

The subjective wellbeing of healthcare staff and their patients

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Research

Keywords: subjective wellbeing, patient satisfaction, EQ5D, nurses, patients

Posted Date: January 15th, 2020

DOI: <https://doi.org/10.21203/rs.2.20895/v1>

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Abstract

Subjective wellbeing (SWB) is a broad category of phenomena that includes people's emotional responses, domain satisfactions (e.g., health or work), and global judgements of life satisfaction. Measures of SWB offer a means to gauge the impact of events in the lives of individuals. This article examines for the first time the ways in which measures of SWB can be used within a healthcare setting, which brings a new perspective to the way that SWB is considered and applied in determining health policy. The research uses methods for SWB data collection developed through innovative empirical work. The study is a cross sectional survey of the adult inpatient population of an NHS hospital and the nurses caring for the patients, which was undertaken at two time points: summer and winter. This work on the SWB of the staff and inpatients of an acute NHS hospital generated new data sets in clinical populations. The SWB of patients was shown to be significantly affected by severe levels of EQ5D states. When considering the data on a ward-by-ward basis, it was shown that nurses health and job satisfaction were important determinants of patient SWB. We discuss the implications of this research and explain how, when and where SWB measures, when used in healthcare, can be used in health policy. We offer a novel perspective that ensures a greater focus is placed on the way that patients experience health interventions when developing health policy.

1. Subjective Wellbeing And Health

When thinking about the effectiveness of health care it is all too easy to get caught up in health metrics and performance measures, and to lose sight of the main goal of making people better. Not enough notice is taken of how health care affects the lives of our patients overall, and in this research we aim to explore how global measures of subjective wellbeing (SWB) can be used in health care settings to benefit patients and inform policy makers. These considerations are applied with new clinical studies that use SWB measures directly, for both patient and staff populations in clinical environments. The ways in which these measures of SWB can be used at policy levels are also examined and SWB measures are considered in relation to how, when and where they have a role in health policy.

The necessity to demonstrate the effectiveness of health care interventions and treatments has formed the basis for evidence based care ([Sackett et al., 1996](#)) and this has led to significant improvements in way that care is delivered and choices regarding health care are made. Until relatively recently the evidence used in making these decisions has tended to be derived from clinical outcome data (e.g. mortality, survival, or infection rates), which has had a significant effect in shaping the way major health problems are tackled (e.g. use of statin therapy to reduce risk of cardiovascular mortality ([The Scandinavian Simvastatin Survival Study Group, 1994](#))). In the last thirty years however, emphasis has also been placed on the way in which health technologies have an impact on the lives of those receiving care. This has led to both the development of methods for valuing the relative cost effectiveness of treatments and also the emergence of a myriad of patient reported outcome measures (PROMs).

Whilst individually these objective and subjective measures can tell us something about a particular aspect of a patient's life or response to treatment, they often provide an incomplete picture of what individuals are actually experiencing. For example, somebody with knee pain may score poorly on a PROM gauging pain and impact on mobility, but it actually may not impact that much on their life as a whole. This is a stylised example, but the idea that we are missing both a global evaluation and an assessment of experience (or experienced utility as economists would say) in appraising the effectiveness of health care is important and one that is becoming increasingly high profile (Chalkidou et al., 2009; Dolan, 2009; Richardson, 2002).

There is a wealth of research into such global measures of SWB in other domains such as crime and the environment (Clark et al., 2008; Kahneman & Krueger, 2006), and there have also been arguments calling supporting the use of SWB in particular clinical contexts (Cummins et al., 2004). There is a lack of clarity, however, both in terms of using them in meaningful ways in clinical environments and joining these measures up at a policy level. The manner in which these global measures of SWB can be defined, applied and integrated into health care and health policy will form the body of my thesis.

2. Accounts Of Subjective Well Being

It is helpful at this stage to consider the nature and construct of SWB, along with how best it has been and could be used in relation to health care and health policy. The three accounts of SWB proposed by Parfit (Parfit, 1984) that allow for measurement of SWB over time and in response to health care interventions are objective lists; preference, satisfaction and mental states (or SWB).

Objective list accounts of SWB are based on assumptions about basic human needs and rights, and Sen (1992) famously argues that the satisfaction of these needs helps provide people with the capabilities to 'flourish' as human beings. In simple terms, people can live well and flourish only if they first have enough food to eat, are free from persecution, are protected from danger. In this way SWB can be measured against a list of set of capabilities. The preference satisfaction account is more closely aligned to a traditional economists view of what should make people happy, ie more income (Dolan, Peasgood, & White, 2008). At the simplest level, "what is best for someone is what would best fulfil all of his desires" (Parfit, 1984). This account may be well suited to certain areas of policy research, but does not lend itself to work within the health care sector.

SWB is a relative newcomer in terms of its relevance politically and its robustness empirically. Generally, SWB is measured by simply asking people about their happiness. In this sense, it shares the democratic aspect of preference satisfaction, in that it allows people to decide how good their life is going for them, without someone else deciding their wellbeing (Graham, 2008).

There have been a number of definitions of the mental state account of SWB over the years, and constructs of SWB overlap into the fields of health, psychology and philosophy. SWB can be considered as 'a person's cognitive and affective evaluations of his or her life' (Diener, Lucas, Oishi, & Suh, 2002, p. 63). The cognitive element refers to the evaluative aspect of SWB, namely what we think about our life

satisfaction overall, or in relation to specific domains. The affective element refers to emotions, moods and feelings, and is a more experiential element of SWB.. Its theoretical rigour extends back to Bentham (1789) who provided an account of wellbeing that is based on pleasure and pain, and which provided the background for utilitarianism. Affect is considered positive when the emotions, moods and feelings experienced are pleasant and negative, when the emotions, moods and feelings experienced are unpleasant. A person who has a high level of satisfaction with their life, and who experiences a greater positive affect and little or less negative affect, would be deemed to have a high level of SWB.

A final dimension of SWB that should be considered is the eudemonic dimension, and relates to higher levels of psychological needs, such as meaning, autonomy, control and connectedness (Ryff, 1989), which contribute towards wellbeing independently of any pleasure they may bring (Hurka, 1993). In some ways these constructs can be considered as objective lists, but they are subjectively experienced and relate to individual interpretation and as such are best thought of as a separate dimension. The recent progress made in measuring the SWB of large populations has sought to capture each of these domains of SWB, so as to provide a rich landscape of information at several levels for analysis.

