specific data set, it is important to consider the scales of measurements. Measurements scale and some assumption guides researcher to choose as appropriate test to answer the research questions. Parametric and non-parametric test may enable the identification of statistical test to perform. Non-parametric test may depend on assumptions that the data used has certain characteristics, for instance an ordinal scale data which means it kind of relative order by position on the scale. Could be temporal position, superiority, or vice versa. The other data types such as interval/ratio scale and the data population is normal distributed, therefore the parametric test may be appropriate for statistical test.

First of all, descriptive statistics are used in order to describe the basic features of the data study. It provides straightforward summaries about the sample and the measures. Also, it enable the data to be clearly visualised. Therefore, the present data may be simply interpreted. There are at least two measures that mainly described such as the measure of central tendency which ways of
discribing the centre of a frequency distribution for a group of data. In this project, it marked the centre of the IPAQ scores and EQ-5D-5L scores. On the other hand, measures of spread is the spread of the data which summarising a group of data by describing how vary the scores are.

Correlation and regression test were used to denote some form of association. In statistical tems, the correlation test simply denote association between two quantitative variables. Assumed that the association is linear, that one variable may increase or decrease a fixed amount for a unit increase or decrease in the other. The other technique that is often used in these circumstances is regression, which involves estimating the best straight line to summarise the association. In this project, the data will be tested between IPAQ score which measuring the physical activity-minutes/week (METs) and the EQ-5D-5L scores to ensure the correlation and regression.

Before choosing the appropriate statistical tests, firstly, normality test and homogeneity test should be tested. Usually, the normality could be inspect by visual presented, although this approach is usually unreliable and does not guarantee that the distribution is normal (Field, 2009; Altman and Bland, 1995; Öztuna et al, 2006). The frequency distribution (histogram), stem-and-leaf plot, boxplot, P-P plot, and Q-Q plot are used for checking normality. Despite of those tools, the common tests for the assessment of normality are Kolmogorov-Smirnov (K-S) test, Shapiro-Wilk test (Öztuna et al, 2006; Peat and Barton, 2008). If the test is significant, the distribution has unequal distribution. On the other hand, if the test is not significant, therefore, the data is normally distributed. According to (Ghasemi and Zahediasl, 2012) states that both K-S test and Shapiro-Wilk test are highly recommended for assessing the normality in parametric statistical test. Also, Levine’s test would be conducted to determine whether the results are homogen or heterogen. These test would be indicator to choose an appropriate test for correlation and mean different.

ANOVA is one of parametric statistical test which is useful tools to determine whether the data is significantly different among means from groups (more than two groups). The study may consider the repeated Measures or One-Way Analysis of Variance (ANOVA), which a statistical test that deemed to be fit to explore the research questions and to determine whether there are significant difference over the baseline and 3 month follow-up and 6 month follow-up. The purpose of the study was to establish if there are diverse in physical activity means among people who has type II diabetes monitored by 3 months follow-up compared to baseline. However, several conditions should be established such as the data was normally distributed and heterogeneity tested. Therefore, ANOVA test maybe chosen as the appropriate statistical test to analyse the data set of this dissertation, if parametric test is appropriate (Walliman, 2011). ANOVA works to examine the differences by comparing the group variability to sub-group variability, which may produce a
ratio value called F. The F would not show up where there was a significant different among groups. Also, a post hoc analysis maybe conducted at some point to discover some results which may shows that there is a significant F value in the test. If the data was not normal distributed, therefore *Friedman’s test* would be appropriate to prove the hypothesis.

Statistical significance

It is commonly use that P values a way of assessing a statistical significance and as a convention are often set at 0.05. Whenever a post hoc analysis test is done, it would generated both P value and F score. P value of 0.05 means that there is 5% chace the result may vary by chance. On the other hand P value of 0.01 means there is a 1% possibility that the result occurred by chance. Afterall, this study may used the conventional (P= 0.05) as a level of statistical significance.

**Summary of methods**

The chapter has summarised the specific methods which may employed to analyse the data set and sistematic way to answer the research question. This has built on the metodological approach outlined in the previous chapter and provides both an explanation and justification for several test to discover the results. Which will be presented in the next chapter.
Results

The aim of this chapter was to investigate the relationship between physical activity and their perceived quality of life. Therefore, demographic characteristics of the participants are presented in the following section. Then, appropriate statistical tests and analysis were attempted to explore the data set. Moreover, the results of statistical test will determine the outcome measures.

Figure 5.1 The Participant Flow
Descriptive statistics for the overall sample

To capture the overall data, the investigator was categorised several variables. The idea was to provide more comprehensive analysis and indicate the further analytical test. These figures below show the demographic of all participants (n=431). The majority of participants were OPTOUT patients which has (61.7%) proportion, followed by (almost 2%) of ON HOLD and (36.4%) ELIGIBLE respectively which was significantly different (p<0.05) and was not normally distributed (p<0.01). Also, in general, participants were greatest in the 35-54 age band.

Moreover, the massive number of participants were referred by health professionals which approximately (70%) out of total participants and the rest were self-referred and non-health referred by (27.6%). Also, there were relatively low of diversity ethics among all samples whose enrolled the program. But, the the highest number of participants came from white ethnic with about (65%) out of (n=431) participants.

