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The development and evaluation of a computer based e-learning tool to enhance knowledge of workplace wellness in healthcare staff and students

Chapter 1: Introduction

1.1: Introduction to the Study

Settings based health promotion is now an essential part of health care practices, required for reducing the burden of noncommunicable diseases (World Health Organisation [WHO], 2010a). In particular, workplace health promotion has become an integral part of improving public health (Mulgan, 2010; Department of Health [DH], 2011a). Workplaces reach a large proportion of the population (WHO and World Economic Forum [WEF], 2008) and by promoting a "culture of health" workplaces and other settings can reduce the burden of illness to both employees and the employer (Musich, Schubiner and McDonald, 2009; Black, 2008; Black and Frost, 2011; WHO, 2010b) .

Workplace health promotion is of particular importance in healthcare settings, as these areas hold high absence rates, and poor staff health can affect patient outcomes (DH, 2011c; DH, 2009c). By improving the health and wellbeing of healthcare professionals, their ability to promote health to others can also be enhanced (Blake and Harrison, 2013; Blake, Malik, Mo, and Pisano, 2011). This is also of importance in healthcare students, as they are the future healthcare workforce (McCann, Clark and Rowe, 2005; Mooney, Timmins, Byrne et al, 2011). With workplace wellness now a central part of public health, it is essential that healthcare staff and students have an understanding of this topic area, empowering them to use workplace wellness initiatives and promote health to other staff, students, patients and the public.

This dissertation will draw on literature surrounding public health, workplace wellness and e-learning. Through the study a high quality educational e-learning tool to enhance knowledge of workplace wellness will be developed, with pre and post knowledge questionnaires. Development will follow a structured process, including expert peer review and a pilot study. Summative evaluation will then take place to reveal any changes in knowledge; the sample demographics and qualitative evaluation of the tool's usability will also be considered.

1.2: Structure of the Dissertation

This dissertation will start with a detailed literature review to outline the background of this study and create specific aims and objectives. The development of the e-learning tool will then be detailed, considering the process and assuring appropriate content and usability of the tool. The method will then be considered, including the strengths and limitations of the chosen methodology and instrument. Finally, a discussion chapter will consider the findings alongside literature and previous research to come to the dissertation conclusion and implications for future practice.

Chapter 2: Background and Literature Review

2.1: Search Strategy

A literature review was used to examine current research evidence relating to workplace wellness, and to inform the content of the e-learning tool. Workplace wellness covers a wide range of health promotion subjects requiring a detailed multifaceted and multidisciplinary search. To cover the broad topic area, a systematic search strategy was not appropriate. Instead, information was selectively drawn following title and abstract analysis from databases: EMBASE, CINAHL, PsycINFO, PubMed, Scopus and Science direct. Grey literature reviewed included DH resources and other health related policy documents.

2.2: Inclusion and Exclusion Criteria

Literature reflecting settings based health promotion was considered; in particular, workplace wellness and promoting the health of the public health workforce. Search terms included: health promotion, health education, health, wellbeing, workplace, wellness, public health, workforce, employee, and other similar search terms. To influence and develop the content of the e-learning tool and knowledge questionnaire six key workplace wellness topics were searched; work-related stress, musculoskeletal disorders, diet and nutrition, physical activity, smoking and alcohol consumption. E-learning as an educational tool and its use within healthcare education was also considered. To gain a broad view of the topic area, primary research and literature reviews were used from databases detailed in the search strategy (Chapter 2.1:p.3).

The literature search excluded any data source which was not available in English as translation services were not available.

2.3: Population Health and Wellbeing

In the last century, improved healthcare and a rise in unhealthy lifestyle behaviours caused a shift in the main cause of death from infectious to chronic diseases (WHO, 2011a). Consequently, in 2008 almost two thirds of deaths globally were due to preventable noncommunicable diseases, largely caused by tobacco use, unhealthy diet, insufficient physical activity and the harmful use of alcohol (WHO, 2010a). In 2009, the leading causes of mortality for people between 35 and 79 years in the UK were coronary heart disease, breast cancer and lung cancer (Office for National Statistics [ONS], 2011a), all of which have been related to increased incidence in people with unhealthy lifestyle behaviours (WHO, 2011a). The rising number of deaths by chronic conditions is a significant public health issue, with the WHO (2010a) projecting that this figure will increase by 15% globally by 2020 if current trends continue. As a result, the WHO and DH have indicated that action needs to be taken to improve public health and wellbeing globally (WHO, 2010a; DH, 2004a; DH, 2011a; DH, 2010a).

Literature indicates that individuals have a personal responsibility for health, with behaviours significantly influenced by individual motivation and choice (Resnik, 2007; Buyx, 2008; DH, 2004a; DH, 2010a). However, it is considered unethical to hold individuals to account for their unhealthy behaviours, as this conflicts with the healthcare obligation to provide care for all sick and vulnerable people (Cappelen and Norheim, 2005). Moreover, health is not influenced by behaviours alone, with other external factors such as health inequalities, underlying conditions and the environment influencing individual ability to achieve health (DH, 2011b; Resnik, 2007). Although individuals hold an important role in maintaining their own health, they should not be held entirely responsible (Cappelen and Norheim, 2005; DH, 2010a; Mulgan, 2010). As such, social and environmental factors are argued to be the most prominent barriers to individuals' adopting healthier behaviours (Mulgan, 2010), thus indicating that individuals require an environment that encourages

health to empower them to make healthy choices (WHO, 1986). Influencing behaviour change therefore requires input from external environmental influences (DH, 2011a; Mulgan, 2010; DH, 2010b).

2.4: Settings Approach to Health Promotion

Promoting behaviour change through settings is considered essential for improving the health of the UK adult population (Mulgan, 2010; DH, 2011a). The significance of creating supportive environments is highlighted across government policy, acknowledging the importance of health promotion through schools, prisons, communities, workplaces and other settings (NICE, 2008; DH, 2010a; DH, 2004a; DH, 2011a; DH, 2011b; Mulgan, 2010; WHO, 2013; WHO, 1986). This healthy settings approach focuses on the environment rather than the individual, reflecting assumptions of the facticity model; that behaviour is a result of genetic or environmental factors beyond an individual's control (Dougherty, 1993). Healthy settings are a well recognised way to target environmental influences on health, by shaping environments to encourage healthy choices (Mulgan, 2010; DH, 2011a). This reshaping of environments is considered the most powerful way to promote behaviour change and improve public health and wellbeing (Mulgan, 2010). Through the effective use of individual and organisational initiatives, environments such as schools and workplaces can achieve large scale health promotion to a significant number of the population, thus creating a "culture of health" (Musich, et al, 2009; US Preventive Services Task Force [USPSTF], 2009; Department of Education, 2011).

However, just creating a supportive health environment cannot guarantee to change individuals' health behaviours, as personal and individual factors still influence ability to achieve health (Ball, Crawford and Mishra, 2006; Crawford, Ball and Mishra, 2007). With this in mind, a multifaceted approach to health must be taken to support individual health needs alongside these environmental changes.

An example is the Healthy Schools initiative, which has achieved wide participation of 99% of UK schools and demonstrates successful settings based health promotion (Tabony, 2010; Ofsted, 2006). As such, research has found settings achieving National Healthy Schools Status (86% of schools in the UK) (Tabony, 2010) to have improved educational outcomes for students (National Centre for Social Research, 2009). Healthy Schools use an environmental approach to support health; for example, encouraging staff and students to actively travel to and from school (Department of Education, 2011). Using this environmental approach can create a "culture of health", but does not influence students' individual understanding and skills required to achieve and maintain health. However, as Healthy Schools also use educational initiatives to meet individual needs of pupils (for example, understanding of how to maintain health), this is an example of a multifaceted approach to healthy settings (Department of Education, 2011). Settings can therefore be used in this multifaceted way to encourage and empower individuals to make informed decisions about their health, benefits which have led to wide implementation of healthy settings on a local and national level.

2.5: Workplaces as a Setting for Health Promotion

The workplace is a strategic health promotion setting reaching a large number of people in the UK. With one of the highest employment rates in the world, 71.5% of UK working aged people can be targeted through health promotion in the workplace (ONS, 2013). Consequently, many global and UK strategic documents now recognise the significant benefits from promoting health in the work setting (WHO, 2011a; WHO/WEF, 2008; DH, 2005; NICE, 2008), where individuals in full-time employment spend up to 60% of their waking hours (Peersman, Harden and Oliver, 1998; Batt, 2009). Moreover, in workplaces employees work closely and frequently with others, creating a stable network for communication and easy enforcement for health promotion initiatives (USPSTF, 2009). This settings based health promotion actively encourages healthy lifestyles through the work setting,

giving employees the opportunity to make healthy choices (WHO, 2007). Whilst providing benefits for population health, workplace wellness initiatives have shown many tangible benefits for organisations and for individual health and wellbeing (Mulgan, 2010; DH, 2011a).

Implementing workplace wellness initiatives is a strategic organisational development associated with improving employee's health and organisational indicators, such as staff morale, productivity and staff turnover (Batt, 2009; Black, 2008; WHO/WEF, 2008; Black and Frost, 2011; Meenan, Vogt, Williams et al, 2010; Chapman, 2005; Chapman 2006; Chung, Melnyk, Blue et al, 2009). Promoting a healthy workforce can therefore elicit organisational savings, with initiatives frequently used to target sickness absenteeism and presenteeism in the workplace (Kiwanuka, Nalwadda and Pariyo, 2011; Cancelliere, Cassidy, Ammendolia and Côté, 2011). Absenteeism is a significant problem for many sectors (Black and Frost, 2011), with the Department of Work and Pensions (2011) estimating that every year around 140 million UK working days are lost due to sickness absences. Further losses also result from presenteeism (employee health problems at work that result in job productivity losses) which is suggested to cost employers 2 to 7 times more than absenteeism (Main, Glozier and Wright, 2005; Stolk, Starkey, Shehabi and Hassan,2009). Although the exact productivity losses through presenteeism are difficult to measure (Schultz and Edington, 2007), it is widely accepted that poor physical and mental health are associated with an increased incidence of both presenteeism and absenteeism (Pauly, Nicholson, Polsky, et al, 2008; Schultz and Edington, 2007; Stolk et al, 2009). Therefore, creating a "culture of health" has significant strategic benefits for employers, improving health outcomes and business performance of employees (Musich, et al, 2009; Pronk and Allen, 2009).

Workplace health promotion is also recognised as an effective way to prevent common chronic conditions, such as obesity and cardiovascular disease (WHO,

2011a; WHO/WEF, 2008; DH, 2005; NICE, 2008; DH, 2012). Workplace initiatives aim to improve individual health behaviours through a supportive environment, activities or health education for employees (Bull, Adams and Hooper, 2008), significantly reducing individual risk of chronic disease (Black, 2008). For example, workplace wellness studies have demonstrated potential to increase physical activity levels, improve diet and enhance smoking cessation amongst employees (Gosliner, James, Yancey et al, 2010; Herman, Musich, Lu et al, 2008; Purath, Miller, McCabe et al, 2004; Bauer, Hyland, Li et al, 2005; Fichtenberg and Glantz, 2002). Furthermore, workplace health initiatives demonstrate possible improvement of employee mental health, linked to reduced symptoms of stress and a reduction in stress related sickness absence (Seymour, 2010). Thus indicating that workplace health promotion can enhance employee's individual health and wellbeing (WHO, 2011a; WHO/WEF, 2008).

The burden of illness is thus shared by employers (eg. lost productivity) and employees (eg. lost work time), creating a rationale for why all workplaces should implement a workplace wellness programme to support behaviour change in employees (USPSTF, 2009, p. 359; Black and Frost, 2011; DH, 2005; NICE, 2008). Soler, Leeks, Razi, et al (2010) found that nearly 90% of workplaces with 50 or more employees provide health promotion programmes, showing that the majority of larger organisations provide this health supportive environment. However, there are significant challenges for Small to Medium Enterprises (SME's) which lack the human and financial resources to provide health promotion (Kelloway, Kelloway and Cooper, 2011). This can be considered a substantial issue, as SME's make up 99% of all enterprises, leaving a large proportion of the working population without workplace health promotion (Kelloway et al, 2011). Small to Medium Enterprises often require governmental or NHS support with meeting the occupational health needs of employees, providing limited, if any, health promotion (Oakley, 2008). Drawing on the literature there appears to be a need for workplace wellness

strategies which are cost effective and easily accessible to organisations with limited resources for health promotion.

Overall, the workplace is recognised as an essential place for creating a health supportive environment, to target the current national and global public health concern of preventable chronic disease (Black, 2008; Black and Frost, 2011; WHO, 2010a).

2.6: Workplace Wellness Initiatives

Workplace wellness programmes hold an essential role in the prevention of noncommunicable diseases (WHO/WEF, 2008) covering key health and wellbeing topics such as diet, physical activity, smoking and alcohol consumption (WHO, 2011a; WHO, 2011b). This type of work-relevant health promotion has shown various benefits for long term health and prevention of chronic disease. Examples of health promotion interventions include providing health education, fitness classes, healthy meal choices, smoking and alcohol cessation services and a variety of support groups and activities (WHO/WEF, 2008). Workplace interventions have been associated with various health improvements, including reduced employee body mass index, blood pressure, diabetes risk score, smoking and alcohol consumption (Bauer, et al, 2005; Fichtenberg and Glantz, 2002; WHO, 2010a; Bergstroma, Bjorklunda, Frieda, et al, 2007; Heinen and Darling, 2009; Dallam and Foust, 2013). Workplaces are thus an essential setting for health promotion in the prevention of long term health conditions and influencing behaviour change across the working aged population.

Prevention of work-related illness is another essential function of workplace wellness interventions; used to fulfil employers legal responsibility to prevent work-related conditions, such as work-related stress and musculoskeletal disorders (Chartered Institute of Personnel and Development [CIPD], 2009; Limm, Gundel and Heinmuller, 2011; Health and Safety Executive [HSE], 2013). The prevention

of musculoskeletal disorders is important in healthcare settings, where these conditions commonly cause long term problems for employees, accounting for 45.5% of all work-related illnesses (HSE, 2013; ONS, 2012; ONS, 2013). Moreover, work-related stress is a significant issue for employees, contributing to 35.5% of all work-related illnesses (HSE, 2010; HSE, 2011/12). Consequently, employee wellbeing can be improved through primary, secondary and tertiary initiatives for work-related illnesses (Golubic, Milosevic, Knezevic et al, 2009).

Overall, many workplace health promotion initiatives have been shown to improve health awareness and employee health behaviours. This was reflected in the evaluation of the national Well@Work project which analysed initiatives across 32 organisations, with interventions including a 6 week stair challenge, optional "taster" physical activity classes, smoking cessation support and team weight loss competitions (Bull, et al, 2008). However, the impact of these initiatives can be limited by low participation rates. Bull et al (2008) found unpredictable participation, from 23% to 82%, across various initiatives and organisations. Questionnaires indicated that this was due to the project's content, access to and convenience of initiatives, poor communication and low levels of employee readiness to participate (Bull et al, 2008). This demonstrates a significant flaw in workplace wellness health promotion, with these findings mirrored in a systematic review of further workplace health promotion programmes, revealing 10%-80% participation across a variety of interventions (Robroek, VanLenthe, VanEmpelen et al, 2009). As a result, the impact of workplace wellness interventions on public health are diminished by low participation (Linnan, Sorensen, Colditz, et al, 2001; Robroek et al, 2009). In order to establish an organisational "culture of health", workplace wellness initiatives must be accessible to a large proportion of the working population, with interventions designed to be flexible and easily accessible (Musich, et al, 2009; Pronk and Allen, 2009; Bauer and Huynh 2001; Atack and Rankin, 2002).