3. Patient And Staff Swb

There is growing interest in the use of Subjective Well Being (SWB) in different populations and measuring impacts using the SWB approach is supported at the highest level (H.M. Treasury, 2008). Within health care and health policy there are similar gains to be made in quantifying the impact of care through utilising these measures of SWB. The macro level considerations have focused on resource allocation methodologies (Dolan et al., 2009; Dolan et al., 2012). There are also compelling arguments at the micro level by which to measure the impact of health care interventions (or treatments) such as surgery on SWB (Lee et al., 2013). There is, however, more to be said on the use of SWB in clinical populations, as the patient can be said to be only one side of the story.

SWB is affected by a host of factors that are experienced by patients whilst they undergo treatment, such as environment, infection, severity of health condition and pre-existing SWB. It is also the case however that the interpersonal relationships patients have with those directly looking after them are important (Jackson et al., 2001). The kind acts that are performed by an empathetic nurse in the middle of a hectic shift are often remembered and valued by patients a long time after discharge from hospital, and equally, or perhaps more so, poor experiences of care givers are also often recounted to friends and may impact on future treatment experiences. During the treatment experience, patients in hospital spend a great amount of time with those who are caring for them directly, and as such may well be affected by how things are going in the lives of the nurses caring for them.

This article sets out to examine the impact of the SWB of nurses on the patients that they are looking after: do happy nurses have happier patients? In adopting the use of measures of SWB at a micro level within a hospital population, it will be possible to say more about how SWB of patients and nurse is affected by different levels of health, and also by each other.

3.1. Background

Measures of SWB are very well suited to capturing the experiences of patients, but we also know that they can have applications in a whole range of other non-patient populations (Stiglitz et al., 2010). The work reported here takes forward this notion. Specifically it sets out to capture the dynamic between patient and staff SWB and to link these data to existing measures of patient experience, self-reported measures of health, and externally observed parameters, such as length of stay and markers of infection. This is a new development in SWB research and is the first of study to do this.

Patient experience gains a great deal of attention in many significant health policy initiatives (Darzi, 2008) and yet there is a lack of consensus as to what this term means, and how to value this (Pettersen et al., 2004). Strategies aimed at improving patient experience can in turn be difficult to assess in light of this uncertainty. An initial consideration of what is already understood about the wellbeing of nurses and the dynamics between patient experience (and SWB) and staff wellbeing is warranted ahead of designing the clinical study.

There are inherent benefits in having a workforce with high wellbeing, and in the late 2000s there was a growing acknowledgement that it would be helpful to know more about the wellbeing of the NHS workforce, in part as a response to the Dame Carol Black's report on the health of the UK's working age population (Black, 2008). The response to this from the Department of Health was a far reaching review of the staff wellbeing within the NHS (Boorman, 2009) along with a host of recommendations for NHS Trusts to implement in order to safeguard the working lives of NHS staff.

The review undertakes a detailed examination of the working lives of NHS staff, including health behaviours such as smoking habits, alcohol consumption, subjective accounts of health and stress, alongside levels of sickness and presenteeism. In a similar vein to many reports and discussions on "well-being" however, the report does not clearly explain what is meant by "well-being" and as such it is left as a somewhat ill-defined construct related to health and prosperity in relation to work. The author does not use the term "well-being" to refer to SWB as has been defined within the social science literature (e.g. Diener's definition of SWB, Diener et al., 1999), but the report does not necessarily suffer from this. What sets it apart from other papers and studies with the field of occupational health in a health care setting is the inclusion of measures of overall life satisfaction within the study. This is a key measure of SWB (Dolan et al., 2011) and as such the report is an important comparator for any work into the SWB of health workers in the UK, or other developed health care systems. The details of the research that supported the review are set out in more detail in an accompanying report (Van Stolk et al., 2009).

Summary data suggested that most (78% of >13000 responses) were satisfied with their lives overall, but that employees with self-reported mental illness reported 31% lower rates of life satisfaction and 20% lower for those with self-reported physical impairments. The report defines sleep deprivation as <6hours of sleep per night and found that employees who reported being sleep deprived also reported being less satisfied. A wealth of additional data relating to number of days of sick leave and subjective feelings of

pressure to return to work are also presented, along with other data relating to more traditional occupational health matters.

The annual NHS staff survey is a further well-known measure of the health and “wellbeing” of NHS staff, and this has been in existence since 2003. Initially set up and by the Health care Commission it is now owned by NHS England and run by the Picker Institute. The survey sets out to gauge the attitude and experiences of NHS staff and to allow NHS Trusts to benchmark their performance in this area against key national guidelines, as well as helping to inform on safety and quality issues. The work does not however measure any domain within its current guise that can be used as a proxy for SWB. It does provide a set of established questions however, that can be included within studies that seek to capture the satisfaction of health care staff along with results. There exists a wealth of additional literature surrounding employee satisfaction with different dimensions of the working environment, and the implications that these factors can have in terms of rates of absence and projected harm and financial expenditure. There is however a lack of work that explicitly measures the SWB of staff in clinical environments.

This study seeks to build on what is already known about patient and staff satisfaction and SWB. There is a lack of evidence in this area and until now there has been no study that examines the SWB profile of staff and patients with and NHS hospital in such a systematic manner. The broad objective is to determine any associations between the health and SWB of patients and the nurses looking after them.

3.2. Aims and objectives

This study aims to measure the SWB and health of an entire inpatient population in an NHS hospital, alongside that of the nurses caring directly for these patients. Specific objectives are to:

1. Identify the determinants of SWB in terms of health and other factors for both the inpatient population of an entire hospital and the nurses looking after them
2. Establish the nature of any associations between patient and staff wellbeing – do happy nurses make happy patients?
3. Determine whether patient satisfaction affects SWB

3.3. Methods

The study is a cross sectional survey of the entire adult inpatient population of an NHS hospital and the nurses caring for the patients at the time of the study. In order to increase the sample size the study was undertaken at two time points, one in the summer and one in the winter. All eligible hospital inpatients were invited to participate in the study and data was collected using a brief self-completed questionnaire.

3.3.1. Inclusion criteria

All adult inpatients resident on surgical, medical and gynaecology wards were invited to participate by the researcher. The study questionnaire was only available in English and patients unable to complete this were excluded. It was decided to exclude the paediatric population as this would be a small sample size and the SWB and health measures used are less well validated for paediatric inpatient populations. A further exclusion was made for the patients admitted to the Intensive Care Unit at the time of the study due to reduction in level of cognition and consciousness associated with this population.