Since, the eligible participants were screened for the study. It appears that there were only (n=157) eligible participants for this project (See table 5.1 below) out of (n=431). Also, the Chi Square test indicates that the categories are not equal probabilities (p<0.01). Therefore, the sample size has dropped dramatically. Furthermore, this project has no control over variable which attempted to determine, discribe or identify what is, why it is happened that way and how it came in the future. Also, the research aimed at the problem through a process of data collection that enables the investigator to describe the situation more comprehensively.

Table 5.1 Frequency Table for Participants’ Status

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>ELIGIBLE</td>
<td>157</td>
<td>36.4%</td>
<td>36.4%</td>
</tr>
<tr>
<td></td>
<td>ON HOLD</td>
<td>8</td>
<td>1.9%</td>
<td>1.9% 38.3%</td>
</tr>
<tr>
<td></td>
<td>OPTOUT</td>
<td>266</td>
<td>61.7%</td>
<td>61.7% 100.0%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>431</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Descriptive Analysis For Eligible Criteria

This flow chart below describes a brief summary towards sample size (n=157). However, the data was captured only 87 participants (55.4%) and loss to follow-up approximately 70 (44.5%) participants’. Despite of that, the total METS-minutes per-week and quality of life perceived has a same sample size (see figure 5.1 below).

![Flow Chart of Eligible Criteria](chart.png)

Figure 5.1 Flow Chart of Eligible Criteria

The proportion of gender was unequal (p<0.01) although it just a slightly different between male 78 participants (49.7%) and female 75 participants (47.8%). Also there were (2.5%) participants which unwilling to assign their gender identity (see figure 5.2).

![Gender Proportion Chart](chart.png)

Figure 5.2 Gender Proportion Chart
All participants also have variety of age groups with the highest participants came from 35-54 years old with 50 participants (17.5%), followed by 55-64 with 48 (16.8%) participants, and 37 (12.9%) participants came from 65-74 age band. Also the distribution of sample were not normally distributed (p<0.01).

Figure 5.3 Age Band Proportion

The participants also came from different districts (n=157). There are 52 (33.1%) participants came from Cherwell, followed by Vale with 32 (20.4%) participants, then City and West similarly about 30 (19.1%) participants, and 13 (8.3%) participants came from South. The Chi-Square test indicates that a district category seems not equal probability (p<0.01). In other word, the data was not normally distributed.

Figure 5.4 Participants’ District
There were five ethnic categories in this project which were Asian/Asian British, Black/Black British, Mixed, Other, and White. White ethnics become the highest number on this sample project with 105 (±70%) participants, However there were a few of them unwilling to answer with 24 (15.3%) participants out of (n=157). The rest (± 14%) were Asian, Black, Mixed, and other ethnics. Therefore, the category also was not normally distributed (p<0.01) (See figure 5.5).

![Ethnic distribution chart](image)

Figure 5.5 Participants’ Ethnic Distribution

Most of participants were referred by GP/Health referrals with 122 (42.7%) participants out of (n=139). Secondly, Self-referral via website enrollment seems quite effective with 29 (10.1%) participants. Compared to other publication with approximately less than (1%). However the test indicates that the distribution of referrers category was abnormal (p<0.01) (See Table 5.2 below).

**Table 5.2 Referrers Distribution**

<table>
<thead>
<tr>
<th>(N=139)</th>
<th>Leaflet</th>
<th>Other</th>
<th>Health Referrer</th>
<th>Non-Health Referrer</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>How Found</td>
<td>2</td>
<td>2</td>
<td>122</td>
<td>1</td>
<td>12</td>
</tr>
</tbody>
</table>
Physical Activity Baseline Description

Physical activities were captured and documented as the baseline (See table 5.3). Several categories such as vigorous, moderate, and walking were selected in order to calculate the METs-minutes per week (n=87). The earliest data captured on 9th June 2010 and latest was on 27th June 2018. In other word, There was a few numbers of participants who did not meet the three month follow-up. Most of participants data captured were on January 2018 (see figure 5.6). However, distribution test shows that the category was not normally distributed (p<0.01).

![Histogram](image)

Figure 5.6 Participants’ Date Captured

Refers to the baseline, there were 5 participants (5.74%) from vigorous minutes-week and 12 participants (13.7%) from moderate minutes-week and 27 participants (31.03%) from walking minutes-week has meet UK government recommendation of minimum PA guidelines for adults which is ≥ 150 minutes a week. A (table 5.3 below) will illustrate the means (SD) for each categories of activity measurement and calculate those into METs-minutes per week. The distribution of sample, however, was not equally distributed. Since then, the data should be assume as non-parametric test for further statistical analysis.

Among all participants (n=87) there were 31 (35.6%) partipants whose achieved the moderat level of METs-minutes per week and there were 3 (3.44%) participants whose achieved the high level
of METs-minutes/week, Unfortunately the majority of participants which were 45 (71.72%) participants were categorised at low level of METs-minutes/week which indicated that the numbers of sedentary lifestyle remind high. Also there was no different mean for both female and male towards vigourous METs, moderat METs, walking METs and total METs (p>0.05), although the sample size were not equal between gender.