A further disadvantage of workplace wellness initiatives is that they largely focus on single elements of health promotion (e.g. diet, physical activity, smoking, alcohol, stress, musculoskeletal disorders) (Meenan, et al, 2010; Sorensen, Stoddard, LaMontagne et al, 2003; Purath, et al, 2004). In order to create an all-encompassing health and wellbeing programme, organisations will often use a range of different interventions on an individual (eg. calculating body mass index) and organisational level (eg. healthy meal options) to cover multiple health topics (Pronk and Allen, 2009). However, this can present challenges for accessing and participating in workplace health promotion, as most SME's are unable to provide multiple interventions (Kelloway et al, 2011). Furthermore, even when multiple interventions are available in the workplace, the large amount of time required to participate can act as a significant barrier to participation (Bull et al, 2008).

2.7: Promoting Health in the Public Health Workforce

Promoting a healthy workforce is essential in the public sector, which holds absence rates that are over a third higher than employees in the private sector (DH, 2009c). The poor health of NHS staff is particularly significant because it impacts individuals, NHS resources and quality of patient care (DH, 2011c). Poor health of NHS staff is an unnecessary financial burden to the organisation, through reduced work productivity and increased sickness absence, with NHS staff having on average more days of absence per year (10.7) than both the public sector as a whole (9.7) and private sector (6.4) (CIPD, 2009; DH, 2009c). One of the most prominent problems with NHS employee health is the high prevalence of unhealthy lifestyle behaviours, making health promotion vital for influencing positive change in this group (DH, 2011c; Blake, Mo, Lee and Batt, 2012; Blake, et al, 2011; Boorman, 2009; O'Reilly, 2009; Blake and Harrison, 2013).

NHS staff have an essential role in the delivery of government health policies, making maintenance of individual health essential for NHS resources and quality of

patient care (DH, 2009a; DH, 2009b; DH, 2011c). Poor health of NHS employees can result in reduced quality of patient care and reduce ability to provide health promotion advice to others, with nurses reporting that they would find it difficult to promote health behaviours to others if they did not follow their own advice (DH, 2011c; DH, 2011d; Boorman, 2009; Blake and Harrison, 2013; Jones, 2012; Hudmon, Addleton, Vitale et al, 2011). The value of a healthy NHS workforce has been recognised across government documents linking healthy NHS staff to better care for patients and higher patient satisfaction (The Point of Care Foundation, 2014; DH, 2011c). Accordingly multiple interventions are now in place to improve the health of the NHS workforce (DH, 2011d; Clark, 2004; Mo, Blake, Batt, 2011; Blake, Zhou and Batt, 2013).

For the provision of health promotion, healthcare staff should have an understanding of the key workplace health promotion topics, as workplace wellness now holds a central role in public health (DH, 2011d; DH, 2011c; Boorman, 2009; Hudmon, et al, 2011). By improving healthcare staff knowledge of workplace wellness, they will be empowered to implement and engage in workplace health promotion alongside maintaining their own health, and providing health promotion to others (Blake and Harrison, 2013; DH, 2011c). This will consequently improve employee health and wellbeing, which has been linked to better outcomes and patient satisfaction (The Point of Care Foundation, 2014; DH, 2011c). To influence an organisational "culture of health" workplace wellness, education should be made available to the whole healthcare workforce, inclusive of non-healthcare professionals.

Promoting understanding of workplace wellness is also important in student healthcare professionals, as this population are the NHS workforce of the future (McCann, et al, 2005; Mooney, et al, 2011). The Institute of Medicine (2003) highlighted the significance of ensuring a well-educated future public health workforce, and recommended that 'all undergraduates should have access to

education in public health'. Targeting healthcare professional students' knowledge of workplace wellness is a primary health promotion approach, which should lead to an improved awareness of personal health for these individuals in the future (Estabrook, 2008).

2.8: Workplace Wellness Education for Healthcare Professionals

Workplace wellness is a topic which is not generically incorporated within structured degree programmes for healthcare students and is currently only taught on an as required basis to healthcare students and staff by specialists in the field. Furthermore, from the literature search there appears to be no available programme or tool to educate the healthcare workforce on workplace wellness. To address the need for workplace wellness education for healthcare staff (and ensuing generations of public health workers), this project will work to develop a workplace wellness educational programme that considers key workplace wellness topics. Due to the essential function of workplace wellness in the prevention of both work-relevant and work-related conditions, the author decided to consider the key topics of nutrition and diet, physical activity, alcohol, smoking, musculoskeletal disorders and work-related stress when developing content for the workplace wellness health education programme.

During the creation of the workplace wellness educational tool, measures should be taken to minimise the identified barriers to participating in health education and interventions, and in particular, convenience and flexibility should be enhanced (Marshall, 2004; Robroek, et al, 2009; Bauer and Huynh, 2001; Atack and Rankin, 2002; Bull et al, 2008). To improve the convenience of the intervention and minimise the disruption to patient care, the time required for completing the tool will be minimised by covering all of the key workplace wellness topics in one accessible, hour long programme. Moreover, there is a need for the package to be easily accessible to a large number of people, one way to achieve this is through

the use of e-learning (Jefferies, 2001; Blake, 2010; DH, 2001; DH, 2011e). E-learning is accepted as a cost effective way to deliver consistent learning to a large number of people (Jefferies, 2001). The potential use of e-learning for delivery of a workplace wellness educational programme will now be considered.

2.9: E-learning

E-learning can be defined as the integration of information technology into the learning/teaching process, using materials delivered by the internet (Glen 2005; Tait, 2008; Ministry of Education, 2010). E-learning is significantly growing in use and popularity, with its potential now acknowledged in multiple government documents (Higher Education Funding Council for England, 2009; Department for Education and Skills, 2003; DH, 2001). In relation to healthcare, an agenda for incorporating e-learning into post-registration nurse education was set in 2001 (DH, 2001). Since then the significance of e-learning in nurse education has been recognised as crucial for maintaining essential skills and professional development (DH, 2004b; DH, 2011e). Through e-learning individuals can work through the content at their own pace, allowing for information to be looked over multiple times if needed, whilst also providing consistent learning across a large number of people (Bozarth, 2008). E-learning can be delivered in a variety of ways, but is most effective when users can engage with the subject through tasks and interactions, optimising their learning experience (Wharrad, Kent, Allcock et al, 2001).

2.9.1: E-learning for Healthcare Staff

In healthcare, e-learning is used for maintaining essential skills and continued professional development (McVeigh, 2009), crucial for maintaining competence and professional registration in line with the Nursing and Midwifery Council [NMC] (2008), the Medical Act (1983) and the Health and Care Professions Council [HCPC] (2012). The Health and Social Care Bill (Bill 132, 2011) has enforced NHS savings of £20bn by 2015, causing a significant financial strain on the NHS, which

has resulted in staff cuts across NHS and community healthcare services (Health and Social Care Information Centre [HSCIC], 2011; HSCIC, 2013). With this in mind, organisations and educators have to provide adequate mandatory training and continued professional development for large numbers staff within this reduced budget to maintain an effective, registered workforce (NMC, 2008; HCPC, 2012; Rivers, 2007). E-learning provides consistent education across large numbers of people in a cost effective way, meeting the need for low cost training in healthcare (Jefferies, 2001). Moreover, it reduces disruption to services and interferes less with patient care, saving up to 60% more time than traditional classroom teaching (Berke and Wiseman, 2003), helping individuals gain knowledge and skills faster than traditional teaching methods (Cook, Levinson and, Garside, 2008).

E-learning is also useful for enhancing participation through its easy access, flexibility and efficient nature (Blake, 2010). E-learning is useful for vocational subjects like nursing and healthcare, allowing for study to take place at a convenient time and place (McVeigh, 2009), thus reducing normal barriers to learning, such as 12-hour shifts (Bauer and Huynh 2001; Atack and Rankin, 2002; Wilkinson, Forbes, Bloomfield et al, 2004). Participation in the e-learning tool should therefore be high in comparison to alternative more time consuming educational alternatives, which may involve a day of classroom teaching. Achieving high participation is important for the success of the workplace wellness educational programme and could contribute to an organisational "culture of health" (Musich, et al, 2009; Pronk and Allen, 2009). E-learning can therefore be used to achieve enhanced participation rates whilst causing minimal disruption to healthcare services (Berke and Wiseman, 2003; Cook et al, 2008).

A setback to the e-learning methodology is that user isolation can occur (Adams and Timmons, 2006; Farrell, 2006), with midwives considering this to be a lonely experience (Wedlake, 2010). It has been acknowledged that healthcare professionals must adjust to self-directed learning, and that the best way to reduce

feelings of isolation is through a blended learning approach, coupling e-learning with work activities or classroom teaching (Wedlake, 2010; Gomez and Lush, 2006). The interactive nature of e-learning activities can enhance user engagement and responsibility, allowing individuals to access information at their own pace and to control their learning (Wharrad, et al 2001). In this way, healthcare professionals are empowered with easily accessible evidence based practice information, essential for high quality patient care (NMC, 2008). Although e-learning can be isolating to those inexperienced in self-directed study, it has the potential to improve individual knowledge, evidence based practice use and also self-regulation amongst healthcare professionals.

Moreover, computer competence is an essential skill required for effective use of e-learning, presenting a barrier for individuals with poor computer competence (Blake, 2010). Yet, computer competence can be easily addressed through IT support, so computer-literacy does not pose a major setback to this method of health promotion. As computers and technology are being used increasingly within healthcare, the benefits of using e-learning are perceived to outweigh these setbacks (Blake, 2008a; Blake, 2008b). Conversely, a significant benefit of e-learning is that it can enhance computer-literacy which is now vital for registered healthcare professionals accessing electronic resources and online systems in healthcare (DH, 2004b; Atack and Rankin, 2002). Overall, e-learning is a valuable learning method for healthcare professionals providing enhanced knowledge, evidence based practice and computer-literacy whilst also being flexible around other responsibilities, improving both work/life balance and participation.

2.9.2: E-learning for Healthcare Students

For healthcare professionals of the future, e-learning is a standard teaching method that is commonly used as a convenient supplement for regular classroom teaching (Blake, 2010). However, research has shown that in nursing education

lecturers can be reluctant to use e-learning, as it can be difficult to meet the learning needs of students on vocational degrees which are already being met in a classroom setting (Dariel, Wharrad and Windle, 2012; Dariel, Wharrad and Windle, 2013). Unlike classroom teaching, a meta-analysis by Cook et al (2010a) has found e-learning to increase students' control over the content, time and setting of their learning. This flexibility and independent learning style has been found to improve students' knowledge and skill acquisition, as a faster alternative to traditional face-to-face methods (Cook et al, 2008). However, a recent high quality systematic review and meta-analysis found that there was no statistical difference between student knowledge from e-learning or classroom teaching (Lahti, Hatonen, Valimaki, 2014). Although it could be argued that students learning needs are already being met (Dariel et al, 2012; Dariel et al; 2013), the benefits of e-learning for student satisfaction, flexibility, accessibility and cost effectiveness make this a favoured learning method for achieving lifelong learning (Cook et al, 2010a; Blecher and Vonderhaar, 2005; Lowry and Johnson, 1999; European Commission, 2011). Overall, students' value e-learning for similar reasons to healthcare professionals, providing them with convenient learning through easily accessible, reusable learning resources.

2.10: Summary of Research

From reviewing the literature there is a requirement for an accessible, cost effective workplace wellness educational tool which incorporates all key health topics. Through e-learning this tool can be made widely available, providing a cost-effective, easily accessible means of health education for a large number of healthcare staff and students (Blake, 2010; DH, 2001; DH, 2011e; Department for Education and Skills, 2003). Various research has shown e-learning to be an effective method for increasing knowledge in different topic areas (Keefe and Wharrad, 2012; Wharrad, Sanderson-Mann, McCandless et al, 2012; Windle, Laverty, Herman et al, 2010; Lymn, Bath-Hextall and Wharrad, 2008). Therefore,

e-learning has the potential to improve workplace wellness knowledge of individuals and also has the ability to be shared beyond the original target group (Windle et al, 2010).

Through this project, a workplace wellness e-learning tool will be developed and evaluated with healthcare staff, students and non-healthcare professionals in the NHS and Higher Education workforce. Following this study the resulting tool will be made available to future students and NHS staff to further develop learning in this area and as part of a wider health and wellbeing programme.

2.11: Aim and Objectives

2.11.1: Aim

The aim of this study is to develop an e-learning tool about workplace wellness and evaluate its usefulness for enhancing workplace wellness knowledge in healthcare staff and students.

2.11.2: Objectives

- To consult with a panel of workplace wellness experts across the UK on the content for the e-learning tool.
- To develop (and amend following peer review), a storyboard for workplace wellness education.
- To develop an online learning package from the peer reviewed storyboard.
- To evaluate and adapt the resulting e-learning tool by peer review using independent experts and a pilot study group.
- Once finalised, undertake a summative evaluation of the tool using online before and after knowledge questionnaires and an assessment of satisfaction for those who complete the e-learning tool.

It is hypothesised that participants will show an increase in workplace wellness knowledge score from pre to post assessment, due to being exposed to the e-learning tool.

The null hypothesis is that there is no significant difference between workplace wellness knowledge scores from the pre to post results following exposure to the e-learning tool intervention.

Chapter 3: E-learning Tool Development

The literature indicates that e-learning is an essential tool for meeting the mandatory and continual development needs of healthcare professionals (McVeigh, 2009). E-learning can deliver consistent content to a large number of people (Jefferies, 2001), and with similar outcomes to classroom teaching (Lahti, et al, 2014) it has additional benefits of enhanced flexibility, accessibility and independent working (Blake, 2010; Joint Information Systems Committee, 2004).

However, the development of these tools requires a significant investment in both time and resources (Weller, 2004). The time required for developing e-learning tools is variable, influenced by the amount and depth of information, the activities included and the length of the e-learning programme. The workplace wellness e-learning tool is an hour long learning resource; e-learning packages of this length have been suggested to require between 30 and 200 hours of input (MacLeod, 2000). However, as the tool was developed by an inexperienced individual the development time was likely to increase to 500 or even 1000 hours (Horton, 2000). As such, the time required to design and develop the e-learning tool itself was a significant resource requirement in this project. This required not only the time of the individual developer, but also the time of 14 workplace wellness experts from around the UK who were consulted throughout the development process. In addition, this presents considerable financial costs for the labour of development and the required hardware and software (Horton, 2000).