Decisions regarding the eligibility for those patients on general wards with reduced levels of consciousness were also made in the study protocol. It was decided that individuals identified by ward nurses as having reduced consciousness as measured by the Glasgow Coma Scale (GCS) due to medical illness would not be invited to participate. This was a broad measure of inclusion/exclusion, and the most common reason for non-inclusion was “confusion”, which equates to a GCS of 14/15. The rationale behind this exclusion was that although certain individuals with confusion may be able to report on their SWB (e.g. those with early dementia), this may not be the case for all such patients. Given that this work is pioneering in many respects the criteria for inclusion on this issue were high.

3.3.2. Study measures

In order to address each of the aims of the study it was necessary to collect information from patients and nurses over four key areas: patient/staff SWB, patient/staff health, patient/staff satisfaction (either with care for patients or job satisfaction for nurses), patient/staff background and demographics. The measures are summarised in Table1 (see Supplementary Material 1 for detailed description and justification).

3.3.3. Sample size

The study site hospital has a total of 495 inpatient beds, although during the study period due to improvement works this was reduced to 460. The total number of eligible beds was 378, after excluding paediatric and critical care patients. This gives 378 patients eligible for inclusion on two sampling occasions, a total of 756. The number of nurses eligible for inclusion is more variable, due to day-to-day staffing variations. Consultation with the senior nursing team at the study site suggested that between four and six nurses would be on duty on each of the ten wards within the study. Accordingly the sample size would be between 40-60 nurses for each study period, giving a total of 80-120 for the study.

3.3.4. Study protocol

On the days of the study all adult wards were visited by the researcher, who invited all eligible in patients to complete the study questionnaire. Patients were able to receive assistance in completing the questionnaire but it was made clear that the responses must be from the patient themselves and not on

their behalf. All nurses directly caring for the patients at the time of the study (i.e. all the nurses on shift at the same time as the study) were invited to complete the nurses questionnaire.

Patients and staff were then asked to complete the study questionnaires within a 3 hour time period on the same day for two different days of the year. The data was collected in the afternoon so as not to interfere with morning clinical ward rounds. The researcher collected all results on the same day and transcribed these to a database for analysis.

Ethical approval was sought for the study but the Research Ethics Committee deemed that none was necessary as no novel intervention or change in procedure was being investigated. The study was discussed with the patient experience team and the senior nursing team ahead of the study, and both groups were supportive of the work. A consent signature was included in the first page of the study to ensure the work was carried out to best practise principles.

3.4. Results and analysis

The results are divided into the descriptive statistics to summarize the basic demographic and background information of both the patient population within the study and the nurses who were enrolled. Regression analyses were then used to show the relationship between SWB and health state (EQ5D) for both the inpatient cohort and the nurses looking after them (directly addressing objectives 1 and 3). Given the fact that the data for this cross sectional study were taken once in the summer and once in the winter, the t-test was used to compare SWB of patients and their health state (EQ5D) during the summer and winter period. Finally, a correlation analysis was used to determine the relationship between the patient and nurse staff wellbeing, as well as between job satisfaction of nurses and their length of time as a nurse.

3.4.1. Descriptive statistics

The sample of the study consisted of 73 nurses and 446 inpatients from a cohort of an entire hospital. The trial flow diagrams are shown in Figure 1 for the patients and Figure 2 for the nurses. The summary of their demographic information can be seen in Supplemental Material 2.

3.4.2. Relationship between SWB and health state for the nurses

A multiple linear regression model was conducted to identify the determinants of SWB of the nurses looking after the patients within the study population. This analysis determined of the extent of the association of the independent variables of the EQ5D health state of mobility, self-care, usual activities, pain/discomfort, and anxiety/depression of the nurses on the four dependent SWB variables of life satisfaction, happiness yesterday, anxiety yesterday, and life being worthwhile. Other independent variables included in the model were age, gender, energy yesterday, sleep yesterday, smoking status,

marital status, having children, feeling valued by the employer, whether they would recommend the hospital to a friend or not, and overall satisfaction with job.

Each of the dependent variables (dimensions of SWB) has a separate regression model to determine whether the influence of each of the five dimensions of EQ5D health state, and other independent variables, were significant predictors or not. The regression model created dummy variables for each of the independent variables of five dimensions of health state of mobility, self-care, usual activities, pain/discomfort, and anxiety/depression; gender, smoking status, marital status, having children, valued by the employer, and the staff member recommended hospital to a friend or not, for each of their respective categorical groupings since these variables were categorical measured variables. The detailed results are presented in Table 5 in Supplemental Material 2. A level of significance of 0.05 was used in the regression analysis.

First, the effects of the five dimensions of health state on the life satisfaction dimension of SWB were investigated. The results showed that none of the independent variables of mobility level 2 ($t(73) = 0.64, p = 0.52$), pain/discomfort level 2 ($t(73) = 0.55, p = 0.55$), anxiety/depression level 2 ($t(73) = -1.02, p = 0.31$), and anxiety/depression level 3 ($t(73) = -0.57, p = 0.57$) have any significant influences to the life satisfaction dimension of SWB since the p-values were all greater than the level of significance value of 0.05. Only the independent variable of overall job satisfaction ($t(73) = 2.42, p = 0.02$) had a significant influence on the life satisfaction dimension of SWB for the nurses. The unstandardized beta coefficient was analyzed to determine the independent contribution and the relative importance of overall job satisfaction job in predicting the life satisfaction dimension of SWB. The beta value of overall job satisfaction was 0.35. This suggests that overall job for the nurses has positive contribution to the model in predicting their life satisfaction. The life satisfaction of the nurses increases by 0.35 if their overall satisfaction with their job increases.