**Table 5.3 IPAQ Baseline Score**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Intensity and Duration</th>
<th>Mean (±SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vigourous Minutes/ Week</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=87)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vigourous day</td>
<td>(n=87)</td>
<td>0.33 (± 1.15)</td>
</tr>
<tr>
<td>Vigourous hour</td>
<td>(n=87)</td>
<td>1.42 (± 1.88)</td>
</tr>
<tr>
<td>Vogourous minutes</td>
<td>(n=87)</td>
<td>45.83 (± 21.51)</td>
</tr>
<tr>
<td><strong>Moderate Minutes/Week</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=87)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate day</td>
<td>(n=87)</td>
<td>1.37 (± 2.39)</td>
</tr>
<tr>
<td>Moderate hour</td>
<td>(n=87)</td>
<td>0.80 (± 1.27)</td>
</tr>
<tr>
<td>Moderate minutes</td>
<td>(n=87)</td>
<td>32.20 (± 20.91)</td>
</tr>
<tr>
<td><strong>Walking Minutes/Week</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=87)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking day</td>
<td>(n=87)</td>
<td>2.85 (± 2.57)</td>
</tr>
<tr>
<td>Walking hour</td>
<td>(n=87)</td>
<td>0.53 (± 1.15)</td>
</tr>
<tr>
<td>Walking minutes</td>
<td>(n=87)</td>
<td>31.89 (± 17.74)</td>
</tr>
<tr>
<td><strong>Sitting Minutes/Week</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=87)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sitting hour</td>
<td>(n=87)</td>
<td>1,154.98 (± 3,205.28)</td>
</tr>
<tr>
<td>Minutes minutes</td>
<td>(n=87)</td>
<td>47.14 (± 24.54)</td>
</tr>
<tr>
<td><strong>Vigourous METS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=87)</td>
<td></td>
<td>220.69 (± 825.66)</td>
</tr>
<tr>
<td><strong>Moderate METS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>237.15 (± 511.19)</td>
</tr>
</tbody>
</table>
Quality of Life Perceived Baseline

Dimension scores (table 5.4 below) indicates the severity and impacts of impairments which is type II diabetes (n=87), with the most participants reporting some problems with pain and anxiety/depression. Also, participants have no problem towards their self-care, usual activities in general. Also, there was no significant different between participants’ health status compared to group of ages (p>0.05). In other word, the severity and impacts of type II diabetes could be affected all ranges of age.

### Table 5.4 EQ-5D-5L Description

<table>
<thead>
<tr>
<th>Level</th>
<th>Mobility</th>
<th>Self-Care</th>
<th>Usual Activities</th>
<th>Pain/Discomfort</th>
<th>Anxiety/Depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>52.3%</td>
<td>81.4%</td>
<td>73.3%</td>
<td>37.2%</td>
<td>60.0%</td>
</tr>
<tr>
<td>2</td>
<td>15.1%</td>
<td>4.7%</td>
<td>11.6%</td>
<td>27.9%</td>
<td>14.1%</td>
</tr>
<tr>
<td>3</td>
<td>27.9%</td>
<td>9.3%</td>
<td>9.3%</td>
<td>27.9%</td>
<td>23.5%</td>
</tr>
<tr>
<td>4</td>
<td>4.7%</td>
<td>4.7%</td>
<td>4.7%</td>
<td>7.0%</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>-</td>
<td>-</td>
<td>1.2%</td>
<td>-</td>
<td>2.4%</td>
</tr>
</tbody>
</table>

Percentages of response to each EQ-5D-5L dimensions level according to wether the individual had a long term health conditions or disability: 1) No problems, 2) Slight Problems, 3) Moderate problems, 4)Severe problems, 5) Extreme problems
The health status baseline also shows (figure 5.7 below) the mean of the samples were 63.68 (± 19.38) and was not normally distributed (p<0.001). Which means non-parametric test would be appropriate to compare the mean difference between the baseline and the 3 months follow-up.

Figure 5.7 A Frequency of Health Status Baseline

Three Month Follow-up

ELIGIBLE Participants
(n=86)

Loss to follow-up
EQ-5D-5L
(n=55)

Total METS
(n=31)

EQ-5D-5L
(n=31)

Figure 5.9 Flow Chart of Three Month Follow up
Out of (n=86) participants who meet the eligible criteria. There were some participants loss to follow-up with 55 (64%) participants. Only 31 (36%) participants succeed to manage three months follow-up. Which means the sample size were shrunk through time. The earliest data captured on May 2018 and the lastest were July 2018.

**Descriptive Analysis for Three Months Follow-up**

Proportion of gender (n=31) among the three months follow-up was 17 (54.8%) participants and 13 (41.9%) participants (see figure 5.10). Also, there were four ages band which were 10 (32.3%) for both 35-54 and 55-64 years old. 65-74 age band has 6 (19.4%) participants and just about (12.9%) participants have no records regards their ages (see figure 5.11).

![Figure 5.10 Gender Proportion on Three Months Follow-up](image)

![Figure 5.11 Group of Ages Three Months Follow-up](image)
All participants postal (n=31) also diverse such as 8 (25.8%) participants from city, 12 (38.7%) participants came from Cherwell, 5 (16.1%) participants from West and 3 (9.7%) for both Vale and South. Moreover, White ethnics remaind the highest number of participants with 19 (61.3%) followed by 4 (12.9%) for both Mixed and Other ethnics. Also just 4 (13%) the accumulative participants from Asian and Black British.