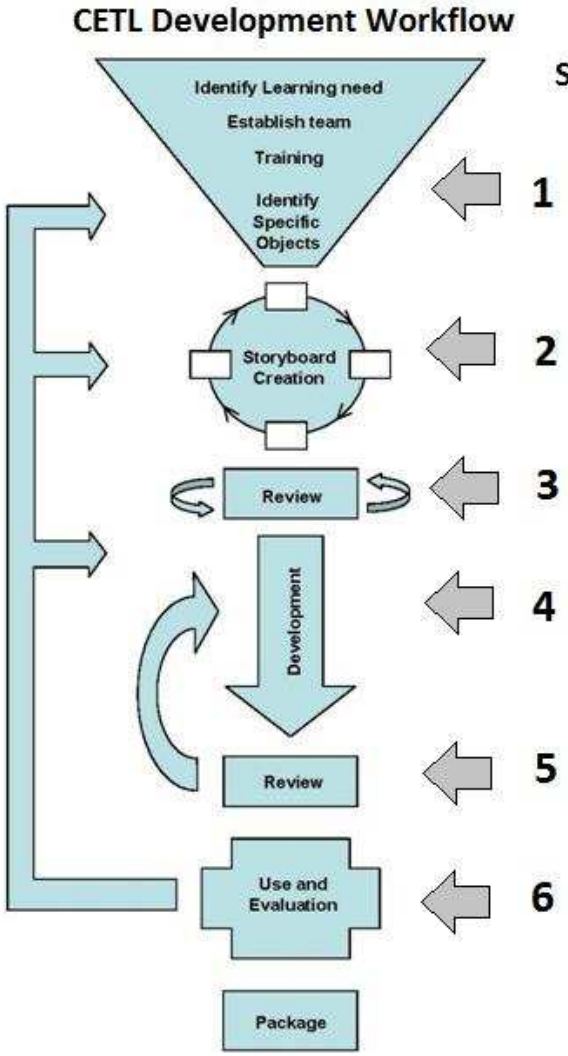
In order to minimise the financial costs of this student led project, the content, design and development of the e-learning tool was undertaken by the student researcher using a free trial of Articulate Presenter software (Articulate, 2010). The resulting e-learning tool was an hour in duration; 45 minutes of learning time and 15 minutes for completion of the online before and after questionnaire. This was

uploaded onto the School of Health Sciences e-learning webpage to allow access via a web link which was emailed to healthcare staff and students.

3.1: The Development Process

The Centre for Excellence in Teaching and Learning in Reusable Learning Objects (RLO-CETL) Agile Development Workflow was followed during the development of the e-learning tool (Figure 3.1). The aim of the framework is to create high quality e-learning objects and enable development where constraints such as time are present (Boyle, Cook, Windle, et al, 2006). The workplace wellness e-learning tool development followed a 6 stage process which reflected the development workflow (Figure 3.1).

Figure 3.1: CETL Agile Development Workflow linked to the 6 stages of the workplace wellness e-learning tool development. (RLO-CETL, 2009)



1. The learning need was identified through the use of a thorough literature review and consultation with experts in workplace wellness.
2. A storyboard for the e-learning tool and the associated knowledge questionnaire was created using current guidelines and research evidence.
3. The storyboard and questionnaire were then peer reviewed by 14 workplace wellness experts and alterations were made accordingly.
4. The e-learning tool was developed using Articulate Presenter 2010 software.
5. The completed e-learning tool was peer reviewed by the same group of 14 workplace wellness experts and also evaluated by 14 participants in the pilot study.
6. The workplace wellness e-learning tool was finalised using the comments from all workplace wellness experts and the pilot study group. This included evaluation questions for ongoing development of the resource.

3.2: Workplace Wellness Experts

Following the CETL Agile Development Workflow (Figure. 3.1.) the learning needs of the target population were first identified using a detailed literature review (RLO-CETL, 2009). Since the topic area of workplace wellness is relatively new yet diverse (diet, physical activity, smoking, alcohol consumption, musculoskeletal disorders and work-related stress) consultation with workplace wellness experts

played a key part in this process. Workplace wellness experts were consulted throughout the development process for peer review of both the storyboard and developed e-learning tool. Using their expertise in this way was essential for ensuring accuracy and credibility of the e-learning tool.

The workplace wellness experts were initially identified through existing research and practice networks held by the dissertation supervisor. Further experts were then identified through analysing lists of contributors to national workplace wellness consultations, following which further workplace wellness experts were recruited to the review panel (British Psychological Society, 2013).

This resulted in a group of 14 workplace wellness experts recruited from both academic and practice backgrounds; including senior lecturers in public health, health and wellbeing managers, workplace health improvement specialists and members of occupational health teams (Further information and details of each expert and can be found in Appendix 1). This partnership working of staff from both practice and academic backgrounds is considered to be the best approach to public health education (Caron, Hiller and Wyman, 2014). Through united working, both groups' expertise can contribute to expert workplace health promotion for healthcare professionals and effectively complement standard classroom education for undergraduates, strengthening the public health workforce of the future (Caron et al, 2014). Moreover, by incorporating these two groups the e-learning tool captured the evidence and rationale for workplace wellness initiatives alongside examples of how these can be implemented practically on a local level.

3.3: E-learning Tool Content

To determine content for the e-learning tool, the author conducted a detailed literature review focussing on the 6 key workplace health promotion topics identified in the last chapter. A storyboard of content was created on Microsoft Word (2010) and peer reviewed by the workplace wellness experts to ensure that

appropriate and factually correct information was provided (the storyboard can be found in Appendix 2). Amendments were made to the e-learning tool content to create the final version storyboard, which was then used to develop the electronic e-learning tool using a free trial of Articulate (2010).

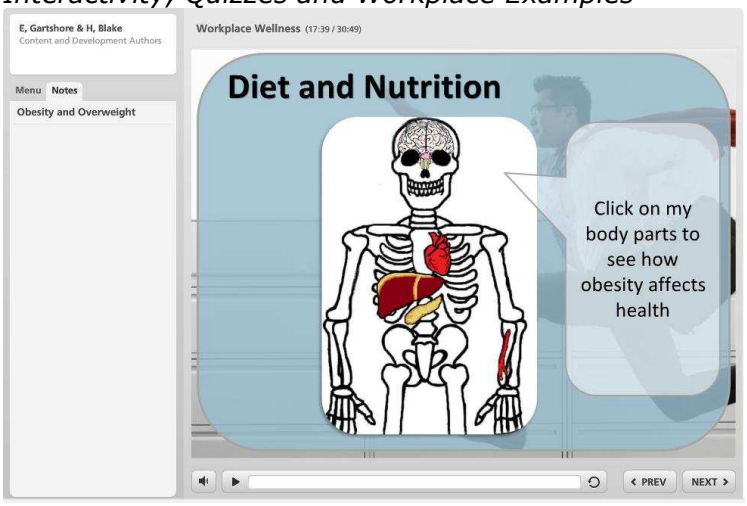
Once the e-learning tool and questionnaires were developed, these were peer reviewed by the workplace wellness experts and a pilot study was also completed. The comments from experts and the pilot group were used to formulate changes and create the final version of the workplace wellness e-learning tool and questionnaires (the final questionnaires can be found in Appendix 3 and the link to the workplace wellness e-learning tool is in Appendix 4). The final instrument was a pre and post-questionnaire consisting of questions to determine demographic information of participants, before and after knowledge scores, and finally, the participants' perceptions of the usability of the e-learning package. Knowledge questions were directly linked to content in the e-learning tool and the evaluation questions were an adaptation of the RLO-CETL (2005) evaluation toolkit. This is a nationally recognised e-learning evaluation tool, with RLO-CETL resources used across health related studies (Windle, et al, 2010; Boyle et al, 2006) and healthcare education (Blake, 2009). Detailed description and rationale for this instrument can be found in Chapter 4.2, p.30.

3.4: Design and Development

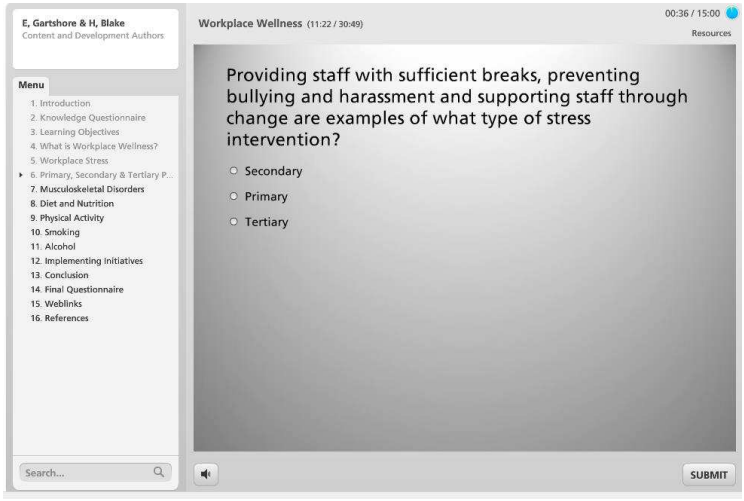
Literature indicates that e-learning is most effective when users are engaged in the content (Joint Information Systems Committee, 2004). Different forms of interactivity such as clickable items, animations and quizzes encourage users to uncover and engage with content. Through the use of graphics, images and activities the workplace wellness e-learning tool was designed to promote interactive learning and thus enhance participants learning experiences (Horton, 2006). The e-learning tool presented clear learning objectives and was divided into

sections of each key health promotion topic identified in the literature review (Chapter 2.8:p.13). These sections were covered in turn, and by enhancing visual appeal and incorporating quizzes and tasks into the e-learning package, users were able to interact with the content and test knowledge as they progressed (Figure 3.2). To further enhance usability of the e-learning tool, text based information was accompanied by an audio commentary providing extra information and clear instructions throughout the e-learning tool.

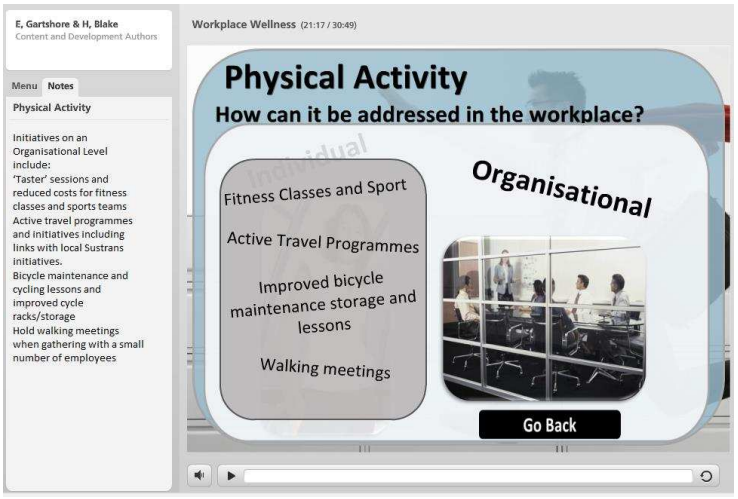
Figure 3.2: Screen shots showing key design elements of the e-learning tool- Interactivity, Quizzes and Workplace Examples



3.2a) Slide from workplace wellness e-learning tool using interactive clickable activities to maintain interest and engage users.



3.2b) Slide from workplace wellness e-learning tool using interactive quiz to test users' knowledge as they progress through the e-learning package.



3.2c) Slide from workplace wellness e-learning tool using workplace examples of physical activity initiatives on an organisational level.

When designing the e-learning tool, it was important to acknowledge that the educational value of images and interactivities in e-learning has been questioned (Glen, 2005). Although enhancing the visual appeal of e-learning programmes can improve user motivation (Joint Information Systems Committee, 2004), Ainsworth (2008) challenges that there is a risk of overloading users with the inappropriate use of diagrams and images. Moreover, Billings, Connors and Skiba (2001) have cautioned that innovations in technology should not detract from educational quality, thus making it essential for the content within the tool to not be compromised (Glen, 2005). These criticisms highlight the importance of using appropriate interactions and images to complement the content within e-learning packages. Horton (2006) suggests that these activities are essential in e-learning, and if used effectively, these can allow users to gain a higher level of understanding. Consequently, enabling users to interact with the e-learning content is highly important within e-learning, supporting users to achieve an enhanced understanding of the content (Horton, 2006). During the development of the e-learning tool appropriate images, interactions and quizzes were chosen to enhance the educational value of the package. In order to test the quality of the e-learning tools interactivity, frequent checks of all technical aspects were undertaken by the author. Moreover, the pilot study and review by workplace

wellness experts were used to determine if the interactive and visual elements enhanced the e-learning content.

The copyright of all images was respected and indicated in the image references in the e-learning tool. Permission from source was sought for use of a few images, however the majority of images used were under a Creative Commons Licence which allows the use of images without having to gain permission from the rights holder (Creative Commons, 2013). All accompanying audio was recorded by the author for use in the e-learning tool.

Development of the e-learning tool was labour intensive and thus presented some unique challenges. Stage 5 of the process (Figure. 3.1) required the final adaptations of the e-learning tool to be made. During this time an updated version of Articulate (2010) was released, which presented an unseen complication, with the previous version of the software no longer available. Consequently, further development time was added, for interactions, audio and navigation to be reformatted to the updated Articulate (2013). As a result, the minor alterations that needed to be made during stage 5, in fact took significantly longer to complete. Although the new version of articulate presented a challenge for time resources, the e-learning tool was improved by the new features offered in the updated software. This included easier navigation, which had been highlighted as a significant issue in the pilot study. Moreover, this new version allowed for the e-learning tool to be accessible on further internet devices, such as phones and tablets, to improve accessibility (Articulate, 2013).

3.5: The Pilot Study

The pilot study group of 14 participants were recruited through pre-existing contacts of the student researcher to represent the target population, and included nursing and physiotherapy students (n=8), Higher Education staff (n=2), registered nurses (n=2) and non-healthcare administration staff (n=2). In this

group there were both female (n=10) and male (n=4) participants. The age of participants included under 18s (n=1), 18-29 (n=11) and 30-44 (n=2). This group used the first version of the e-learning package, completing the incorporated pre and post-questionnaire. The evaluation questions for the pilot study considered the appropriateness and usability of the e-learning tool and the questionnaires used.

The pilot study revealed an improvement of knowledge score in all 14 participants. This primarily indicated that the workplace wellness e-learning tool could improve knowledge of key workplace wellness topics. Moreover, feedback from the pilot study was useful in developing the tool usability and ensuring that features such as navigation, activities and images were deemed appropriate by the user group. By including user feedback in the development process, this encompassed the perspective of the target population alongside that of workplace wellness experts.

Overall, development time for the e-learning tool equated to approximately 500 hours. Following this development process (Figure. 3.1), the implementation and evaluation of the e-learning tool could take place.

Chapter 4: Methods

4.1: Methodology

Choosing the correct research methodology is essential for providing quality research and meeting the aims and objectives of the study (Grove, Burns and Gray, 2012). Quantitative and qualitative research methodologies will be critiqued to provide a rationale for the chosen methodology.

Quantitative research follows a positivist approach and places emphasis on rationality, objectivity, prediction and control (Walker, 2005). Quantitative studies produce numerical data, which is subject to statistical analysis and used to find trends and possible relationships between variables (Walker, 2005). This research methodology minimises bias by controlling extraneous measures and ensuring reliability and validity, consequently increasing confidence in findings (Grove et al, 2012). The focus on numerical data, inflexibility and often artificial settings of quantitative research are all identified weaknesses of this methodology (Walker, 2005; Burns and Grove, 2009).

In contrast, qualitative research is subjective with findings often open to interpretation (Grove et al, 2012). Qualitative studies are naturalistic and therefore usually take place in natural settings, with an aim to explore, describe and interpret social phenomena (Grove et al, 2013; Holloway and Wheeler, 2013). This research methodology can be used to explain and understand complex concepts, which cannot be achieved through quantitative measures (Holloway and Wheeler, 2013). The subjectivity of qualitative research is criticised due to the individual interpretation of results as this can make findings difficult to generalise (Grove et al, 2012).