Second, the effects of the five dimensions of health state on the happiness yesterday domain of SWB were investigated. The results also showed that none of the independent variables of mobility level 2 ($t(73) = 0.68, p = 0.50$), pain/discomfort level 2 ($t(73) = -0.13, p = 0.90$), anxiety/depression level 2 ($t(73) = -1.65, p = 0.11$), and anxiety/depression level 3 ($t(73) = -1.30, p = 0.20$) had any significant influence to the happiness yesterday domain of SWB since the p-values were all greater than the level of significance value of 0.05. This showed that the health states of the nurses were not significantly related to the happiness yesterday domain of SWB. Also, the demographic variable of age ($t(73) = 0.88, p = 0.38$), energy yesterday ($t(73) = 1.02, p = 0.31$), sleep yesterday ($t(73) = 0.58, p = 0.57$), and the categorically measured demographic variables of gender (female) ($t(73) = -0.29, p = 0.77$), smoking status (no) ($t(73) = 0.57, p = 0.57$), marital status (married) ($t(73) = -1.40, p = 0.17$), have children (no) ($t(73) = 0.12, p = 0.91$), valued by employer (no) ($t(73) = -1.10, p = 0.92$), staff member recommend hospital to a friend or not (no) ($t(73) = -0.43, p = 0.67$), and overall satisfaction with job ($t(73) = -1.22, p = 0.23$) also did not have any significant influence on the happiness yesterday domain of SWB.

Third, the effects of the five dimensions of health state on the anxiety yesterday domain of SWB were investigated. The results showed that only the independent variables of anxiety/depression level 2 ($t(73) = 3.09, p < 0.001$) and anxiety/depression level 3 ($t(73) = 3.25, p < 0.001$) had a significant influence to the anxiety yesterday domain of SWB, since these were the only p-values less than the level of significance value of 0.05. The beta values of anxiety/depression levels 2 and 3 were 1.92 and 3.61, respectively. This suggests that both anxiety/depression levels 2 and 3 have a positive contribution to the model in predicting their SWB in terms of anxiety yesterday. The anxiety yesterday score increases by 1.92 if the patients have a level 2 anxiety/depression health state while their anxiety yesterday score increases by 3.61 if they report a level 3 anxiety/depression health state. This result suggests that nurses having more severe health state levels of anxiety/depression will have lower levels of SWB as measured by anxiety yesterday.

Lastly, the effects of the five dimensions of health state on the life being worthwhile dimension of SWB were investigated. The results also showed that only the independent variables of anxiety/depression level 2 ($t(73) = 3.09, p < 0.001$) and anxiety/depression level 3 ($t(73) = 3.25, p < 0.001$) have significant influence to the life being worthwhile dimension of SWB for the nurses, since these were the only p-values less than the level of significance value of 0.05. The beta values of anxiety/depression levels 2 and 3 were -0.71 and -0.97, respectively. This suggests that both anxiety/depression levels 2 and 3 both have negative contributions to the model in predicting their life being worthwhile dimension. The life being worthwhile dimension of SWB decreases by 0.71 if the nurses have a level 2 anxiety/depression health state and by 0.97 if they report a level 3 anxiety/depression health state. This result suggests that nurses having more severe health state levels of anxiety/depression will have lower levels of SWB as measured by anxiety yesterday.

3.4.3. Relationship between SWB and health state for the patients

Another multiple linear regression model was conducted to determine the determinants of SWB for the patients. This analysis determined the extent of the association of the independent variables of the different dimensions of EQ5D health state and the dependent variables of the four dimensions of SWB (life satisfaction, happiness yesterday, anxiety yesterday, and life being worthwhile). Other independent variables included in the model were age, gender, energy yesterday, sleep yesterday, smoking status, marital status, having children, surgery on this admission, treated for infection, overall satisfaction with care, satisfaction with doctors, satisfaction with nurses, satisfaction with communication, mean satisfaction scores, and length of hospital stay.

Each of the dimensions of the dependent variable of SWB for the patients have separate regression models to determine whether the influence of each of the five dimensions of health state and other independent variables were significant predictors or not. The regression model created dummy variables for each of the independent variables of five dimensions of health state of mobility, self-care, usual activities, pain/discomfort, and anxiety/depression, gender, smoking status, marital status, having

children, having surgery, and being treated for infection, for each of their respective categorical groupings since these variables were categorical measured variables. The results are presented in Table 6 in Supplemental Material 2. A level of significance of 0.05 was used in the regression analysis.

First, the effects of the independent variables on the life satisfaction dimension of SWB were investigated. The results showed that self-care level 3 ($t(446) = -2.50, p = 0.01$), pain/discomfort level 3 ($t(446) = -3.33, p < 0.001$), and anxiety/depression level 3 ($t(446) = -5.35, p < 0.001$) have significant influences on the life satisfaction dimension of SWB, since these were the p-values less than the level of significance value of 0.05. The unstandardized beta coefficient was analysed to determine their independent contribution and relative importance. The beta values of self-care level 3, pain/discomfort level 3, anxiety/depression level 3 were -0.48, -0.68, and -1.03, respectively. This suggests that self-care level 3, pain/discomfort level 3, and anxiety/depression level 3 have significant negative contributions to the model in predicting life satisfaction of the patients. The life satisfaction for patients decreases by 0.48 if they have level 3 self-care; decreases by 0.68 if they have level 3 pain/discomfort; and decreases by 1.03 if they have level 3 anxiety/depression health state. This result shows that patients that self report more severe health states for self-care, pain/discomfort, and anxiety/depression will have lower levels of SWB as measured by life satisfaction.

Alongside the independent variable of health state, the independent variables of energy yesterday ($t(446) = 3.47, p < 0.001$) and the demographic information of smoking yesterday (no) ($t(446) = 2.33, p = 0.02$) have also significant influences to the life satisfaction dimension of SWB. The beta values for energy yesterday and smoking status (no) were 0.13 and 0.24, respectively indicating that energy yesterday and smoking status (no) have positive contributions to the model in predicting the life satisfaction domain of SWB for patients. The life satisfaction increases by 0.13 for every one increase of their energy yesterday score; and increases by 0.24 for non-smokers, meaning that non-smoking patients who report higher energy levels have higher levels of life satisfaction.

Second, the effects of the five dimensions of EQ5D health state of patients on the happiness yesterday dimension of SWB were investigated. The results show that the independent variables of mobility level 2 ($t(446) = -2.29, p = 0.02$), mobility level 3 ($t(446) = -2.73, p = 0.01$), and anxiety/depression level 3 ($t(446) = -3.89, p < 0.001$) have significant influences to the happiness yesterday dimension of SWB, since the p-values are less than the level of significance value of 0.05. The beta values of mobility level 2, mobility level 3, anxiety/depression level 3 were -0.21, -0.42, and -0.70, respectively. This suggests that mobility level 2, mobility level 3, and anxiety/depression level 3 have significant negative contributions to the model in predicting happiness yesterday of the patients. The happiness yesterday SWB score decreases by 0.21 if they have level 2 mobility; decreases by 0.42 if they have level 3 mobility; and decreases by 0.70 if they have level 3 anxiety/depression health state. This shows that the patient EQ5D health states for mobility and anxiety/depression were negatively significantly related to the happiness yesterday dimension of SWB. This means that patients who report more difficulty with their mobility and more anxiety and depression will have lower levels of SWB, as measured by happiness yesterday.