![Figure 5.12 Participants District Proportion](image1)

![Figure 5.13 Participants’ Ethnicity](image2)
Physical Activity Measurement for Three Months Follow-up

Overall, the moderate METs have the highest mean with 289.29 (± 405.80), followed by walking METs-minutes per week with 116.56 (± 184.17) and 122.58 (± 268.71). Also there were strong association between Walking METs-minutes per week and vigourous METs-minutes per week (p<0.05). Total METs-minutes per week given by ages group was homogen and equal (p>0.05).

Compared to gender, vigourous METs-minutes per week, moderate METS-minutes per week, and walking METs-minutes per week were equal and homogen (p>0.05). Also comparison of vigourous, moderate and walking minutes were not diverse between male and female. Age group also homogen and equally compares to vigourous, moderate and walking minutes. Moreover, there was a negative correlation between sitting-minutes per week compared to total METs (p<0.05).

Sitting minutes/week still the highest numbers with 29,361 (± 133,013.05) which indicates the sedentary lifestyle reminds among those participants (n=31). Moreover, the correlation test indicates that the significant negative association between sitting-minutes per week compared to total activities (p<0.05). In moderation activity, the participants (n=6) achieved the UK government recommendations which is ≥ 150mins/week and 2 participants from walking minutes per week whose achieved the UK’s recommendation of minimum physical activity.

The table bellow illustrate the several activity categoties such as Vigourous METs-minutes per week, moderate minus per week, walking METs-minutes per week as well as sub-details among groups.

Table 5.5 Three Month Follow-up of Physical Activity Measurement

<table>
<thead>
<tr>
<th>Activity</th>
<th>Intensity and Duration</th>
<th>Mean (±SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vigourous Minutes/Week (n=31)</td>
<td>Vigouros day (n=22)</td>
<td>0.95 (± 1.83)</td>
</tr>
<tr>
<td></td>
<td>Vigourous hour (n=6)</td>
<td>0.67 (± 0.51)</td>
</tr>
<tr>
<td></td>
<td>Vigourous minutes (n=6)</td>
<td>11.67 (± 11.25)</td>
</tr>
<tr>
<td>Moderate Minutes/Week</td>
<td>Moderate day (n=21)</td>
<td>3.00 (± 2.09)</td>
</tr>
</tbody>
</table>
Baseline of EQ-5D-5L (n=21) was investigate in five dimensions and has been calculated the scores. The table below present a brief summary of description of quality of live perception among all participants with type II diabetes. The overall score 43.42 (± 34.46) and the five dimensions towards the health status follow-up are correlated (p>0.05) with determinant value (0.54). Also, mobility description dimension has a negative correlation with walking-minutes per week (p<0.05) tested by Spearman’s test.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
<th>Value (± Standard Deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate hour</td>
<td>(n=18)</td>
<td>1.17 (± 1.88)</td>
</tr>
<tr>
<td>Moderate minutes</td>
<td>(n=18)</td>
<td>15.61 (± 14.37)</td>
</tr>
<tr>
<td>Walking Minutes/Week</td>
<td>(n=31)</td>
<td>1.17 (± 1.88)</td>
</tr>
<tr>
<td>Walking day</td>
<td>(n=21)</td>
<td>2.76 (± 2.68)</td>
</tr>
<tr>
<td>Walking hour</td>
<td>(n=14)</td>
<td>0.14 (± 0.36)</td>
</tr>
<tr>
<td>Walking minutes</td>
<td>(n=14)</td>
<td>16.07 (± 10.77)</td>
</tr>
<tr>
<td>Sitting Minutes/Week</td>
<td>(n=21)</td>
<td>5.60 (± 2.58)</td>
</tr>
<tr>
<td>Sitting hour</td>
<td>(n=20)</td>
<td>5.60 (± 2.58)</td>
</tr>
<tr>
<td>Sitting minutes</td>
<td>(n=20)</td>
<td>N.A</td>
</tr>
<tr>
<td>Vigorous METS</td>
<td>(n=31)</td>
<td>122.58 (± 268.71)</td>
</tr>
<tr>
<td>Moderate METS</td>
<td>(n=31)</td>
<td>289.29 (± 405.80)</td>
</tr>
<tr>
<td>Walking METS</td>
<td>(n=31)</td>
<td>116.56 (± 184.17)</td>
</tr>
<tr>
<td>Total METS</td>
<td>(n=31)</td>
<td>528.44 (± 623.47)</td>
</tr>
</tbody>
</table>
Table 5.6 EQ-5D-5L Follow-up Description

<table>
<thead>
<tr>
<th>Level</th>
<th>Mobility</th>
<th>Self-Care</th>
<th>Usual Activities</th>
<th>Pain/Discomfort</th>
<th>Anxiety/Depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>42.9%</td>
<td>71.4%</td>
<td>52.4%</td>
<td>19.0%</td>
<td>40.0%</td>
</tr>
<tr>
<td>2</td>
<td>14.3%</td>
<td>9.7%</td>
<td>23.8%</td>
<td>33.3%</td>
<td>35.0%</td>
</tr>
<tr>
<td>3</td>
<td>28.6%</td>
<td>9.5%</td>
<td>23.8%</td>
<td>38.1%</td>
<td>25.0%</td>
</tr>
<tr>
<td>4</td>
<td>14.3%</td>
<td>-</td>
<td>-</td>
<td>4.8%</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>-</td>
<td>4.8%</td>
<td>-</td>
<td>4.8%</td>
<td>-</td>
</tr>
</tbody>
</table>