Previous papers that have implemented e-learning programmes have been criticised for using evaluations based on subjective user opinions, as these do not

fully reflect educational outcomes (Bloomfield, 2008). As the workplace wellness e-learning tool is an educational intervention, a quantitative research method was utilised to measure knowledge and provide numerical data to measure and analyse knowledge scores.

4.2: Research Design

4.2.1: Pre and Post-test Design

The study used an experimental one-group pre and post-test method to examine changes in knowledge following exposure to a workplace wellness educational intervention. Experimental research involves assessment of change following the introduction of an active variable (Polit and Tatano-Beck, 2008). The pre and post-test method was chosen as it can be used to measure change in the dependant variable following introduction of an intervention (Nelson, Drumville and Torgerson, 2010). However, pre and post-test designs do not identify the cause of change and only recognise that change has occurred (Nelson et al, 2010). Changes between the pre and post-test could be due to influencing factors other than the intervention such as testing or temporal effects (Nelson et al, 2010). Testing effects could cause a change in outcome due to the initial pre-test highlighting deficits in knowledge, causing the participants to improve knowledge by other means (Nelson et al, 2010). Whereas, temporal effects assume that change is due to time, in this study increase in knowledge could be due to the continued professional development of healthcare staff and students (Nelson et al, 2010).

A criticism of the chosen one-group design is that it does not use a control or non-intervention group. This can make it difficult to firmly conclude that a change in knowledge is as a result of the e-learning tool, and not from anything else that happened during this period (Macnee and McCabe, 2008). If a control group had been used it would help to eliminate threats to internal validity, as the participants in each group would be experiencing the same effects (Macnee and McCabe,

2008). However, Polit and Tatano-Beck (2008) identify that if pre and post-testing takes place immediately before and after the intervention it is plausible that the intervention is the cause of any identified changes. This provides the rationale for immediate before and after knowledge testing of participants carrying out the e-learning tool; to reduce the likelihood of temporal and testing effects having an influence on the results. Moreover, the limitations of using a control group were identified as: recruitment of participants via cohorts, lower number of participants, longer delay between pre and post-test questionnaires and lower response rate for post-questionnaire (Polit and Tanato-Beck, 2008; Macnee and McCabe, 2008).

After consideration of different possible methods, a pre and post-test comparison design was used, assessing knowledge of workplace wellness before and after the e-learning intervention.

4.2.2: Research Method

The setting for the study was primarily a School of Health Sciences at a large university in the UK. Data was recorded over a 7 week period from 22nd November 2013- 10th January 2014. 2390 students (2050 Nursing students, 194 Midwifery students and 146 Physiotherapy students) and 263 staff in the school were sent an email invitation to undertake the workplace wellness e-learning package as optional professional development. Moreover, 36 staff at a local NHS trust were also offered this professional development. Participants were sent an invitation email which included information regarding the background and purpose of the project to allow them to make an informed decision to participate. The project information assured participants that completion of the pre and post-questionnaire and e-learning tool were voluntary and that responses would remain confidential, anonymous, and for students this would not impact on their progression on their university programmes. The email also included a web-link to the e-learning tool and consent was taken as completion of the questionnaires and e-learning tool;

participants were made aware of this in the invitation email. All staff and students were given 7 weeks from receipt of the invitation e-mail to complete the e-learning tool, with the finish date clearly stated. After the finish date the tool was still available online, but completion of this optional professional development was not as part of the study, and as such, a participation certificate would not be issued. The invitation email was sent by the dissertation supervisor, as the student researcher could not access the required email lists. Further reminder emails were sent at the start of week 2, 4 and 7 of the study duration, re-iterating the invitation to participate. This ability for researchers to remind potential participants has been recognised as important for improving response rates in both postal and web-based research (Glidewell, Thomas, MacLennan, et al, 2012; Dillman, Smyth and Christian, 2009; Adams and Monroe, 2012). Participating staff and students during the study duration could optionally provide their name and email address to be sent a completion certificate, these details were stored on a separate e-page to the responses for data analysis (a certificate template can be found in Appendix 5). After completion, certificates were sent and all participant contact details were immediately destroyed, protecting the privacy of personal information. The research data will be kept for 7 years in accordance with the Data Protection Act (1998).

To evaluate the e-learning tool, participants were asked to complete an electronic pre and post-test multiple choice knowledge questionnaire and some post-test evaluation questions, which were incorporated into the online e-learning tool. Evaluation questions were adapted by the student researcher from the RLO-CETL (2005) evaluation toolkit, and related to if participants found it engaging, useful and if they would recommend this to others. Open-ended questions were also used to enable users to comment on what was liked and what could be improved, for example, the ease of use or interactivity. The duration of this dissertation was 17 months (October 2012- March 2014) due to time required for designing,

developing and review of the e-learning package, obtaining ethical approval and the time for research and data analysis.

4.3: Sample

The sample was drawn from undergraduate and postgraduate students and staff in the School of Health Sciences. All students attending and staff working in the school in the academic year 2013/2014 were invited to participate alongside 36 NHS staff members, making a target population of 2689 participants.

A non-probability sampling method, convenience sampling, was used as the healthcare students and staff were appropriate, available participants who were willing to respond (Gravetter and Forzano, 2010). The main advantage of this sampling method is convenience, which elucidates the wide use of this method in nursing research (Polit and Tatano-Beck, 2008, Takona, 2002; Cohen, Manion and Morrison, 2011). This sampling method is considered weak as it does not incorporate a random process for selection and gives the research little control over the representativeness of the sample, thus leaving the sample open to sampling and voluntary bias (Gravetter and Forzano, 2010; British Educational Research Association, 2004). However, as this study is examining the learning of participants, the sample is fit for purpose; demonstrating whether the e-learning tool can increase learning amongst healthcare staff and students, whilst also revealing the proportion of students and staff that will willingly sign up to engage in online professional development. Convenience samples are useful for projects which require a sample of participants that do not need to be representative of the whole population (Smith, 2010), which is the case in this study looking at how an intervention changes knowledge in any participant.

4.4: Instrument

4.4.1: Multiple Choice Questionnaire

The research instrument used within this study was a multiple choice questionnaire designed to assess knowledge before and after participants carried out the workplace wellness e-learning tool. In the literature review, no questionnaires measuring knowledge of workplace wellness were identified. Consequently, the questionnaire used was developed to directly relate to the e-learning tool.

Questionnaires are widely used in healthcare to measure satisfaction, care quality and for use in a significant amount of nursing and healthcare research (Jack and Clarke, 1998). In research, questionnaires are used to measure knowledge, attitudes and intentions (Gerrish and Lacey, 2010), and are therefore appropriate to utilise in this study aiming to establish whether an e-learning tool can increase healthcare staff and students' workplace wellness knowledge.

4.4.2: Questionnaire Development

The questionnaire was developed using close-ended questions providing presubscribed response alternatives. This type of questionnaire facilitates analysis and allows for quantitative comparability of responses (Polit and Tatano-Beck, 2013). Multiple choice questionnaires are quick to complete, and by using online questionnaires this method is highly cost-effective and easy to disseminate to participants, which is of particular benefit to this undergraduate dissertation where funding and time constraints exist (Polit and Tatano-Beck, 2013; Hughes and Hayhoe, 2007). Furthermore, by using questionnaires complete anonymity is possible helping to protect participants in line with research ethics (Polit and Tatano-Beck, 2008; 2013). Maintenance of complete anonymity was possible in this study if participants chose to withhold their name and email address. However,

these details could be added to allow for completion certificates to be sent to users.

Knowledge questions were specifically selected where answers were provided in the e-learning tool, using concepts from the constructive alignment theory (Biggs, 1999). The e-learning tool aligned learning activities with the stated learning outcomes and the assessment questions were also selected to test the learning outcomes of the educational tool (Houghton, 2004). The post-questionnaire contained the same questions as the pre-questionnaire with the addition of evaluation questions. The post-questionnaire included 8 likert-type questions in order to determine the participants' level of agreement with statements (Polit and Tatano-Beck, 2013). These were used alongside 3 open-ended questions to form the main evaluation of the e-learning tool (Polit and Tatano-Beck, 2008).

The pre and post-questionnaires were created alongside the e-learning tool and validated by the panel of workplace wellness experts (workplace wellness expert details are in Appendix 1). Each member of the expert panel individually and independently of other members reviewed the questionnaire. Each panel member provided feedback on appropriateness of the questions and accuracy of information in the questions, the questionnaire was then altered accordingly to ensure quality. The use of this expert panel is based on the assumption that a group opinion is better than an individual one. Therefore, using a panel of workplace wellness experts should create a higher quality, valid and accurate e-learning tool and questionnaire than if this was just created by one person (Keeny, Hasson and McKenna, 2010).

4.4.3: Questionnaire Limitations

Although questionnaires can reach a large number of people in a target population, the main disadvantage of this method is low response rates (Keeny et al, 2010; Gerrish and Lacey, 2010), particularly due to the time commitment required for

completion of the e-learning tool (Deniz and Citak, 2010). This has been targeted by the questionnaires being directly linked to the e-learning tool and presented as a before and after knowledge quiz. An identified disadvantage of multiple choice questionnaires is that potentially important responses may be omitted as these may not be anticipated by the researcher (Polit and Tatano-Beck, 2013; Hughes and Hayhoe, 2007). It is for this reason that a panel of experts analysed the questionnaire, to ensure not only that questions were appropriate, but also to assess the reliability and validity of these questions (Keeny et al, 2010). Furthermore, due to the questionnaire measuring knowledge, and not attitudes or intentions, the questions chosen were made to have only one factual correct answer; subsequently reducing the likelihood of missing important responses. The disadvantages of questionnaires have been considered and measures to reduce these effects have been taken.

4.5: Reliability and Validity

4.5.1: Reliability

Instrument reliability is associated with its repeatability and whether the questionnaire is able to reproduce the same results again when used in similar circumstances with similar participants (Basit, 2010; Polit and Tatano-Beck, 2008). Reliability in quantitative research also requires consistency and repeatability over time (Basit, 2010).

A pilot study of the e-learning tool revealed an improved overall workplace wellness knowledge score percentage accuracy in all participants. If reflected in the study results in Chapter 5, this will indicate repeatability and reliability of this instrument (Basit, 2010).

4.5.2: Validity

Validity of the research instrument relates to if the questionnaire measures what it is supposed to measure, and if this is done correctly and accurately (Polit and Tatano-Beck, 2008). The workplace wellness questions were not adapted from validated questionnaires as none were available, however their development was through consultation with experts, thus ensuring a degree of content validity.

A pilot study was conducted to establish face validity; whether the questionnaire 'looked' like it was measuring what it is supposed to be (Polit and Tatano-Beck, 2008). The pilot study requested that participants make comments about the questions to ensure that they were clear, appropriate and non-biased. The feedback received was highly positive, but also influenced some improvements to the instrument.

Content validity is whether the questionnaire is comprehensive and reflects the concepts it is supposed to measure (Macnee and McCabe, 2008). To ensure content validity, the expert panel all reviewed the questionnaire to assess the comprehensiveness and appropriateness of the questions used. This was also considered by the pilot study group.

4.6: Ethical Considerations

In all research studies, participants have the right not to be physically or emotionally harmed, the right to full disclosure and privacy, anonymity and confidentiality (International Council of Nurses, 2012). For this reason, all empirical research using human subjects must obtain ethical approval from an appropriate governing body (Wood and Ross-Kerr, 2011). Ethical approval was submitted to and granted by University of Nottingham Medical School Research Ethics Committee (approval letter: Appendix 6). Permission to access these students was granted by the Head of School, Chair of the School of Health Sciences Work, Health

and Wellbeing Committee, course directors and unit leaders. Ethical implications considered included consent, right to withdraw, anonymity and data protection.

4.7: Resource Implications

As a student dissertation, the only expenditure was administration, covered by the author. A free trial of Articulate (2010) e-learning development software was used to create the hour long resource. However, if this was a funded project, further costs would have included consultancy fees for e-learning technologists, expert peer review, e-learning package development and statistical-analysis software.

4.8: Data Analysis

The questionnaire was conducted using surveymonkey, linked directly to the e-learning tool. The e-learning was offered to participants over a 7 week duration, after this time the collected knowledge tests were analysed.

Questionnaires were marked and standardised scores were derived using the following equation: (number of correct scores/maximum score)x 100. This was repeated by an external marker to ensure accuracy of data. The data was then searched for outliers and numerical values not in the coding system, before proceeding with analyses using Statistical Package for the Social Sciences (SPSS) version 21.0.

Descriptive statistics were used to display the participants' demographic characteristics, and also to analyse the evaluation responses. The statistical significance of the relationship between the intervention and knowledge was explored using t-testing and calculation of effect size. Question specific analysis was then used to highlight areas of knowledge deficit in the pre-questionnaire and post-questionnaire data. Significance was set at $p<0.05$ for all statistical comparisons.

Chapter 5: Results

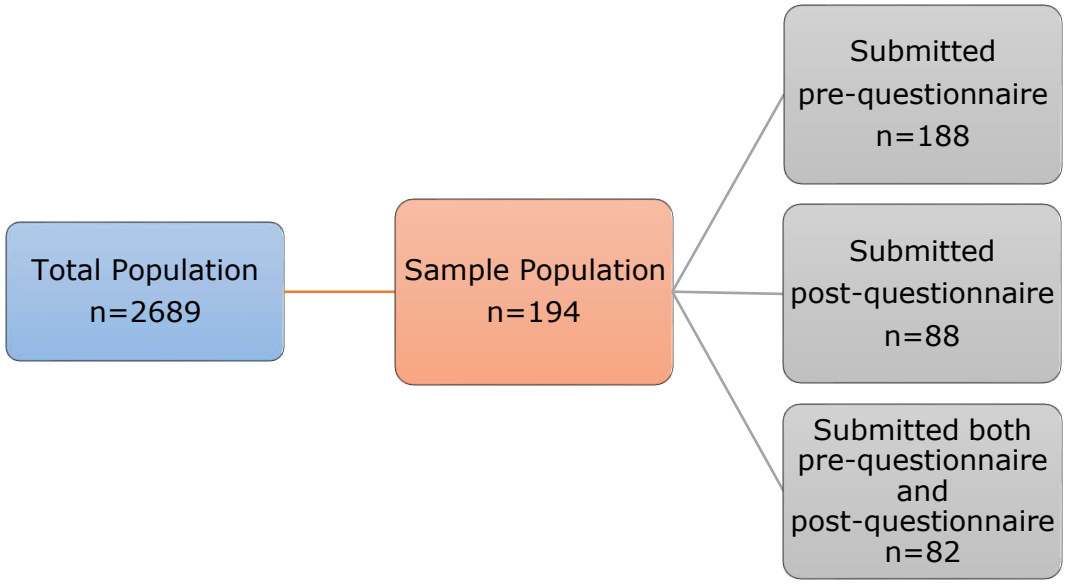
This chapter highlights the key findings from the study, considering responses from the pre-questionnaire which was at the start of the e-learning tool, and also the post-questionnaire at the end of the tool.

5.1 Response Rate

The workplace wellness e-learning tool was made available to 263 staff and 2390 students in a large UK university, School of Health Sciences. A further 36 participants from a local NHS trust were also invited. This gives a total population of n=2689. Participation in the study was voluntary, with a conservative response rate of 7.2% of the total population accessing the resource, this makes up the sample population (n=194). This low response rate was predicted, due to the self-selecting nature of optional professional development (Burns and Grove, 2010).