Aside from the independent variable of health state, the independent variable of sleep yesterday ($t(446) = 3.26, p < 0.001$), demographic information of gender (female) ($t(446) = -1.99, p = 0.05$), marital status (widowed) ($t(446) = -2.07, p = 0.04$), and surgery (no) ($t(446) = -2.22, p = 0.03$) have also significant influences on the happiness yesterday dimension of SWB. The beta values for sleep yesterday, gender (female), marital status (widowed), and surgery (no) were -0.17, 0.09, -0.26 and -0.20, respectively, indicating that gender (female), marital status (widowed), and surgery (no) have negative contributions while sleep yesterday has positive contribution to the model in predicting the happiness yesterday of patients. The happiness yesterday of inpatient cohort of an entire hospital increases by 0.09 for every one increase of their sleep yesterday score; decreases by 0.17 for female patients; decreases by 0.29 for widowed patients; and decreases by 0.20 for those who have not experienced surgery.

Third, the effects of the five dimensions of EQ5D health state of patients on the anxiety yesterday dimension of SWB were investigated. The results showed independent variables of anxiety/depression level 2 ($t(446) = 6.43, p < 0.001$) and anxiety/depression level 3 ($t(446) = 8.73, p < 0.001$) have significant influences on the anxiety yesterday dimension of SWB, since these were the p-values less than the level of significance value of 0.05. The beta values of anxiety/depression levels 2 and 3 were 0.96, and 2.44, respectively. This suggested that anxiety/depression levels 2 and 3 have significant positive contributions to the model in predicting anxiety yesterday of the patients. The anxiety yesterday SWB score increases by 0.96 if they have level 2 anxiety/depression, and increases by 2.44 if they have level 3 anxiety/depression health state. This positive and significant means that those in more severe EQ5D states of anxiety/depression will report higher anxiety scores and experience lower levels of SWB.

The independent variable of energy yesterday ($t(446) = -1.95, p = 0.05$) also had a significant influence on the anxiety yesterday dimension of SWB. The beta values for energy was -1.10 indicating that energy yesterday has negative contribution to the model in predicting the SWB in terms of anxiety yesterday for patients. The patient SWB scores for anxiety yesterday decreases by 0.10 for every one increase of their energy yesterday score.

In the fourth regression model, the effects of the five dimensions of health state on the life being worthwhile dimension of SWB were investigated. The results show that only the independent variable of anxiety/depression level 3 ($t(446) = -2.54, p = 0.01$) had significant influence on the life being worthwhile dimension of SWB. The beta value of anxiety/depression level 3 was -0.54. This suggests that EQ5D anxiety/depression level 3 has a significant negative contribution to the model in terms of predicting life being worthwhile for the patients. The patient life being worthwhile SWB score decreases by 0.54 if they report EQ5D state level 3 for anxiety/depression. This means that that the health state of anxiety/depression was negatively significantly related to the life being worthwhile dimension of SWB, and it follows that patients who report the most severe EQ5D health state of anxiety/depression will have lower levels of SWB as measured by life being worthwhile.

In addition to this, the independent variables of energy yesterday ($t(446) = 01.97, p = 0.05$) and surgery (no) ($t(446) = -1.99, p = 0.05$) have also significant influences to the life being worthwhile dimension of

SWB. The beta values for energy yesterday and surgery (no) were 0.08 and -0.21, respectively, indicating that surgery (no) had a negative contribution while energy yesterday has positive contribution to the model in predicting the life being worthwhile SWB dimension for patients. The life being worthwhile SWB score increases by 0.08 for every one increase of their energy yesterday score and decreases by 0.10 if the patient has not experienced surgery.

3.4.4. Comparison of SWB and self-reported health score (EQ5D-VAS) between summer and winter

The t-test was conducted to compare the health state and subject of well-being of the nurses and inpatient cohorts during two measurement points of summer and winter. A level of significance of 0.05 was also used in the hypothesis testing. Descriptive statistics of the SWB dimensions of life satisfaction, happiness yesterday, anxiety yesterday, life being worthwhile, and the further variables of energy yesterday, and sleep yesterday, and the EQ5D visual analogue scale for self-rated health score of the nurses and patients are summarized in Table 7 in Supplemental Material 2.

For the SWB dimensions, the mean comparison showed that the nurses and inpatient cohorts have higher life satisfaction, happiness, energy yesterday, and sleep yesterday during the summer than in the winter. These were because the mean scores during summer were higher than during winter. The anxious yesterday and worthwhile life scores were higher during the winter than in the summer.

For the health state comparisons it is not possible to compare EQ5D states on a continuous scale, however the EQ5D visual analogue scale was collected and this was used as a self-reported health state as a continuous variable. The nurses and patients both reported better health states in terms of the EQ5D visual analogue score in the summer than in the winter. The mean differences were further validated by the t-test of difference to see if the differences are significance or not, based on the t statistics at the level of significance of 0.05.

The resulting statistic of the t-test of differences of the SWB and EQ5D visual analogue score between the summer and winter are shown in Table 8 in Supplemental Material 2. This shows that the SWB dimensions of happiness yesterday ($t(517) = 2.79, p = 0.01$), energy yesterday ($t(484.17) = 2.56, p = 0.01$), and sleep yesterday ($t(477.44) = 3.00, p < 0.001$) were significantly different between the summer and winter period. The mean difference showed that the SWB in terms of happiness yesterday (Mean difference = 0.23), energy yesterday (Mean difference = 0.29), and sleep yesterday (Mean difference = 0.44) of nurses and inpatient cohorts was significantly greater in the summer season than in the winter season; but that there was no significant difference in the EQ5D visual analogue health score between the seasons.