Percentages of response to each EQ-5D-5L dimensions level according to whether the individual had a long term health conditions or disability: 1) No problems, 2) Slight Problems, 3) Moderate problems, 4) Severe problems, 5) Extreme problems

Statistical test and answering the hypothesis

Regards to answer the research question, therefore, the specific test should be refer to the nature of the question. At least, there are three big question for this dissertation project such as:

- Is there any correlation between physical activity and quality of life perception among people with type II diabetes?
- Is there any different between the baseline of physical activity, compared to the three months follow-up?
- Is there any different between people perceives of quality of life baseline, compared to three months follow-up

The first question is seeking the relationship between variables such as a strong association between total physical activity-minutes per week (METs) and quality of life perception by using EQ-5D-5L scores for both baseline and three months follow-up. Also, known that the data was not normally distributed, therefore, non-parametric test should be appropriate for determine which hypotheses should be rejected. Correlation Coefficients test are used to answer the research question were Pearson’s test, Kendall’s and Spearman’s test.

The other two questions are looking for different mean between two samples groups which were mean differences between physical activity baseline compared to three months follow-up as well as mean of EQ-5D-5L baseline scores compared to its three months follow-up. Since the data was not normally distributed and heterogen. Therefore non-parametric test should be conducted to determine which hypotheses may be rejected.
First, the *Pearson Correlation test* implies that there was a strong association between Total activity-minutes per-week and EQ-5D-5L scores (p<0.05, 1-tailed) at the baseline. Also, *Kendall’s test* and *Spearman’s test* indicates that after three month follow-up, total activities-minutes per week (METs) and EQ-5D-5L scores were strongly associated (p<0.01) one-tailed. (see appendix 3).

Moreover, there was a strong association between Total activity-minutes per-week and EQ-5D-5L scores (p<0.01) at three months follow up, *Kendall’s test* and *Spearman’s test* indicates that after three month follow-up, total activities-minutes per week (METs) and EQ-5D-5L scores were strongly associated (p<0.01) one-tailed. (see appendix)

The second answer regards the differences between baseline EQ-5D-5L scores and EQ-5D-5L scores at 3 month follow-up should be answered as ‘there was a significant differen between EQ-5D-5L scores compared its’ follow-up data (p<0.05). Also, there was a significant different between total activities-minutes per-week scores and its’ scores at 3 month follow-up.

Therefore, the research question has been answered after test series conducted for this project. Although, should be admitted that there was a limitation to conclude the study, however, further analysis and discussion may be warranted to evaluate this study. Therefore, the following chapter would disscuss the results of the project.
**Discussion**

The findings of the study indicate that the strong association between physical activities intervention towards their perceived of quality of life. The relationships approved several articles within the topic and may change the course of intervention. However, there was a significant gap found in the study, around the correlation and factors which may changes between perception of quality of life by five dimensions of health over physical activity interventions. Also, it did not include the motivational aspect which may influence the results and perceived.

The aim of the study was to investigate physical activity intervention could influence the quality of life perception. Having presented the findings above, the following selection will mainly focus on discussing these results and conclude the research questions posed in the objectives. Several research questions were statistically tested by rejecting the null hypotheses which in this study some research nature has been sorted out according to their purposes such as seeking the relationship, and the other looking for the differences.

Refer to statistical methodes often used to analyse data with small sample size. Non-parametric data do not require making any assumptions about the distribution of the population which allowed the data non-normal distributed, central limit theorem can not be applied, even sometimes referred to as a distribution-free methods. Moreover, non parametric have some distinct advantages when observing nominal, ordinal type of data, or measured imprecisely sample. Also, it is relatively simple to conduct.

However, non-parametric methods also have lack of power compared to traditional approaches. Particularly, if the sample size was relatively small or if the assumptions for the corresponding parametric method holds. Also, some says that non-parametric test are not systematic to withdraw the conclusion.

Despite of approach methods above, the study also supports the positive association between physical activity and quality of life. According to McAuley et al (2006) study, physical activity, quality of life such as self-efficacy were all related indirectly. Specifically, physical activity influenced self-efficacy and quality of life through physical and mental health status, which in turn influenced global quality of life improvement.

Considering the age band of participants which consist 35-74 years old which could be categorised as older adults. Comprehensive critical review of the literature of physical activity and quality of life among older people also matched into the project’s finding. Subsequent study of bridging the
knowledge gap regarding physical activity and quality of life perceived has been construct appropriately and applicable in real practice.

The various indexes of quality of life perceive fairly differ somewhat. Quality of life commonly use to describe a broad range of subjective outcomes (Ware et al, 1994). Participants express their level of health status towards their long-term condition which in this case were type II diabetes. However, the measurement tools did not include personal relationship, cognitive function, meaning in life. The critics about some categories of quality of life dimension should be addressed in the future research.