Out of the sample population (n=194), the response rate to the pre-questionnaire was 96.9% (n=188 submitted responses to the pre-questionnaire). The response rate for the post-questionnaire was 45.4% (n=88 submitted responses to the post-questionnaire). Deniz and Citak (2010) suggest that participation is often affected by the size of the intervention, making it likely that the length of the e-learning tool caused this reduced response rate of the post-questionnaire. Those who submitted both the pre-questionnaire and post-questionnaire made up 42.3% of the sample population (n=82). This response data is displayed in Figure. 5.1.

Figure. 5.1 Breakdown of Participants and online submission of Pre-questionnaires and Post-questionnaires.



All responses to the pre-questionnaire and post-questionnaire from the sample population were considered in the data analysis. Any questions within the submitted questionnaires that have not been answered have been listed as "Missing" values.

5.2: Demographic Characteristics

The demographic questions were situated in the pre-questionnaire. As 3.1% (n=6) of the sample population did not submit the initial pre-questionnaire, their demographics have not been captured in the data. As the majority of the sample population did provide demographic information the analysis assumes that these findings are representative of the entire sample population.

5.2.1: Gender

This data shows that participants within the study were predominantly female, making up 93.1% (n=175) of the submitted sample population data (Table. 5.1). The over-representation of females reflects the gender ratio of the population with the majority of participants from female dominated professions (n=122 64.9%

nursing and midwifery staff and students). The NMC (2008b) indicated that 89.3% of registered nurses and midwives were female in 2008, reflecting this same gender imbalance.

Table. 5.1 Gender of Participants

Gender	Pre-questionnaire sample population (n=188)
Male	**6.9% (n=13)**
Female	**93.1% (n=175)**

5.2.2: Age

Participants were predominantly aged 18-29, with 52.1% of the sample population in this age category. The rest of the sample included participants aged 30-44 (30.3%) and 45-60 (17.6%). No participants were Under 18 or Over 60 which reflects the target population of participants in higher education or employment (Table. 5.2).

Table. 5.2 Age of Participants

Age	Pre-questionnaire sample population (n=188)
Under 18	**0**
18 - 29	**52.1% (n=98)**
30 - 44	**30.3% (n=57)**
45 - 60	**17.6% (n=33)**
Over 60	**0**

5.2.3: Employment

Over half (53.7%) of the participants were in employment during the study (Table. 5.3). Of the n=101 (53.7%) participants who were employed, 45.6% (n=46) were employed by a Higher Education Institute, which was 17.1% of the School of Health Sciences workforce. Participants employed by an NHS Organisation counted for 35.6% (n=36) of the employed participants. Smaller numbers of participants were employed by a private/ independent healthcare provider or other organisation (Table. 5.4). All 8 of those selecting "Other" worked in their student capacity as a Student Nurse, Student Midwife or Student Ambassador.

Table. 5.3 Participants currently employed

Are you currently employed?	Pre-questionnaire sample population (n=188)
Yes **No**	**53.7% (n=101)** **46.3% (n=87)**

Table. 5.4 Employer

Employer	Employed participants (n=101)
Higher Education Institute	**45.6% (n=46)**
NHS Organisation	**35.6% (n=36)**
Private/ independent healthcare provider	**8.9% (n=9)**
Other	**7.9% (n=8)**
Missing	**2% (n=2)**

5.2.4: Occupation

Of those who were employed, participants were from a range of occupational groups with Healthcare assistant/ support staff representing the largest proportion (17.8%) of the sample population. Higher Education Clerical and administrative staff represented the second largest group (15.8%) and Higher Education Academic Staff were the third largest group with 12.8% of the sample. The remaining 36.6% of completed responses were split amongst all occupational groups (Table. 5.5).

Table. 5.5 Participants Occupational Groups within Organisation

Employment Group	Occupational Group	Employed participants (n=101)
NHS Organisation and Private/ Independent healthcare provider (44.5% n=45)	Healthcare assistant/ support staff	17.8% (n=18)
	Qualified allied health professionals	2.0% (n=2)
	Clerical and administrative staff	8.8% (n=9)
	Qualified nursing	4.0% (n=4)
	Qualified healthcare scientists	2.0% (n=2)
	Management and senior management	2.0% (n=2)
	All doctors	1.0% (n=1)
	Missing	6.9% (n=7)
Higher Education Institution (45.6% n=46)	Professional and support staff	3.0% (n=3)
	Academic Staff	12.8% (n=13)
	Clerical and administrative staff	15.8% (n=16)
	Domiciliary staff	1.0% (n=1)
	Other	6.9% (n=7)
	Missing	5.9% (n=6)
Other (7.9% n=8)	Other specified	5.9% (n=6)
	Missing	2.0% (n=2)
Missing (2% n=2)	Missing	2.0% (n=2)

5.2.5: Higher Education

This data shows that a significant proportion of participants (69.1%) were Higher Education Students at the time of the study (Table. 5.6). The 130 Higher Education students made up 5.4% of the School of Health Sciences student body, and consisted of 86.3% (n=112) Undergraduate Students and 13.1 %(n=17) Postgraduate Students.

Table. 5.6 Higher Education Students

Higher Education Student	Pre-questionnaire group (n=188)
Yes	69.1% (n=130)
No	22.9% (n=43)
Missing	8.0% (n=15)

5.2.6: Discipline of Study

Higher Education students in the sample (n=130) were predominantly Nursing students, with 76.9% of students in this group. Smaller numbers of students were studying Midwifery, Physiotherapy or Other (Table 5.7).

Table. 5.7 Higher Education Students Discipline of Study

Discipline of study	Pre-questionnaire group (n=130)
Nursing	**76.9% (n=100)**
Midwifery	**13.8% (n=18)**
Physiotherapy	**5.4% (n=7)**
Other	**3.1% (n=4)**
Missing	**0.8% (n=1)**

5.3: Workplace Wellness Knowledge: Pre-questionnaire and Post-questionnaire Analysis

Participants that fully completed the pre-questionnaire (n=146) and post-questionnaire (n=86) knowledge questions will be considered. Scores for both questionnaires were marked out of 20, for analysis the percentage response accuracy of the results was used.

5.3.1: Distribution and Variance

Before analysing the statistical data from the knowledge questions, the distribution of the data needed to first be considered. Descriptive statistics were used to determine if the data showed a normal distribution.

The pre-questionnaire P-P Plot shows the normal pattern of knowledge scores, these scores have a normal distribution with the data closely following the Expected Cumulative Probability line (Figure. 5.2). The P-P Plot data indicates that the cases are unweighted for both the pre-questionnaire and post-questionnaire scores (Table. 5.8). Following the e-learning tool intervention, the post-questionnaire scores also indicate a normal distribution. However, this data shows

more deviation from the Expected Cumulative Probability line than seen in the pre-questionnaire (Figure. 5.3).

Table. 5.8 Estimated Distribution Parameters

Distribution		Total Score Pre-questionnaire	Total Score Post-questionnaire
Normal	Location	47.6027	77.5000
	Scale	11.93689	13.71453

Figure. 5.2 P-P Plot of Total Score Accuracy from the Workplace Wellness knowledge Pre-questionnaires

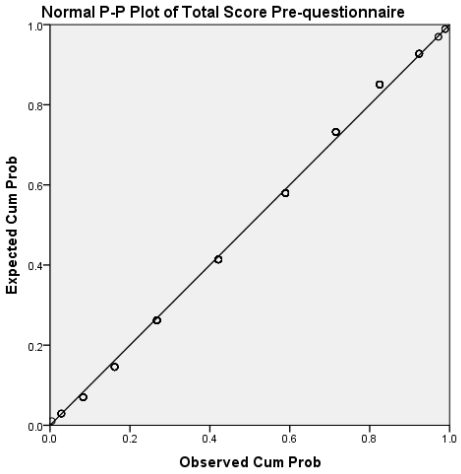
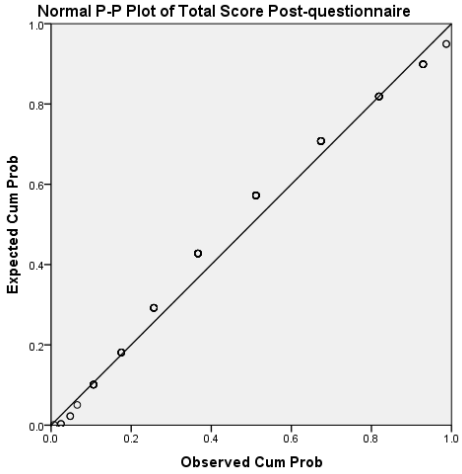


Figure. 5.3 P-P Plot of Total Score Accuracy from the Workplace Wellness knowledge Post-questionnaires



The normality of the data was further confirmed through the use of two normality tests. Both tests demonstrate a low p-value for the pre-questionnaire and post-questionnaire Total Score (Table. 5.9). From this data it can be assumed that there is a normal association between scores as both Kolmogorov-Smirnov and Shapiro-Wilk tests demonstrate significant values at the $p<0.05$ level. Therefore the null hypothesis can be rejected (at this 5% significance level) and we can conclude that there is a difference between the workplace wellness knowledge mean response accuracy between participants before and after the e-learning tool intervention.

Table. 5.9 Tests of normality

	Time	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	n	Sig. (p value)	Statistic	n	Sig. (p value)
Total Score	Pre-questionnaire	.100	146	.001	.977	146	.015
	Post-questionnaire	.142	86	.000	.938	86	.000

The skew of the data, presented in the descriptive statistics again reflects that there is a normal distribution of the pre-questionnaire data, showing skewness value of 0.028, which is close to the no skew value of 0 (Table. 5.9). The normal distribution of the scores before the intervention can be seen in the Frequency Percentage Histogram (Figure. 5.5), showing an even and normal distribution of the data. However, post-intervention the Total Score data shows a negative skew of higher test scores, with a skew of -0.884. This can be seen in Figure. 5.6, although the Total Score data has shifted the normal distribution curve is still present.

Table. 5.10 Descriptive statistics of pre-questionnaire and post-questionnaire Total Scores

Group	N	Minimum	Maximum	Mean		Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Std. Error
Pre-questionnaire	146	20.00	75.00	47.6027	.98790	11.93689	.028	.201
Post-questionnaire	86	35.00	100.00	77.5000	1.47888	13.71453	-.884	.260

Figure. 5.5 Frequency Histogram showing normal distribution of Pre-questionnaire Total Score Percentage Accuracy.

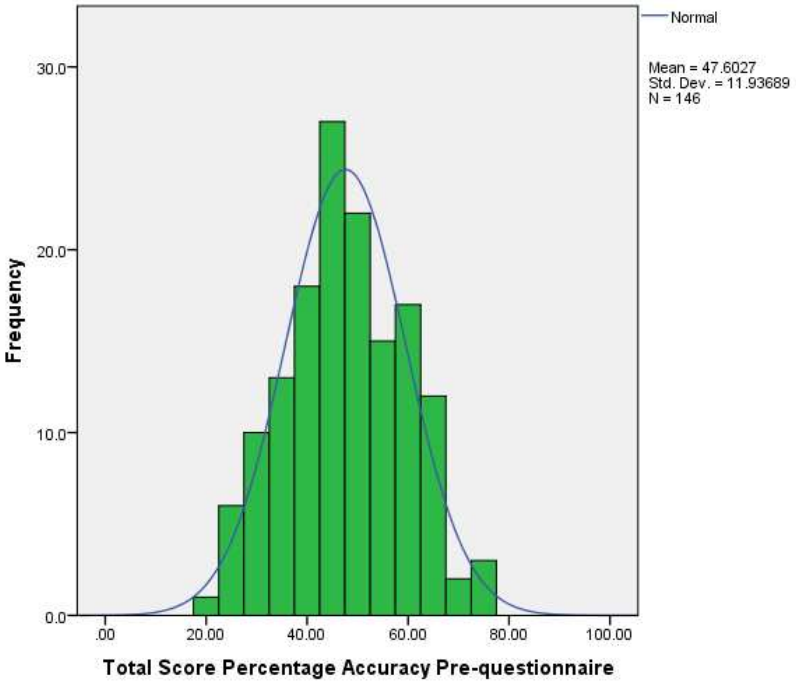
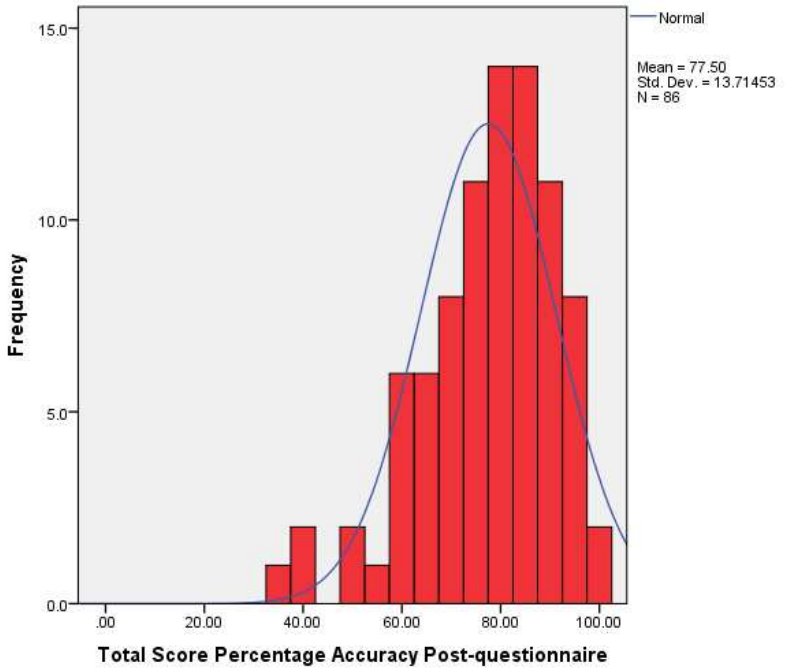


Figure. 5.6 Frequency Histogram showing normal distribution of Post-questionnaire Total Score Percentage Accuracy.



The P-P Plots, normality tests and skewness data all show that there is a normal data distribution in the pre-questionnaire knowledge Total Score before the intervention. Post-intervention, the knowledge data shows a normal distribution

curve that has a negative skew, as a result of a higher Total Score Accuracy mean of 75.5% (Table. 5.10).

As the data revealed a normal distribution, the statistical significance of the relationship was explored using a one-way between-groups analysis of variance (ANOVA) test. The mean score was found to increase significantly (F=303.598) from the pre-questionnaire to the post-questionnaire Total Scores; with a probability of significance score of p=0.000 (p<0.05), it is unlikely that this difference is due to chance (Table. 5.11).

Table. 5.11 ANOVA

Total Score- Pre-questionnaire and Post-questionnnaire	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	48375.571	1	48375.571	303.598	.000
Within Groups	36648.459	230	159.341		
Total	85024.030	231			

5.3.2: Baseline Workplace Wellness Knowledge: Pre-questionnaire Analysis

The mean response accuracy for the pre-questionnaire (n=146) was 47.60%±11.94% accuracy (Table. 5.10). The distribution of pre-questionnaire scores can be seen in Figure. 5.5, ranging from 20% accuracy (4/20) to 75% (15/20), with less than half of participants (48.7%) scoring at least 50% accuracy (10/20). These results suggest that overall the workplace wellness knowledge of the participants was poor at the outset.