3.4.5. Relationship between patients' and nurses' health and SWB

In order to examine any potential relationship between the SWB of the patients and the health and SWB of the nurses a set of regressions were run using the patient SWB as the dependent variable and the nurses' health and SWB as the independent variables. The final analysis in this section sets out to determine the impact of nurse SWB and health on the SWB of the patients. In order to run a regression analysis to see whether the nurses' health and SWB is a determinant of the SWB of the patients it is necessary to provide values of the nurses scores that correspond to each patient. It is thus necessary to identify the nurse that has looked after each individual patient, or to provide an aggregated score at a ward level. On a practical level patients are primarily looked after by one nurse per shift, but over a period of days the care received would be provided by a number of different nurses depending on shift pattern, annual leave and other considerations. Accordingly the mean health and SWB scores for the nurses on each ward were calculated and used as independent variables. This approach allows for the variation that will inevitably be seen within the staff population and takes into account the dynamic status of nursing care provided.

The SWB score for the nurses was calculated by generating the mean SWB for each nurse as a mean of the four SWB domains (anxiety was reverse coded to give a maximum anxiety of 10 and a minimum of 0). The mean of this compound value was then taken for the nurses working on each ward. The "mean nurses' health score" was the self-rated EQ5D-VAS, which was also averaged for the nurses on each ward. The third independent variable used in this analysis was the "mean nurses job satisfaction" for the nurses working on each ward. The detailed results are shown in Table 9 in Supplemental Material 2.

First, the effects of the independent variables on the life satisfaction dimension of SWB were investigated. The results showed that the mean nurses' health score ($t(446) = 2.12, p = 0.04$) and the mean nurses' job satisfaction ($t(446) = 2.65, p = 0.01$) both have significant influences on the life satisfaction dimension of SWB, since the p-values are less than the level of significance value of 0.05. The unstandardized beta coefficient was analysed to determine their independent contribution and relative importance. The beta values of the mean nurses' health score and mean job satisfaction were 0.14 and 0.15 respectively. This suggests that both have significant positive contributions to the model in predicting life satisfaction of the patients.

Next, the effects of the independent variables on the happiness yesterday dimension of SWB were investigated. The results showed that the mean nurses' job satisfaction ($t(446) = 2.49, p = 0.01$) has a significant influence on the happiness yesterday dimension of SWB, since the p-value is less than the level of significance value of 0.05. The unstandardized beta coefficient was analysed to determine their independent contribution and relative importance. The beta value of the mean nurses' health score was 0.14. This suggests that it has a significant positive contribution to the model in predicting the happiness yesterday dimension of SWB of the patients.

The third regression showed the effect of the independent variables on the anxiety yesterday dimension of SWB. The results showed that none of the three independent variables had a significant impact on the anxiety yesterday dimension of SWB of the patients.

In the final regression, the effects of the independent variables on the life being worthwhile dimension of SWB were investigated. The results showed that the mean nurses' health score ($t(446) = 2.73, p = 0.01$) and the mean nurses' job satisfaction ($t(446) = 0.21, p = 0.00$) both have significant influences on the life being worthwhile dimension of SWB, since the p-values are less than the level of significance value of 0.05. The unstandardized beta coefficient was analysed to determine their independent contribution and relative importance. The beta values of the mean nurses' health score and mean job satisfaction were 0.18 and 0.21 respectively. This suggests that both have significant positive contributions to the model in predicting the life being worthwhile dimension of SWB.

3.5. Discussion

This was the first time that a full picture of the SWB of inpatients for an entire acute hospital was captured along with the SWB of the nurses caring directly for them. This research sets out to measure the SWB and health of the inpatient population of an NHS hospital and the nurses looking after them. A key objective was to identify any associations between the SWB of patients and the nursing staff looking after them. It also sought to investigate the determinants of SWB for both the patients and the nurses looking after them. Results from SWB work such as these can be challenging to interpret and their format may not be familiar to policy makers and clinicians, with this in mind a clear context is provided throughout the discussion and an approach that focuses on real world implications is taken.

Previous work has demonstrated that within clinical populations there are strong associations between more severe health states of mental illness and lower levels of SWB (Graham et al., 2009) but that surprisingly other domains of the EQ5D such as mobility were only weakly negatively associated with SWB and not significantly.

The study population was 446 in-patients, and this in itself represents a significant contribution to the field of SWB research, as there are very few datasets of this kind that include patient SWB and health state, and none that also link this with the SWB and health state of the care providers. There are inherent difficulties in capturing the data for these paired populations within a clinical environment, and these are discussed later along with strategies that could help with future work. Having said this the demographic data have been seen to be largely in keeping with national levels (Boorman, 2009; Healthcare Commission, 2013; NHS Inpatient Survey, 2013) and as such are representative of the population in which we are practising.

For the patients within the study, it was shown that SWB in terms of life satisfaction was significantly negatively affected by the most severe EQ5D health states for the self-care, pain/discomfort and anxiety/depression domains. This is in keeping with the health and SWB presented by Graham from South America (Graham et al., 2011), but there is no comparable data from European or North American populations. The loss of the ability to care for oneself is central to illness and health losses generally, and not being able to look after oneself particularly for an elderly patient is not uncommonly a reason to present to acute medical services, even in the absence of an acute illness. It is perhaps not surprising

therefore that SWB in terms of life satisfaction was significantly negatively affected for patients who reported the most severe levels self-care (EQ5D self-care level 3). This determinant of SWB is also reported for population wide samples both in terms of this EQ5D health state (Dolan & Metcalfe, 2012), and also the similar domain of “role limitations” within the SF6D for both moderate and severe limitations (Dolan et al., 2012).

Level 3 of the EQ5D health state domain of pain/discomfort had a significant negative impact on the life satisfaction dimension of SWB. Again, this negative association has been demonstrated in other work and helps support the validity of this sample (Dolan & Metcalfe, 2012). The majority of work that has analysed the determinants of SWB in terms of self-reported health states are from large population samples and as such any comparisons should be cautious. It is interesting that given the fact that patients in hospital are more likely to be in pain than those in non-clinical populations (primarily in relation to trauma and recent surgery) that associations between pain/discomfort and other dimensions are not seen. One explanation is that there were adequate analgesia prescriptions within the in-patient cohort, but it is equally possible that in general people’s SWB is not that affected by pain in moderate or low levels. This has significant policy implications, as the cornerstone of the health technology appraisal methodology supported by NICE (NICE, 2008) uses the hypothetical preferences of the general population to rank health state severity (Brazier et al., 2005). These population preference derived data may exaggerate the impact of pain/discomfort when compared to mental health states, which is in contrast to these findings.