Compared to Thiel et al, (2017) study which examine the association between meeting physical activity recommendations and health related quality of life. The study conclude that a significant positive association was observed with HRQL, particularly physical health. Reflecting to this dissertation project study, any type of physical activity intervention basically will improve overall quality of life whatever long-term conditions people might suffer, or even people in general health status.

The results above implicitly correlating anxiety/depression towards physical activity. Although, the statistical test did not express the result. Yet, refers to Lok and Canbaz (2017) study might support the correlation among them. The study highlights that physical activity program has a significant level of impact towards depression. Moreover, physical activity program reducing depressive symptoms after ten weeks intervention. In the other hand, after ten weeks program, the quality of live levels among older people has increased.

Interesting study by Engum et al (2005), several factors were correlated with type II diabetes. However, those factors were not different from those people without diabetes population. Instead, comorbid chronic somatic diseases were associated with depression in type II diabetes. Therefore, type II diabetes without other chronic somatic disease may not increase the risk of depression (Engum et al, 2005).

Regards to mobility, self-care and usual care towards type II diabetes, study by Abate et al (2011) found that musculoskeletal problem which affected the daily function was significantly influenced by diabetic conditions. It may increase the cross-linking of collagen by the non-enzymatic advance glycation end products formation which lead to movement restriction, furthermore, it may decreasing a daily function and self-care.
Reflecting the study finding which discover the high number of sitting-minutes per week (both baseline and 3 month follow-up) also associated with sedentary behavior. It may prolonged or increased risk of type II diabetes, cardiovascular disease and all-cause mortality, although the minimum recommended levels of daily physical activity are achieved (Hegarty et al, 2016). Therefore, the investigator encourage the practitioner, health provider, policy maker to create approach models to tackle and shift people’s behavior into active lifestyle.

Moreover, decreased physical activity, high sedentary time such as watching television, high alcohol consumption, smoking behavior, air pollution may presented robust evidence for increase risks of type II diabetes (Bellou et al, 2018). As well as medical conditions, dietary, lifestyle, environment, low level of education and psychosocial factors are some risk factors for type II diabetes millitus (Bellou et al, 2018).

In general, in between the age 40-44 and 75-79 for men and women respectively will lose about (10.8%) and (6.4%) of muscle mass, also, the independent risks factor for diabetest which is sarcopenia has been reported as the presence or absence of diabetic conditions and its severity (Kim et al, 2010; Wang et al, 2016). The skeletal muscles require insulin for assimilate glucose in peripheral tissues and would be used as energy or stored in the form of glycogen. Skeletal muscle mass reduction due to sarcopenia lowers glucose metabolism by insulin, resulting the insulin resistance, moreover makes sarcopenia contributes to the onset or exacerbation of diabetes (Umegaki, 2016).

Diabetes seems associated with 67% increased risk of disability (Tabesh et al, 2018). In addition, Obesity and history of cardiovascular disease explained the largest percentage of the relationship between disability and diabetes. Therefore, weight management and physical activity intervention required to reduce diabetic disease. These variables are recommended as public health and rehabilitation awareness. In this project, however, did not include weight management and cardiovascular measurement. Instead, the project was looking the numbers of physical activity-minutes per week (METs) which implies to measure the cardiovascular system implicitly.

Study by Cooke et al (2018) finds that the integration pedometers into clinical practice and successful in engaging most participants in his study and fairly engaging the participants to increase their activity level. The pedometer-based monitoring combined with steps count prescriptions and monitoring participants’ improvement. The physicians implies the strategy provided a framework for discussing physical activity and motivating patients, although the platform was not perfect yet. Also, it requires more samples to generalise the results.
Limitations

The current study have been considered a huge number of findings. However, this study still were out from perfect. Since, to some extend the data was out of the control of the researcher. As know this project was secondary analysis of primary data, the quality of data, sample size, and protocol were parts of the limitation. However, the secondary analysis allows the researcher conduct the project without a large number of funding but still able to provide useful study for improving the quality of practice.

Secondly, this study was a first secondary analysis by a novice researcher under Clinical Exercise and Rehabilitation Research Group (CLEAR) supervision. Since, the project should be finished within a year for Master dissertation. Therefore, a large sample size was not possible and long-term evaluation are not possible to conduct for this project.

This project, however, truly represent a real-life setting which may contributes a further study towards the affects of physical activity towards quality of life perception in Oxfordshire. Also, it may be input for community base rehabilitation to upgrade their projects towards several long-term conditions such as type II diabetes disease.

Recommendations

Further research are required to explore the correlation between physical activity towards quality of life, as well as evaluation of mesaurment and the effecency of the intervention which may beneficial for those people with type II diabetes. The findings can be consider as preliminary result to conduct a primary study which may representing the population and perhaps could be generalised in real practice. Also, Motivational aspect should be considered in the future research.