An ANOVA test revealed no statistically significant relationship between pre-questionnaire score and age (F=0.177 and p=0.838) or pre-questionnaire score and gender (F=1.160 and p=0.321). ANOVA test also showed that being in employment had no statistically significant effect on pre-questionnaire knowledge score (F=2.246 and p=0.136) and neither did participants being in higher

education (F=0.765 and p=0.383). This indicates that across healthcare staff and students' workplace wellness knowledge is generally poor regardless of work experience or education.

5.3.3: Changes in Workplace Wellness Knowledge Following Exposure to the E-learning Tool: Post-questionnaire Analysis

There is a clear difference in the mean accuracy of score between all of the pre-questionnaire (n=146) and post-questionnaire (n=86) results; 47.6% mean accuracy (9.52/20) in the pre-questionnaire to a statistically significant (as shown by Table. 5.11 ANOVA) 77.5% mean accuracy (15.5/20) in the post-questionnaire. The changes in score are also apparent in the frequency histograms, showing a negative skew towards higher knowledge scores in the post-questionnaire results (Figure. 5.6).

As the data was normally distributed (Table. 5.9), parametric testing was used to explore the effects of the intervention upon score. A paired t-test was used, this test looks at changes in mean scores in one group of participants making it an appropriate test to determine changes in knowledge before and after the e-learning tool intervention. The number of participant scores used in the t-test was n=76; the number of participants that submitted a pre-questionnaire and post-questionnaire without any missing values. For the participants completing both pre-questionnaire and post-questionnaire knowledge questions, the t-test showed a significant difference between knowledge scores: $t(75)=-14.801$, $p < 0.0005$(Table. 5.13). Due to the means of the before and after scores and the direction of the *t*-value, it can be concluded that there was a statistically significant improvement in Total Score following exposure to the workplace wellness e-learning tool from 48.95±12.28 to 77.96±14.08($p < 0.0005$); an improvement of 29.01±17.09 (Table. 5.12 Table. 5.13). As a significant difference in score has been found, it is also important to know the size of the effect. For these results the

effect size was calculated, using the difference between means divided by the standard deviation (Table. 5.13). The results show an effect size of 1.7, which is described as a large effect (Cohen, 1988). Therefore, the mean pre-questionnaire and post-questionnaire scores not only reached statistical significance, but the workplace wellness e-learning tool had a large effect on the knowledge score of participants.

Table. 5.12 Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pre-questionnaire Total Score	**48.9474**	**76**	**12.28321**	**1.40898**
Post-questionnaire Total Score	**77.9605**	**76**	**14.07545**	**1.61457**

Table. 5.13 Paired Samples t-Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre-questionnaire Accuracy - Post-questionnaire Accuracy	**-29.01316**	**17.08839**	**1.96017**	**-32.91802**	**-25.10829**	**-14.801**	**75**	**.000**

5.4: Question Specific Analysis

The percentage of correct responses for each question has been analysed individually. Responses have been colour coordinated according to the percentage of correct response to see the accuracy of questions visually; Green>75.00%, Amber 75.00%-50.00%, Red 49.99%-25.00%, Dark Red<25.00%.

5.4.1: Pre-questionnaire Question Specific Analysis

Question specific analysis of the pre-questionnaire knowledge questions further reflects the poor baseline knowledge of the sample (Table. 5.14). On 10/20 questions under 50% of participants gave a correct response. A serious knowledge

deficit is indicated by the 5/20 question where under 25% of participants responded correctly. Moreover, by looking at questions where over 75% of participants scored a correct answer, we can again see poor knowledge amongst participants, with one question falling in this category.

Table. 5.14 Percentage of correct response at baseline

Pre-questionnaire knowledge questions	Percentage correct response (n=148)
6) What are musculoskeletal disorders?	89.86% n=133
2) Choose the definition below for work-related illnesses	74.32% n=110
10) Fill the gaps: Obesity reduces life expectancy by roughly _____ and increases the risk of _____	72.30% n=107
8) Providing the correct moving and handling equipment in the workplace is an example of which type of prevention?	68.24% n=101
20) Which statement about workplace wellness scheme participation is true?	68.24% n=101
1)Please complete this sentence: In the last century the main cause of death has shifted from _____	63.51% n=94
14) Which of these physical activity interventions is working on an individual level?	63.51% n=94
15) Smoking is estimated to cause what percentage of lung cancer deaths?	62.84% n=93
3) Please complete this sentence: Evidence has associated the implementation of workplace wellness initiatives with _____	58.11% n=86
9) On average, what percentage of adults in the UK achieve their '5 a day'?	55.41% n=82
12) For adults, what amount of moderate physical activity is recommended per week?	47.30% n=70
17) What is the recommended alcohol limit for men?	43.92% n=65
7) What proportion of the UK population are estimated to suffer back pain at some point in their lives?	38.51% n=7
4) Approximately what percentage of work-related illnesses is made up of people suffering from workplace stress?	35.14% n=52
11) Please complete this sentence: Encouraging employees to check their Body Mass Index, bring healthy food to work and keep food diaries are examples of ____	32.43% n=48
5) Which intervention below is an example of a secondary prevention stress intervention?	22.30% n=33
19) Which type of enterprise accounts for more than 99% of all enterprises?	21.62% n=32
16) What percentage of adults were still smoking in 2010?	15.54% n=23
18) What percentage of men and women are estimated to drink over the recommended alcohol limits?	14.86% n=22
13) In 2012, what percentage of adults did the Health Survey England estimate to be meeting the recommended weekly amount of moderate/vigorous physical activity?	13.51% n=21

5.4.2: Post-questionnaire Question Specific Analysis

As revealed in the statistical analysis, the intervention has shown a significant change in knowledge scores. By looking at each question's percentage of correct response, knowledge has notably improved, with all questions showing an increase in the percentage of correct responses (Table. 5.15). All questions post-intervention achieved a correct response rate above 25%, thus showing no serious knowledge deficit. Moreover, 14/20 questions have achieved a correct response from over 75% of participants, with two questions achieving 100% correct response rate.

The large effect found in the statistical analysis can again be seen through the question specific analysis comparison of pre-questionnaire and post-questionnaire scores (Table. 5.16). Significant knowledge improvement is indicated by the changes in correct response score, with the most significant improvements in questions 16 and 5, which initially scored under 25% and then post-intervention scored over 75%. A significant shift in correct responses was achieved through the e-learning tool, from 1/20 questions to 14/20 questions achieving over 75% correct responses. Although all questions showed an increase in correct responses, three questions (2, 8 and 20) were revealed to not have a statistically significant increase in the percentage of correct responses (Table. 5.16). However, this does not undermine the success of the tool as overall t-tests and analysis have shown the ability of the intervention improve workplace wellness knowledge.

Table. 5.15 Percentage of correct response post-intervention

Post-questionnaire knowledge questions	Percentage correct response (n=86)
1) Please complete this sentence: In the last century the main cause of death has shifted from _____	100.00% n=86
6) What are musculoskeletal disorders?	100.00% n=86
3) Please complete this sentence: Evidence has associated the implementation of workplace wellness initiatives with _____	97.67% n=84
12) For adults, what amount of moderate physical activity is recommended per week?	89.53% n=77
10) Fill the gaps: Obesity reduces life expectancy by roughly _____ and increases the risk of _____	88.37% n=76
15) Smoking is estimated to cause what percentage of lung cancer deaths?	87.21% n=75
9) On average, what percentage of adults in the UK achieve their '5 a day'?	83.72% n=72
17) What is the recommended alcohol limit for men?	82.56% n=71
11) Please complete this sentence: Encouraging employees to check their Body Mass Index, bring healthy food to work and keep food diaries are examples of_____	81.40% n=70
2) Choose the definition below for work-related illnesses	79.07% n=68
14) Which of these physical activity interventions is working on an individual level?	79.07% n=68
20) Which statement about workplace wellness scheme participation is true?	79.07% n=68
5) Which intervention below is an example of a secondary prevention stress intervention?	77.91% n=67
16) What percentage of adults were still smoking in 2010?	77.91% n=67
18) What percentage of men and women are estimated to drink over the recommended alcohol limits?	73.91% n=63
8) Providing the correct moving and handling equipment in the workplace is an example of which type of prevention?	69.77% n=60
7) What proportion of the UK population are estimated to suffer back pain at some point in their lives?	63.95% n=55
4) Approximately what percentage of work-related illnesses is made up of people suffering from workplace stress?	56.98% n=49
19) Which type of enterprise accounts for more than 99% of all enterprises?	55.81% n=48
13) In 2012, what percentage of adults did the Health Survey England estimate to be meeting the recommended weekly amount of moderate/vigorous physical activity?	43.02% n=37

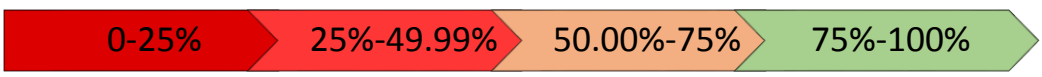
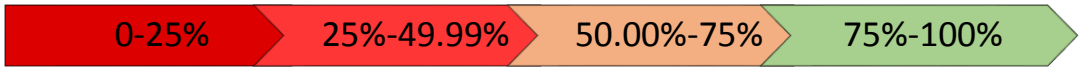


Table. 5.16 Percentage of correct response comparison between baseline and post-intervention

Question specific analysis percentage correct comparison	Pre-questionnaire (n=148)	Post-questionnaire (n=86)	P value (<0.05)
6) What are musculoskeletal disorders?	89.86% n=133	100.00% n=86	0.000
2) Choose the definition below for work-related illnesses	74.32% n=110	79.07% n=68	0.440
10) Fill the gaps: Obesity reduces life expectancy by roughly _____ and increases the risk of _____	72.30% n=107	88.37% n=76	0.001
8) Providing the correct moving and handling equipment in the workplace is an example of which type of prevention?	68.24% n=101	69.77% n=60	0.840
20) Which statement about workplace wellness scheme participation is true?	68.24% n=101	79.07% n=68	0.057
1) Please complete this sentence: In the last century the main cause of death has shifted from _____	63.51% n=94	100.00% n=86	0.000
14) Which of these physical activity interventions is working on an individual level?	63.51% n=94	79.07% n=68	0.008
15) Smoking is estimated to cause what percentage of lung cancer deaths?	62.84% n=93	87.21% n=75	0.000
3) Please complete this sentence: Evidence has associated the implementation of workplace wellness initiatives with _____	58.11% n=86	97.67% n=84	0.000
9) On average, what percentage of adults in the UK achieve their '5 a day'?	55.41% n=82	83.72% n=72	0.000
12) For adults, what amount of moderate physical activity is recommended per week?	47.30% n=70	89.53% n=77	0.000
17) What is the recommended alcohol limit for men?	43.92% n=65	82.56% n=71	0.000
7) What proportion of the UK population are estimated to suffer back pain at some point in their lives?	38.51% n=57	63.95% n=55	0.000
4) Approximately what percentage of work-related illnesses is made up of people suffering from workplace stress?	35.14% n=52	56.98% n=49	0.001
11) Please complete this sentence: Encouraging employees to check their Body Mass Index, bring healthy food to work and keep food diaries are examples of ____	32.43% n=48	81.40% n=70	0.000
5) Which intervention below is an example of a secondary prevention stress intervention?	22.30% n=33	77.91% n=67	0.000
19) Which type of enterprise accounts for more than 99% of all enterprises?	21.62% n=32	55.81% n=48	0.000
16) What percentage of adults were still smoking in 2010?	15.54% n=23	77.91% n=67	0.000
18) What percentage of men and women are estimated to drink over the recommended alcohol limits?	14.86% n=22	73.91% n=63	0.000
13) In 2012, what percentage of adults did the Health Survey England estimate to be meeting the recommended weekly amount of moderate/vigorous physical activity?	13.51% n=21	43.02% n=37	0.000



5.5: E-learning Tool Evaluation

The post-questionnaire at the end of the e-learning package contained a series of evaluation questions to assess the usability of the e-learning tool. 84 participants completed these evaluation questions.

5.5.1: Access to the E-learning Tool

The majority of participants accessed the tool at home (70.2%, n=59). Smaller numbers also accessed the resource in university (15.5%, n=13) or whilst at work (13.3%, n=11).

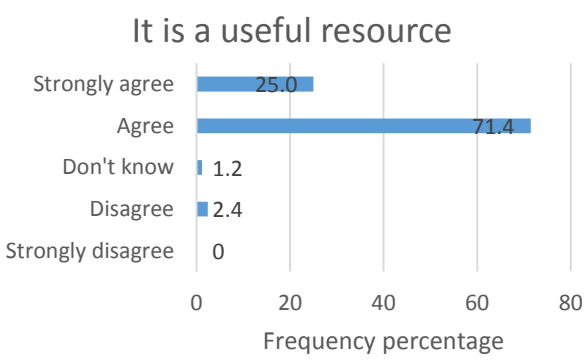
5.5.2: Computer Confidence

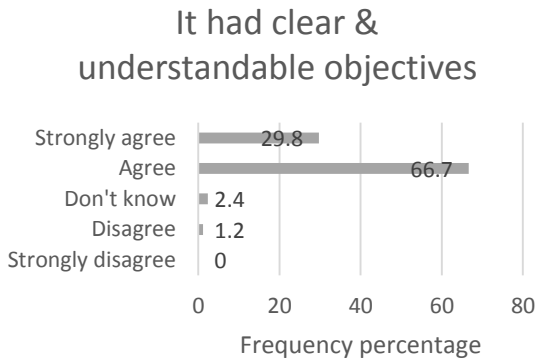
Participants rated their computer confidence, with over half of participants rating their computer confidence as either high (47.6%, n=40) or very high (16.7%, n=14). Conversely, 33.3% (n=28) of participants rated computer confidence as average and 2.4% (n=2) as low. Overall, these results show that the majority of participants had high computer confidence. This could indicate voluntary bias due to the self-selecting nature of the study (Burns and Grove, 2010), with people with poor computer confidence not accessing the e-learning package. However, as no data was collected from those who did not access the e-learning tool, no comparison in computer competence can be made.

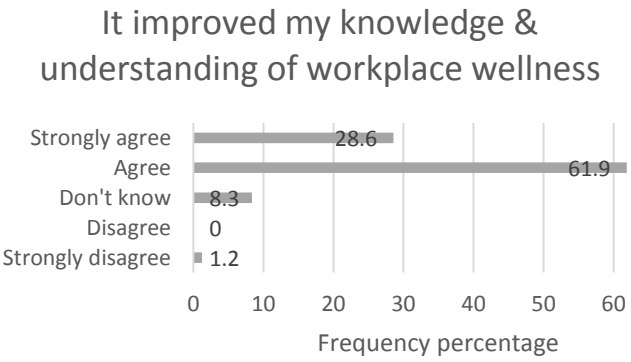
5.5.3: Evaluation Specific Questions

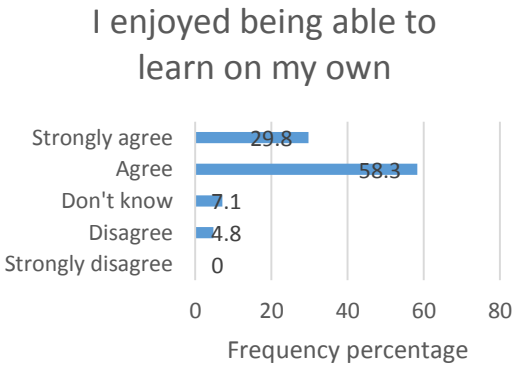
In the post-questionnaire, there were eight specific e-learning tool evaluation questions, answered by 84 participants. For all evaluation questions, the majority of participants responded that they either agreed or strongly agreed to each statement (Figure. 5.7).