Severe levels of anxiety/depression were also found to have a significant impact on the life satisfaction dimension of SWB for the patients. This was anticipated, as mental health has a consistent and negative effect on the SWB of patients and non-clinical populations (Dolan et al., 2008; Koivumaa-Honkanen et al., 1999). EQ5D level 3 for anxiety/depression was also significantly associated with every dimension of SWB that was included in the study, further highlighting its importance in clinical populations. None of the other domains of EQ5D had such a consistent impact on the SWB of patients. It is perhaps not surprising that the EQ5D level 2 for anxiety/depression is also significantly negatively associated with the anxiety yesterday dimension of SWB. This impact across the board for anxiety/depression is a clear message for policymakers and for those in clinical roles caring for patients.

The priorities within an acute hospital that does not directly provide mental health inpatient or outpatient services may well not be geared to addressing the mental health of patients. This may be entirely appropriate, as the clinical workload would not usually include treating mental health complaints as the chief medical problem. It must be remembered that patients can however have more than one problem, and for those patients who self-report anxiety and depression, discussing or working through their anxiety or treating their depression must be highlighted as a priority as it has such a significant impact on SWB. Initiatives that could help integrate such priorities are local or national programmes that could help screen for and treat mental health conditions pro-actively within hospitals could be one way that policy makers could use this data to reduce the burden of illness effectively.

One way forward would be for patients to complete an admission health questionnaire on admission to the ward. This would not have to be completed if they were critically unwell, but at a juncture when they were able to consider the questions fully. The questionnaire could act as a screening tool for mental health conditions and help uncover any undiagnosed mental health problems, or other health issues. The answers to the questionnaire would generate a score that could trigger referral to the mental health liaison service within the hospital (all NHS acute hospitals have this service). An abbreviated tool could also be employed in Emergency Departments where there is often a need to rapidly diagnose mental health issues, that are often not the complaint that they patient may volunteer on presentation to health care services.

The happiness yesterday dimension of SWB is significantly affected by EQ5D anxiety/depression level 3, and also EQ5D mobility level 2 and level 3. This negative association with the mobility domain of the EQ5D is not reported in the regression data for EQ5D and health state data elsewhere. It has been argued that the lack of association in non-clinical populations between mobility and SWB is due to issues of adaptation. In this way, an individual who has some difficulties getting about (EQ5D mobility level 1) will adapt to these difficulties so that they do not impact on their life as a whole. A simple example of this could be that they catch the bus into town rather than walk, which they used to. In this way their SWB as measured does not suffer any significant losses. One explanation of the result for the impact of the mobility domain on the SWB dimension of happiness yesterday in the population sample is that these adaptive strategies have yet to develop. Lack of mobility due to illness is common, and this is reflected in the much higher rates of EQ5D mobility level 3 in the study sample when compared to the general population (BHPS, 2011). These sudden reductions in mobility may be transient or long term, but their impact on positive affect as measured by the SWB of happiness yesterday is felt significantly at moderate and severe levels. All acute hospitals have dedicated teams led by physiotherapists that tailor exercises and care plans to improve mobility alongside treatment of any acute medical problem. The findings from this work serve to highlight the importance of improving mobility in clinical populations in order to help address patient SWB.

The regression analysis for the patient sample within the study also demonstrated a significant association between energy and life satisfaction. This does not seem unexpected, and the notion of including energy as a determinant of health seems sensible. It is notably absent from the EQ5D health state classification system, and so this finding is significant. The result is worthy of further exploration and consideration as efforts that can help improve the subjective energy levels of patients may help improve their SWB. A further association was noted between life satisfaction and not smoking. From a health policy perspective this seems like music to the ears of policy makers and clinicians alike. In the experience of patients, however, it is more likely that the impact on SWB is felt not because smokers have poorer health, but due to the fact that smokers are unable, or find it difficult to, smoke whilst as an inpatient and have a lower SWB as a result.

Sleep was also found to be an important determinant of SWB in terms of happiness yesterday, and those who were more satisfied with their sleep reported higher levels of happiness. Sleep can be a scarce

resource in hospitals ([Southwell & Wistow, 1995a](#); [Southwell & Wistow, 1995b](#)), and there has been great interest in improving the environments to improve sleep. This study is the first that demonstrates a significant impact on SWB due to reduced subjective sleep scores and as such it provides evidence for investment in strategies to improve sleep quality for patients whilst in hospital.

In taking this forward there are a number of initiatives that have helped with improving sleep in isolated trials and studies that could be rolled out to help improve sleep quality. Simple initiatives that consolidate the number of nursing rounds that are made overnight and having an effective alarm silencing system for non-critical devices have been shown to be highly effective and can often have zero or minimal cost implications (Freedman et al., 1999). Other efforts have demonstrated that background music in an area that is unavoidably noisy can help patients (De Niet et al., 2009) and also shown that simple eye mask and ear plugs, much like passengers receive on a long haul flight greatly improve the quality and length of sleep (Yazdannik et al., 2014). Many of these ideas are simple and easy to implicate but it is in delivering these ideas to the clinical environment that presents a challenge. Patient experience teams may be well placed to help lead and champion these issues going forward.

Structural considerations such as the size of hospital wards and the number of patients sharing a room or bay also have influence on the sleep quality of patients. There may be little appetite or budget for large scale hospital redesign for the purposes of sleep improvement, but these data certainly support initiatives that seek to improve sleep quality when new units or hospitals are planned.

When considering the results of the regression analysis for the nurse population within the study sample the most apparent significant determinant of their SWB is overall job satisfaction. This was found to be significant for the life satisfaction dimension of SWB. The nursing sample can be considered as a group of professionals in their working environment, and as such there are greater comparisons for this population to the general (non-clinical) population than to clinical populations. It is surprising that there are no other significant determinants of life satisfaction within the sample, as in general population samples there are consistent positive associations between marriage/significant life partner and life satisfaction ([BHPS, 2011](#); [Dolan et al., 2008](#)). The association between life satisfaction and job satisfaction may be due to the focusing effect of completing a questionnaire about your life and your job whilst at work. Care was taken however to ask the SWB questions first, so that the independent factors would not bias the dependent ones, and as such the result is most likely to be a valid one. The results from the Boorman review into wellbeing at work for the NHS support these findings ([Boorman, 2009](#)), and specifically the staff perception survey undertaken by the Work Foundation for the Department of Health ([Van Stolk et al., 2009](#)).