Conclusion

Overall findings of the study indicate that the strong association between physical activities intervention towards their perceived of quality of life. The relationships approved several articles within the topic and may change the development of intervention.
Reflection

This dissertation has been stretched the authors intellectual and knowledge. The experience of doing research enhance the author’s desire to studying in higher level education. Reflecting the demand of this kind of project, it helps the author as a beginner to deepen the understanding of research processes and evaluation. Through the process, new knowledge has been acquired and implemented. In other word, this project simply transform the author’s knowledge into transferable skills.
References


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Maritim, A.C., Sanders, R.A. and Watkins, J.B., 2003. Diabetes mellitus is a metabolic disorder characterized by hyperglycemia and insufficiency of secretion or action of endogenous insulin. *Journal of Biochemical and Molecular Toxicology*, 17, pp.24-38.


The IPAQ group., International physical activity questionnaire: Short last 7 day telephone format. 2002, The IPAQ Group.


Appendix 1

Oxford Brookes University
Faculty of Health and Life Sciences
Decision on application for ethics approval

The Departmental Research Ethics Officer (DREO) has considered the application for ethics approval for the following project:

**Project Title:** Pragmatic Study: Association Between Physical Activity Intervention and Quality of Life Perception Among People With Type II Diabetes

**DREC Reference:** 0518-71

**Name of Applicant(s):** Jonathan Phillip  
**Name of Supervisor(s):** Dr Johnny Collett

Please tick one box

1. The Departmental Research Ethics Officer / Faculty Research Ethics Committee gives ethical approval for the research project.  
   Please note that the research protocol as laid down in the application and hereby approved must not be changed without the approval of the DREO / FREC

2. The Departmental Research Ethics Officer / Faculty Research Ethics Committee gives ethical approval for the research project, subject to the following:

3. The Departmental Research Officer / Faculty Research Ethics Committee cannot give ethical approval for the research project. The reasons for this and the action required are as follows:

Signed: ............ Approval Date: 28-05-2018

Designation: Departmental Research Ethics Officer

*(Signed on behalf of the Faculty Research Ethics Committee)*

Date when application reviewed (office use only):

H&LS/FRec/E3 August 2011
Appendix 2

Figure 1: EQ-5D-5L (UK English sample version)

Under each heading, please tick the ONE box that best describes your health TODAY

MOBILITY
- I have no problems in walking about
- I have slight problems in walking about
- I have moderate problems in walking about
- I have severe problems in walking about
- I am unable to walk about

SELF-CARE
- I have no problems washing or dressing myself
- I have slight problems washing or dressing myself
- I have moderate problems washing or dressing myself
- I have severe problems washing or dressing myself
- I am unable to wash or dress myself

USUAL ACTIVITIES (e.g. work, study, housework, family or leisure activities)
- I have no problems doing my usual activities
- I have slight problems doing my usual activities
- I have moderate problems doing my usual activities
- I have severe problems doing my usual activities
- I am unable to do my usual activities

PAIN / DISCOMFORT
- I have no pain or discomfort
- I have slight pain or discomfort
- I have moderate pain or discomfort
- I have severe pain or discomfort
- I have extreme pain or discomfort

ANXIETY / DEPRESSION
- I am not anxious or depressed
- I am slightly anxious or depressed
- I am moderately anxious or depressed
- I am severely anxious or depressed
- I am extremely anxious or depressed
• We would like to know how good or bad your health is **TODAY**.

• This scale is numbered from 0 to **100**.

• **100** means the *best* health you can imagine.
  0 means the *worst* health you can imagine.

• Mark an X on the scale to indicate how your health is **TODAY**.

• Now, please write the number you marked on the scale in the box below.

YOUR HEALTH TODAY = [ ]
Appendix 3

Referal Card

Want free advice about how and where to get more active?
Please complete and return this freepost card and we will contact you. Alternatively visit our website at www.getoxfordshireactive.org for further information.

Name: __________________________ Gender: [ ] Male [ ] Female

Age: [ ] 16-19 [ ] 20-34 [ ] 35-54 [ ] 55+

Telephone: ________________________ Postcode: __________________________

Email: ____________________________

Ethnicity: [ ] White [ ] Mixed [ ] Asian/Asian British [ ] Black/Black British [ ] Chinese/Other

If other please specify: __________________________

In the past week, on how many days have you done a total of 30 min or more of physical activity, which was enough to raise your breathing rate? (This may include sport, exercise and a brisk walk or cycling for recreation or to get to and from places, but should not include housework or physical activity that may be part of your job).

[ ] None [ ] One [ ] Two [ ] Three [ ] Four [ ] Five [ ] Six [ ] Seven

Do you have any long term illness, health problem or disability that limits your daily activities? [ ] Yes [ ] No

Which of the following best describes how your impairment or illness affects you? (Please select all that apply)

[ ] Vision [ ] Hearing [ ] Mobility [ ] Fatigue [ ] Pain [ ] Speaking or making yourself understood

[ ] Learning or remembering [ ] Mental Health problems [ ] Other

Where did you find out about GO Active, Get Healthy?

[ ] Referred by my Doctor / Health Practice [ ] Name of surgery and address]

[ ] Information from my local Health Centre [ ] Name of centre and address]

[ ] Information from my local Leisure Centre [ ] Information from my local Library

[ ] From a friend [ ] Surfing the internet [ ] Other (please specify): __________________________

When is the best time to contact you by telephone, bearing in mind it may take about 20 minutes to find out more about you and possible activities that would be suitable eg weekdays 1-2pm

[ ] We would like to be able to send you details of activities that might be of interest to you. GO Active Get Healthy will use your information in accordance with the Data Protection Act 1998. Please tick here if you are not happy!