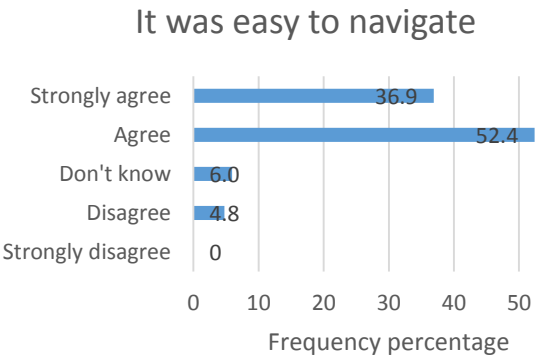
Figure. 5.7: Frequency histograms for 8 E-learning tool evaluations Likert Questions

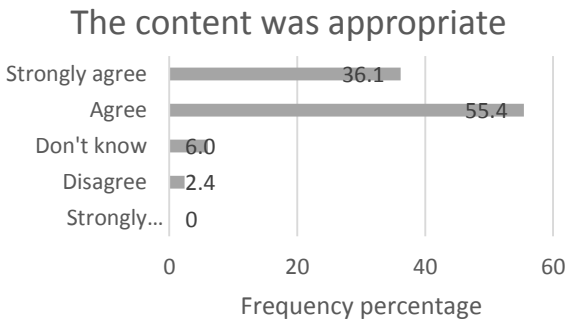


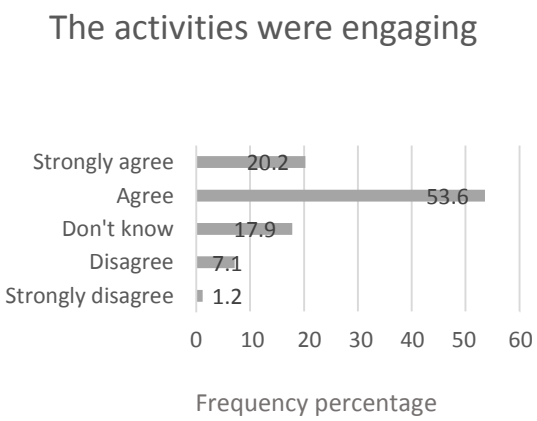


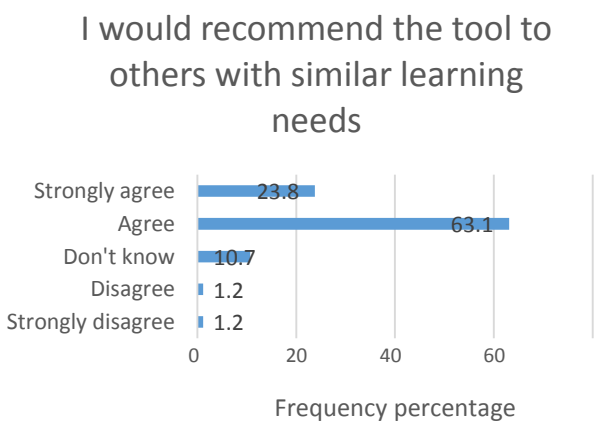












Open-question qualitative responses indicated that participants liked that the tool was "simple and easy to use" (n=20) and that they could "complete in my own time" (n=9); 10.5% of participants liked that they could access the tool where they wished, with 2 participants directly stating "easy to access at home" as a benefit of this tool. The negative comments given mainly indicated that the e-learning tool was "too long" or that it "progressed too slowly", this made up 14.0%(n=12) of the post-questionnaire sample. This was opposed by 12.2% (n=9) of participants who commented that the e-learning tool was quick or concise.

5.6: Overview of Results

The results showed that participants' prior workplace wellness knowledge was generally poor. It was statistically determined that employment, gender, age or being a higher education student had no effect on previous workplace wellness knowledge in the pre-questionnaire data. The statistical analysis suggests that the intervention was successful in increasing participants' knowledge of workplace wellness, with post-questionnaire test accuracy significantly higher than pre-questionnaire accuracy. Overall, the e-learning tool had a positive evaluation with 96.4% (n=81) of participants indicating that the tool was useful and 86.9% (n=73) of participants saying they would recommend the tool to others.

The discussion chapter will now consider the significance of these findings in line with the wider body of literature. The implications for healthcare practice and education will also be considered.

Chapter 6: Discussion and Conclusion

The findings that were presented in the previous chapter will now be discussed alongside the literature. This will cover participants' pre-existing knowledge, the effectiveness of the e-learning tool and the participant evaluation. Moreover, the limitations and strengths of the study will be considered. A conclusion will finally be presented alongside the implications this will have for future research, education and practice.

6.1: Response Rate

The response rate from the total population reflects the anticipated small sample size. This is often seen as an issue in e-learning studies (Bloomfield, 2008) due to the self-selecting nature of this research method (Burns and Grove, 2010). A possible explanation for the low response rate in self-selecting samples has been identified by Deniz and Citak (2010), who suggest that having an interest in the research subject is a significant factor influencing individual participation. Therefore, it can be assumed that the participants accessing the e-learning tool may have already had an interest in workplace wellness.

Although the low response rate from the total population would be considered a significant methodological issue in a questionnaire based study (Polit and Tanato-Beck, 2008), this study is not comparable, as it is an evaluation of an hour long professional development tool that individuals are voluntarily undertaking. The response rate for this study is therefore promising, as 194 participants have opted to undertake professional development outside of their other commitments during the brief timescale of 7 weeks. Responses from both staff and students in the School of Health Sciences was considered significant, as they volunteered to do further professional development in a period of transition for Higher Education Institutes. With a further 36 healthcare professionals accessing the e-learning

tool, this presents a promising response rate of individuals who have voluntarily engaged with this professional development.

Low response rates are argued to reduce the validity and reliability of the conclusions (Polit and Tanato-Beck, 2008; Gerrish and Lacey, 2006; 2010). The response rate is therefore a limitation of the study, as this could be argued to be low, thus affecting the generalisability of conclusions. However, the sample size was still sufficient, with statistical analysis revealing a significant and large effect on knowledge scores following the intervention. Therefore, the conclusions drawn are likely to be true as a large effect size was found despite the sample size (Cohen, 1988).

On reflection, a possible way to increase the response rate would be to have made this resource a mandatory part of healthcare student curriculum, or mandatory training for staff (Owens and Kelly, 1998). This would have increased participation significantly, removing voluntary bias and improving the generalisability of the conclusions (Polit and Tanato-Beck, 2008; Gerrish and Lacey, 2006).

6.2: Demographic Characteristics of the Study Sample

Demographic information suggested that the sample was representative of the total population. Participants reflected the gender ratio of the population, with females making up the majority of participants, as is commonly seen in the female dominated professions that are nursing and midwifery (NMC, 2008b). Age of the participants also reflected the total population, showing ages which were similar to the ages of UK higher education students in "studies allied to medicine" (Equality Challenge Unit, 2013). On reflection, comparison of age categories would have been more accurate if the same age categories had been used.

Higher numbers of students accessed the tool than university staff, which again reflects the target population which was made up of a large number of healthcare

students. However, demographics reflected that a higher percentage of the School of Health Sciences staff undertook the e-learning tool than the percentage of students. This staff engagement could reveal a higher interest of staff in the subject area of workplace wellness, possibly because they are currently employees who can directly benefit from workplace health promotion (Deniz and Citak, 2010).

6.3: Pre-existing Workplace Wellness Knowledge

The pre-questionnaire results suggest that overall workplace wellness knowledge of the sample population was poor at the outset of the study, with less than half of participants scoring 50% accuracy. The poor knowledge of participants was also reflected in the question specific analysis, showing a significant knowledge deficit, with 25% of questions (5/20) achieving less than 25% correct responses. The statistical analysis of the pre-questionnaire scores revealed that there was no statistically significant relationship between pre-existing knowledge and any of the demographics considered in the study including age, gender, employment and higher education. Thus suggesting that the sample population has a poor baseline knowledge of workplace wellness, regardless of experience, employment or education.

Moreover, the question specific analysis identified areas of particularly poor baseline knowledge amongst the sample. Questions which scored under a 25% correct response rate revealed a significant knowledge deficit of the incidence of negative health behaviours; for example, the percentage of UK adults smoking. Poor knowledge of health promotion was also reflected by questions scoring under a 50% correct response rate, showing a poor awareness of primary, secondary and tertiary prevention in the workplace. Furthermore, a poor baseline awareness of specific health recommendations was indicated, with under 50% of participants aware of the recommended amount of physical activity for adults and the recommended alcohol limits for men.

This poor knowledge could have significant implications for population health, as health professionals have a key responsibility in delivering health promotion (DH, 2009a; DH, 2009b; DH, 2011c). Healthcare professionals should now be making "every contact count", taking every opportunity to promote physical and mental health to others (DH, 2012). For healthcare professionals to deliver these health promotion responsibilities, knowledge of workplace wellness must be improved (Blake and Lloyd, 2008; Mo, et al, 2011; Blake et al, 2012; Merrill, Aldana, Garrett et al, 2011). The poor knowledge of healthcare professionals is likely to be influencing their ability to promote health, as individuals with a lack of understanding of health recommendations are unlikely to follow these and may not promote these positive health behaviours to others (Blake and Harrison, 2013), thus diminishing the effectiveness of public health promotion.

Results from the pre-questionnaire indicate a significant deficit in knowledge of workplace wellness, health promotion and health recommendations. This could have significant implications for population health, as healthcare professionals do not have the knowledge required to deliver their role in health promotion. Knowledge of the key health promotion topics, and specifically how to implement these in the workplace, must be improved to empower this group to improve their own health and also to fulfil their responsibilities as role models for health (Blake and Harrison, 2013; Blake, et al, 2011).

6.4: Effectiveness of E-learning Delivery in Enhancing Knowledge: Comparison of Pre-questionnaire and Post-questionnaire

Results indicate that the e-learning tool was successful in enhancing healthcare staff and students' knowledge of workplace wellness. This was not only revealed in knowledge questionnaire accuracy, but also self-reported in the evaluation questions, with the majority of the sample agreeing or strongly agreeing that their knowledge and understanding of workplace wellness had improved.

The assessment questions were directly aligned with e-learning content and learning objectives (Biggs, 1999) to achieve a cohesive educational tool (Houghton, 2004). To ensure the appropriateness of these questions in assessing workplace wellness knowledge, the panel of workplace wellness experts also analysed and adjusted the knowledge questionnaire (Polit and Tatano-Beck, 2013; Keeny et al, 2010). The use of developed closed questions is noted to yield similar conclusions to open-ended questions, whilst avoiding miscellaneous responses seen in open-ended questions (McColl, Jacoby, Thomas, et al, 2001). Although this is a benefit of this instrument, it could be criticised that questions are often biased and infer correct responses to participants (McColl et al, 2001). However, question specific analysis does not reflect bias within the tool, as in the majority of questions a statistically significant increase in the percentage of correct responses was seen. If the questionnaire was leading participants to select correct responses, similar results would have been seen in both the pre-questionnaire and post-questionnaire. Overall, significant measures were taken to ensure the accuracy and appropriateness of the instrument used in this study. It can therefore be assumed that the findings were an accurate interpretation of participant workplace wellness knowledge.

The paired t-test showed a statistically significant improvement in the mean accuracy of score between all of the pre-questionnaire and post-questionnaire results, thus revealing the success of the e-learning tool. Moreover, the large effect size (Cohen, 1988) shows a large improvement in workplace wellness knowledge amongst participants following the intervention. From both the question specific analysis and statistical analysis, it can be concluded that the e-learning tool is a successful method for improving workplace wellness knowledge amongst healthcare staff and students.

The study found that knowledge of workplace wellness can be enhanced, meeting the deficit of healthcare professionals' baseline knowledge. Through health

education, the e-learning tool can improve the health and wellbeing of NHS employees, with question specific analysis exposing an improved knowledge of health recommendations. For example, awareness of recommended weekly physical activity improved from a baseline 47.30% correct responses to a statistically significant 89.53%. Improving healthcare staff and students' knowledge of workplace wellness issues is of particular importance because it can empower individuals to reflect on their own health behaviours. Poor health behaviours of NHS employees has been identified as a significant issue (Blake et al, 2012), which not only influences the health of NHS staff and high absence rates (CIPD, 2009; DH, 2009c), but also their ability to promote health to others and be role models for patients and the public (Blake and Harrison, 2013; Blake, et al, 2011). A recent report by The Point of Care Foundation (2014) identified the need to improve staff health and wellbeing, showing that patient satisfaction is consistently higher in trusts with better rates of staff health and wellbeing. Moreover, the report linked higher staff satisfaction to lower rates of mortality and hospital acquired infection. Consequently, this study responds to calls for improving healthcare staff health and wellbeing, alongside key recommendations that resources targeting multiple health behaviours should be implemented in the workplace for NHS staff (Blake et al, 2012), presenting a health education resource to improve knowledge of 6 workplace health topics.

The workplace wellness e-learning tool was also shown to improve knowledge of specific workplace wellness interventions, empowering participants to improve their own workplace health through the use of these interventions. As well as score improvements seen in the questions specific analysis, comments in open-ended evaluation questions also reflected that users felt empowered to improve their health in the workplace. For example, one participant stated "I can now make sure I walk during my breaks and don't sit for long periods of time". The resource

therefore acts as a support to help learners understand the mechanisms that they can use to improve their own health and encourage others.

By improving healthcare staff and students' knowledge of workplace wellness the e-learning tool can contribute to improved population health by empowering healthcare professionals to fulfil their responsibility as role models for health (Blake and Harrison, 2013). The resource provides the knowledge required for healthcare staff and students to provide health promotion to others and "make every contact count" (DH, 2012). Furthermore, disseminating the information learnt from the e-learning tool will not only benefit patients, but also fellow employees. With the majority of participants agreeing or strongly agreeing that they would recommend the e-learning tool to others, this resource can contribute to a "culture of health" amongst the healthcare workforce (Polit and Tanato-Beck, 2008).

However, it could be criticised that the e-learning tool is a form of health education and thus encourages "victim blaming" by educating individuals and consequently relying on their individual motivations for behaviour change (Resnik, 2007; Buyx, 2008; Dougherty, 1993). This is an issue highlighted across health promotion, and is the rationale for requiring health supportive environments (Resnik, 2007; Buyx, 2008). Although this is a valid criticism of health education interventions, the workplace wellness e-learning tool is not designed to be a health promotion intervention on its own, but instead, is improving the knowledge and awareness of the available workplace wellness health promotion, to encourage employees to access the mechanisms already in place. This tool therefore acts to reinforce a culture of health, by signposting healthcare professionals to available support and encouraging them to provide health promotion information to others. Despite its primary function as a support mechanism for use alongside workplace health initiatives, an added benefit of the e-learning tool is that this may also improve individual health through the health promoting nature of the content, reinforcing the importance of individual workplace health to the user (WHO, 2011b).