[ ] Please tick here if you do not want GO Active Get Healthy to use the information you have provided as part of the long term monitoring and evaluation of the GO Active Get Healthy programme, or contact you for monitoring and evaluation purposes
Appendix 4

Correlation between baseline Physical Activity-minutes per-week and baseline EQ-5D-5L scores

<table>
<thead>
<tr>
<th></th>
<th>baseline_healthState</th>
<th>TotalMETSbaseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
<td>.225*</td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td>.018</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>87</td>
<td>87</td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (1-tailed).

<table>
<thead>
<tr>
<th></th>
<th>baseline_healthState</th>
<th>TotalMETSbaseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kendall's tau_b</td>
<td>1.000</td>
<td>.220**</td>
</tr>
<tr>
<td>Correlation Coefficient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td>.</td>
<td>.002</td>
</tr>
<tr>
<td>N</td>
<td>87</td>
<td>87</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (1-tailed).

<table>
<thead>
<tr>
<th></th>
<th>baseline_healthState</th>
<th>TotalMETSbaseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman's rho</td>
<td>1.000</td>
<td>.304**</td>
</tr>
<tr>
<td>Correlation Coefficient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td>.</td>
<td>.002</td>
</tr>
<tr>
<td>N</td>
<td>87</td>
<td>87</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (1-tailed).
Correlation between Physical Activity-minutes per-week and EQ-5D-5L scores at 3 month follow-up

### Correlations

<table>
<thead>
<tr>
<th></th>
<th>3month_TotalMETS</th>
<th>3month_healthState</th>
</tr>
</thead>
<tbody>
<tr>
<td>3month_TotalMETS</td>
<td>Pearson Correlation</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (1-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>31</td>
</tr>
</tbody>
</table>

|                  | 3month_healthState | Pearson Correlation | 1                  |
|                  | Sig. (1-tailed)    | .624**              | 1                  |
|                  | N                 | 31                 | 31                |

**. Correlation is significant at the 0.01 level (1-tailed).

### Correlations

<table>
<thead>
<tr>
<th></th>
<th>3month_TotalMETS</th>
<th>3month_healthState</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kendall's tau_b</td>
<td>3month_TotalMET</td>
<td>Correlation</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>Coefficient</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sig. (1-tailed)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
</tr>
</tbody>
</table>

|                  | 3month_healthStat| Correlation        | .561**             | 1.000           |
|                  | e                | Coefficient        |                  |                 |
|                  |                  | Sig. (1-tailed)    | .000              | .               |
|                  |                  | N                  | 31                | 31              |

|                  | 3month_TotalMET  | Correlation        | 1.000             | .741**          |
|                  | S                | Coefficient        |                  |                 |
|                  |                  | Sig. (1-tailed)    | .                 | .000            |
|                  |                  | N                  | 31                | 31              |

|                  | 3month_healthStat| Correlation        | .741**             | 1.000           |
|                  | e                | Coefficient        |                  |                 |
|                  |                  | Sig. (1-tailed)    | .000              | .               |
|                  |                  | N                  | 31                | 31              |

**. Correlation is significant at the 0.01 level (1-tailed).
Appendix 5

Non-Parametric Test for Median Differences Between baseline EQ-5D-5L scores and EQ-5D-5L scores at 3 month follow-up

Hypothesis Test Summary

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 The median of differences between baseline health state and 3-month health state equals 0.</td>
<td>Related-Samples Sign Test</td>
<td>.063</td>
<td>Retain the null hypothesis.</td>
</tr>
<tr>
<td>2 The median of differences between baseline health state and 3-month health state equals 0.</td>
<td>Related-Samples Wilcoxon Signed Rank Test</td>
<td>.009</td>
<td>Reject the null hypothesis.</td>
</tr>
<tr>
<td>3 The distributions of baseline health state and 3-month health state are the same.</td>
<td>Related-Samples Friedman's Two-Way Analysis of Variance by Ranks</td>
<td>.041</td>
<td>Reject the null hypothesis.</td>
</tr>
</tbody>
</table>

Asymptotic significances are displayed. The significance level is .05.

Non-Parametric Test for Median Differences Between baseline Total activities-minutes per-week scores and Total activities-minutes per-week scores at 3 month follow-up

Hypothesis Test Summary

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 The median of differences between related TotalMETS and TotalMETSbaseline equals 0.</td>
<td>Related-Samples Sign Test</td>
<td>.152</td>
<td>Retain the null hypothesis.</td>
</tr>
<tr>
<td>2 The median of differences between samples TotalMETS and TotalMETSbaseline equals 0.</td>
<td>Related-Samples Wilcoxon Signed Rank Test</td>
<td>.041</td>
<td>Reject the null hypothesis.</td>
</tr>
<tr>
<td>3 The distributions of TotalMETS and TotalMETSbaseline are the same.</td>
<td>Related-Samples Friedman's Two-Way Analysis of Variance by Ranks</td>
<td>.102</td>
<td>Retain the null hypothesis.</td>
</tr>
</tbody>
</table>

Asymptotic significances are displayed. The significance level is .05.

¹Exact significance is displayed for this test.