6.5: Evaluation of the E-learning Tool

The e-learning tool evaluation revealed that the resource was accessed through a variety of settings, including home, work and university, with the majority of participants accessing the resource at home. This reflects the benefits of using e-learning to deliver the workplace wellness programme, providing easy access and flexibility for users (Blake, 2010). The e-learning tool was convenient for the vocational nature of the sample population, allowing students and staff to engage in the e-learning tool at a convenient time and place outside of their other responsibilities (McVeigh, 2009). This method of educational delivery can consequently be argued to reduce the impact of professional development on healthcare services (Berke and Wiseman, 2003) and help healthcare professionals to control their work/life balance (Bauer and Huynh 2001; Atack and Rankin, 2002; Wilkinson et al, 2004). The small percentage of individuals accessing the e-learning tool at work could be argued to support suggestions that access to computers is an issue for e-learning in the workplace (McVeigh, 2009). However, this could in fact reflect individual preference to undertake e-learning while at home, allowing healthcare staff to engage in continued professional development outside of their busy working hours. This was seen through subjective feedback, reflecting that some participants liked that they could access the tool where they wished. However, reasons for the chosen settings cannot be confirmed as the questionnaires did not ask for reasons for why individuals chose the settings.

The majority of the sample rated their computer confidence as high or very high. This could be argued to reflect that computer confidence across healthcare professionals is high, due to the requirements of computer competency across these professions (DH, 2004b; Atack and Rankin, 2002). However, computer confidence is an identified barrier to e-learning (Wilkinson et al, 2004 and McVeigh, 2009), making it more likely that because the sample was self-selecting, participants with low computer confidence did not access the resource. This

conclusion is reflected by the significantly low number of individuals who reported low computer confidence, possibly reflecting voluntary response bias (Deniz and Citak, 2010). Conversely, this cannot be confirmed as the evaluation questions were situated in the post-questionnaire. Alternatively, the low numbers of participants reporting low computer confidence could explain the high dropout rate of participants who completed the pre-questionnaire but did not complete the final e-learning tool questionnaire. Thus, those with poor computer confidence may have found it more difficult to navigate the e-learning tool and progress to the end of the resource. Computer confidence is a factor that could have contributed to either the low response rate from the total population, or over half of participants who completed the initial questionnaire but not the post-questionnaire. As no comparison data was collected, this cannot be confirmed in this study and can only be suggested.

6.5.1: User Feedback

Participants' experiences of the e-learning tool reflected that they found it improved knowledge of workplace wellness, and was useful and engaging (Figure. 5.7). The majority of staff and students also reported that they enjoyed being able to learn on their own and would recommend the tool to others. Open-ended feedback reflected participants' reasons for enjoying the e-learning tool; including the information/content provided, ability to engage with the tool, interactive quizzes throughout, and the use of engaging images, audio and interactions. These responses also revealed that the nature of the e-learning tool was concise and easy to use, with the interactions helping students and staff to be engaged and learn the information provided. As a result, almost all participants felt that following use of the e-learning tool had improved their knowledge of workplace wellness, and statistical analysis revealed that across all participants' knowledge improved significantly.

However, it should be noted that the responses given in e-learning evaluations may have been influenced by the self-selecting nature of the sample, and thus possible bias from participants' interest and enthusiasm for workplace wellness (Burns and Grove, 2010; Deniz and Citak, 2010). Although individuals who have an interest in the subject are more likely to access and complete the e-learning tool (Denis and Citak, 2010; Gerrish and Lacey, 2006; 2010), other e-learning studies have found similar results, with participants' valuing the engaging, interactive and flexible nature of e-learning (Keefe and Wharrad, 2012; Lymn et al, 2008 and Windle et al, 2010). These previous e-learning studies revealed that users mainly agreed or strongly agreed with statements regarding usability, thus highlighting the importance of interactivity, ease of use and flexibility. In particular, previous e-learning research has emphasised the importance of interactivity for enhancing learning for users (Windle, McCormick, Dandrea and Wharrad, 2010). By integrating a selection of audio, imagery and text, the workplace wellness e-learning tool can be argued to appeal to the wide audience of varied healthcare workers and students (Lymn et al; 2010), engaging visual, auditory and kinaesthetic learners simultaneously. With a third of participants' commenting that the tool was clear and easy to follow and nearly all users considering the tool a useful resource, this study can conclude that the diverse needs of learners were being met, thus leading to the enhanced knowledge seen through statistical analysis.

The evaluation of the e-learning tool also showed some criticisms, reflected in the open-ended responses. Areas where the resource could be improved mainly consisted of participants' considering the tool "too long" in length. However, with the majority of participants neither criticising nor complimenting the length of the tool, it can be assumed that it was an appropriate length for learners. Furthermore, in the delivery of the workplace wellness content, e-learning was chosen to deliver the content in a concise way. Berke and Wiseman (2003) estimate that e-learning

can save 60% of time in the delivery of learning. Therefore, it can be assumed that if the workplace wellness programme was a classroom teaching session, it would have taken at least 2.5 hours to deliver the same content. Despite some criticism of the length of the e-learning tool, this method of learning takes less time than classroom teaching (Berke and Wiseman, 2003), with added benefits of being flexible and accessible (Lymn et al, 2008).

Another criticism of the e-learning tool was that users wanted to be given their scores for the knowledge pre-questionnaire and post-questionnaire. Due to the nature of the study and the technology used, this was not possible within the e-learning tool itself. In order to respond to user comments, scores of both knowledge questionnaires were added to the completion certificates given to all users completing the e-learning tool.

Overall, the evaluation was largely positive and reflected comments seen throughout the e-learning literature. E-learning is a user friendly method of learning that can respond to the learning needs of a wide group of varied participants (Lymn et al, 2008). Moreover, interactivity and engaging the user is essential in e-learning, which was reflected in the evaluation of the workplace wellness e-learning tool and also seen in previous e-learning studies (Keefe and Wharrad, 2012; Lymn et al, 2008 and Windle et al, 2010).

6.6: Limitations of the Study

It is important to consider the limitations of the study, some of which have already been mentioned through the discussion of the research findings.

6.6.1: Response Rate

The response rate is a limitation of this study which has already been discussed in Chapter 6.1, p.59. The small sample size can be criticised for diminishing the validity and reliability of the conclusions (Polit and Tanato-Beck, 2008; Gerrish and

Lacey, 2006). However, due to the e-learning tool being offered as optional professional development, this response rate of self-selecting individuals is sufficient. Although, the self-selecting nature of the sample can be criticised for voluntary response bias (Burns and Grove, 2009).

6.6.2: Voluntary Response Bias

As identified in the response rate discussion, voluntary response bias is likely to have occurred in the research due to the self-selecting nature of the sample (Burns and Grove, 2009). This voluntary bias is a common criticism of many e-learning studies (Levine-Wissing and Thiel, 2006), and consequently, the results could be argued to show higher than average knowledge scores, as participants are likely to be those with an interest in the subject (Deniz and Citak; 2010). However, this was not reflected in the results of the pre-questionnaire, which revealed a significantly poor baseline knowledge of workplace wellness across participants. This may indicate that the sample recruited individuals who were not previously interested in the topic area. Alternatively, these results could be argued to show that baseline knowledge of those interested in workplace wellness is significantly poor and consequently the baseline knowledge of healthcare professionals generally is likely to be even poorer. In this study, it would not have been possible to identify if the sample population reflected higher knowledge scores or a higher interest in the topic area than the total population, as this would have required making the e-learning programme mandatory for a group of individuals.

Similarly, the high computer confidence described in the evaluation of the e-learning tool discussion could also be explained by this bias, with participants posessing low computer competence not accessing the e-learning tool. Moreover, this is likely to have also affected the e-learning tool post-questionnaire results, as those interested in the subject area (Deniz and Citak; 2010) with higher computer competence (Wilkinson et al, 2004 and McVeigh, 2009) may have more motivation

and skills to complete the e-learning tool. It can therefore be suggested that the knowledge and evaluation post-questionnaire scores may have shown higher than average responses to both the knowledge and evaluation questions, due to participant interest in the subject area and computer-literacy.

For minimisation of bias, randomised controlled trials are considered the 'gold standard' of research methods (Grossman and Mackenzie, 2005). In recruiting for this study, this would have reduced the voluntary bias, however this was not an appropriate design for this professional development tool evaluation study. For future-learning research, using a different method would help to minimise bias amongst knowledge score and evaluation results.

Response rate and voluntary response bias pose methodological issues which require caution when generalising the results of the study. However, these flaws are also seen across other published e-learning studies (Bloomfield, 2008; Keefe and Wharrad, 2012). Consequently, for the findings of this study to be confirmed, replication and extension by future studies is required (Bloomfield, 2008).

6.7: Strengths of the Study

Despite some limitations, the study also has significant strengths which will now be considered.

6.7.1: Content of the E-learning Tool

The e-learning tool covered a new area of learning which is not commonly in the healthcare curriculum, or easily available to healthcare staff. The literature review, alongside the poor knowledge of healthcare professionals seen in the pre-questionnaires, shows the need for an educational programme to teach healthcare professionals about the emerging topic of workplace wellness. This is a strength of the e-learning tool which this study has shown can significantly increase workplace

wellness knowledge, with potential implications for student and staff wellbeing and public health.

However, it can be argued that the development of e-learning involves a trade-off between engaging the user and the quality of content (Glen, 2005). In order to achieve appropriate and high quality content, a recognised evidence-based process was followed. This involved quality control and peer review throughout all stages of the process, whereby both users and experts in workplace wellness reviewed the accuracy and appropriateness of design (RLO-CETL, 2005). Through evaluation, this study can be seen to show success in achieving a balance between content and interaction, with comments reflecting user satisfaction with content and usability.

6.7.2: Sample

The range of participants from different occupations, student groups and employment, make the sample representative of the target population. This is a strength of the study, making it possible to generalise the conclusions to the total population.

6.7.3: Method

In e-learning, the method can often be criticised due to the success of e-learning measured with only qualitative evaluation tools. These are based purely on user opinions providing subjective accounts that do not reflect educational outcomes (Bloomfield, 2008). Through the use of a developed knowledge questionnaire, score accuracy of participants provided quantitative measures. This improves the methodology of the study, as objective measurements of learning were able to take place through statistical analysis of overall knowledge and also question specific analysis.

Moreover, steps were taken to eliminate threats to internal validity in the one-group design. With the pre and post-testing incorporated into the e-learning tool,

this ensured that testing took place immediately before and after the intervention, making it is plausible that the intervention was the cause of any identified changes (Polit and Tatano-Beck, 2008). This eliminated common criticisms of the one-group design, that it is difficult to conclude that a change in knowledge is as a result of the e-learning tool, and not from anything else that happened during this period (Macnee and McCabe, 2008). This methodology is consequently a strength of the study, reducing the likelihood of temporal and testing effects influencing the results. This study design allowed for a wide group of participants to be offered the e-learning tool, rather than a small sample such as one cohort or course, as seen in other e-learning studies (Keefe and Wharrad, 2012).

Overall, the study shows strengths in methodology, content and sample, thus improving the ability for effects to be linked to the intervention and for conclusions to be applied to the wider total population.

6.8: Conclusion and Summation of Findings

At the time of writing this is the first study to measure healthcare staff and student knowledge and understanding of workplace wellness, and present an intervention to improve the knowledge deficit. This project identifies the growing importance of workplaces as health promotion settings (WHO; 2011b) and the vital part large healthcare organisations have in the improvement of public health and wellbeing. In targeting this vocational population, e-learning was chosen to provide flexibility and accessibility for participants, alongside further benefits of reaching a large number of users with consistent education (Jefferies, 2001; Rivers, 2007).

Development of the e-learning tool was a significant part of this dissertation project, requiring a substantial amount of time from the researcher, 14 workplace wellness experts and a group of pilot participants. This process followed a recognised pathway to ensure appropriate and high quality content and design of the e-learning programme. Through expert peer review, the e-learning tool and

incorporated questionnaires were developed to include 6 key workplace health topics; work-related stress, musculoskeletal disorders, diet and nutrition, physical activity, smoking and alcohol consumption. Following the detailed development process, the e-learning tool was made available online and offered as optional professional development for healthcare staff and students.

Through pre-questionnaire analysis, this study identifies a significant workplace wellness knowledge deficit amongst healthcare staff and students. This poor knowledge was found to be unrelated to experience, study or occupation, showing concerning knowledge deficits of key health promotion recommendations relating to physical activity and alcohol consumption. Thus, a significant need to improve the workplace wellness knowledge of healthcare staff and students was identified.

From statistical analysis, effect size and question specific analysis, this study is able to conclude the success of the e-learning tool in improving the knowledge of workplace wellness amongst healthcare staff and students. This tool was shown to be an effective method for improving knowledge and was also widely accepted by participants as a useful resource that they would recommend to others.

With the poor workplace wellness knowledge likely to be poorer amongst healthcare staff and students who do not have an interest in this subject area (Deniz and Citak, 2010), this study concludes that knowledge of workplace wellness is poor across healthcare staff and students. As healthcare professionals require workplace wellness knowledge in order to fulfil their role in health promotion, this requires specific action to improve knowledge amongst healthcare professionals. Implementation of the e-learning tool on a wider scale has promising potential for improving healthcare students and healthcare professionals' ability to be role models, and moreover, will contribute to a "culture of health" across healthcare settings (Blake and Harrison, 2013; Musich et al, 2009).

6.9: Implications for the Future

Through the use of e-learning this innovative student project identifies a significant deficit in workplace wellness knowledge amongst healthcare staff and students. Consequently, there is a need to improve the workplace wellness knowledge of individuals in healthcare and health related higher education settings in order for healthcare professionals to fulfil their role in the health promotion agenda (DH, 2011d; DH, 2011c; Boorman, 2009). Due to the success of the e-learning tool in improving workplaces wellness knowledge, this tool should be implemented across wider health related settings to increase knowledge. This is important across the whole of these organisations for achieving a "culture of health" (Musich et al, 2009), but is most important amongst those who have a role in health promotion to others (DH, 2009a; DH, 2009b; DH, 2011c).

Overall, the study shows that the e-learning tool developed improved knowledge of workplace wellness, and is considered acceptable and recommended by participants. Consequently, this resource would be most useful if incorporated into workplace mandatory training and made available across healthcare curriculums. Moreover, this resource could be used as a professional development tool to support the development of workplace health champions (Blake and Chambers, 2011).

In taking the e-learning tool forward, permission has been granted by a local NHS trust human resources department for the e-learning tool to be made available to over 13,000 employees. Moreover, current liaising is taking place with the professional development and human resources department at a large university in the UK, to make the e-learning tool more widely available to staff and students. For the future, this should improve poor knowledge of workplace wellness amongst these groups, encouraging individuals to reflect on their own health and promote healthy behaviours to others.

This study also has implications for future research into e-learning. The study identified confidence in computers as a possible factor influencing participation and completion of e-learning. Specific research assessing the impact of computer competency on the reliability and validity of e-learning study conclusions is required to improve the generalisability of this study's conclusions. Furthermore, this e-learning study supports the use of e-learning and blended learning in healthcare education, with positive quantitative results and user feedback on this method of learning.

From this study, it is hoped that further research and implementation of interventions to improve healthcare professionals' knowledge and understanding of workplace wellness will take place. Moreover, widespread implementation of the workplace wellness e-learning tool or an alternative flexible and accessible learning method could influence culture change and health promotion across healthcare settings, leading to healthier, happier staff and better patient outcomes (DH, 2011c).