Moderate and severe levels of anxiety/depression (EQ5D levels 2 and 3) had a significant effect on the SWB of the nurses within the sample, as measured by the anxiety yesterday dimension of SWB. This correlation between the two constructs of negative affect was anticipated, however the fact that both moderate and severe levels of anxiety significantly impacted on the life being worthwhile dimension of SWB was not forecast. There have been no previous accounts that detail similar measurements within

clinical for the life worthwhile dimension of SWB, but it has been reported previously that anxiety impacts on life satisfaction and also on levels of perceived stress (Van Stolk et al., 2009). This significant negative effect that anxiety/depression has on the worthwhileness of the lives of nurses is important, as it follows that if life is less worthwhile than employee engagement is less, and from this point there are clear and well established associations with higher rates of absenteeism and poorer performance (Boorman, 2009).

The results also demonstrated an interesting difference between the summer and the winter sampling. This was done primarily to achieve a higher sample number, but offered an interesting natural experiment. The results of the t-tests showed that the SWB in terms of happiness yesterday, energy yesterday, and sleep yesterday were significantly better in the summer season than in the winter. This result has been noted previously in population samples (Harmatz et al., 2000). Smith (1979) highlights the issues with such seasonal trends and goes on to report (now) historic data that fail to adequately explain a clear overall pattern of seasonality with respect to SWB. This is the first time, however, that it has been replicated within a clinical population and as such is an important consideration for future larger scale work.

A really significant finding from the study was the lack of impact that satisfaction had on the SWB for the patient sample. At the planning stage of the study there was considerable debate as to which measures of satisfaction with care or patient experience to include. The inclusion of three different domains was decided upon as they tapped into different areas that would have meaning for policy makers. The first issue to mention is that there was no reporting of extremely low levels of satisfaction (0 and 1), which suggests that there was no serious underlying dissatisfaction with the care received. However it is known that responses to satisfaction instruments are rarely given at this lower end of the scale even when patients are unhappy with their care and as such this is not unusual (Cleary et al., 1992, Coulter et al., 2009). This issue has also been discussed in the NHS inpatient Survey report (NHS Inpatient Survey 2013). Within the study, however, none of the three different domains of satisfaction proved to be significant determinants of the SWB of the patient population. This may be seen as a surprising finding, but this result is in line with reported lack of clarity surrounding the meaning of such measures for patients, and often policy makers. This result does raise serious questions with respect to the value of patient experience data, as if there are no real effects on any of the four domains of SWB then should we continue to collect it?

The final analysis within the results was to assess for any direct relationship between the SWB of the nurses and the patients. Does a happy nurse necessarily mean a happy patient? The challenge in performing the regression was how to assign corresponding values for nurse health and SWB which made sense. Taking the mean values for these variables for each ward allowed this series of regression analysis to be undertaken and interesting results were seen. It was shown that the nurses' job satisfaction was a significant determinant of patient SWB in terms of life satisfaction, happiness yesterday and life being worthwhile, and nurse health score was a significant determinant of patient SWB for the life satisfaction and life being worthwhile domains. Interestingly there were no significant associations

between the nurses SWB and patient SWB. Overall these results suggest that it is not happy nurses that have happy patients, but rather it is healthy nurses and those satisfied with the jobs that have happy patients.

This is a new and noteworthy finding, and one that will naturally have implications that will support the health of nurses in clinical work. The reasons for this could be in part explained by the fact that healthier nurses are more able to perform their job, which is often strenuous and stressful. Healthier nurses may also be more pro-social and likely to engage with patients, which may result in improved patient SWB. Similar arguments would also account for the finding that nurse job satisfaction is a significant determinant of patient SWB. The specific details of the nurse health are not known in depth, and this is self-reported health that has been used within the analysis, but this has been shown consistently to correspond with objective levels of health ([Helliwell, 2003](#)). Future work can be directed at examining this more closely to help uncover in more detail which aspects of nurse health have the greatest influence on patient SWB.

From a policy perspective these are very interesting results, and in taking them forward there are a number of areas that can be considered as targets for interventions. Improvements in nurses' health would appear to help benefit patients in terms of their SWB, and so alongside schemes that promote nurses health such as access to medical treatment and occupational health services, which are currently under severe pressure ([Boorman, 2009](#)), other innovative policies could be developed. These may be for example in terms of behaviour change programmes that incentivise exercise or healthy eating ([Dolan et al., 2012](#); [Vlaev et al., 2016](#)), or could include discounted gym membership.

3.5.1. Limitations

Sample size for the nursing population within the study is the most important limitation within this study. There was some reluctance from the nursing team to participate within the study and the most common reason given for not wanting to participate was lack of time. The researcher had worked in a clinical capacity within the hospital and had a good working relationship with many of the nursing staff, which helped with recruitment but may be difficult to replicate in other hospitals where clinical staff are not familiar with the research team.

In order to allow for completion of the questionnaire within a fairly limited timescale difficult decisions had to be made with respect to what domains to include and what to exclude. Ideally further clinical data surrounding the method of admission, co-morbidities and medications would have been collected, however in the trialling of the initial data questionnaire it became apparent that this would significantly extend the time taken to complete the form and so the existing data set was decided upon.

The analysis of the data when considered as two separate groups (nurses and patients) required standard regression principles to be applied. In considering the effects of the nurses' health and SWB on the SWB of the patients however a greater challenge was met. The decision to take the mean values for

the nurses on each ward allowed this analysis to be undertaken with a regression based approach, but this does inevitably mean that some of the subtleties in the patterns of these relationships may be lost. In a situation where there was one-to-one care provided by a nurse (e.g. home care situation or in intensive care units) this would not be necessary. The approach taken does offer a realistic way forward in this analysis and also ensures that one particularly unhappy or unsatisfied nurse does not skew the results, which is likely to reflect the real life situation.

A separate limitation and one that is inherent in any cross sectional study is that there is no follow up data for these patients. Turning this methodology into a cohort study would be challenging due to the variations in diagnoses that these patients would have and the identification of appropriate follow up intervals. For this reason cohort studies may be better when examining the SWB of a clinically related group of individuals. The other issue with respect to cross sectional data is that it is not possible to control internally for any underlying individual differences in SWB. This is done automatically for panel data as the responses are from the same individual, and it is the difference between the values over time that is the main finding. In future work this could be controlled by asking patients to report on personal optimism, which in some studies has been shown to be a marker of baseline SWB (Graham et al., 2011), and this may help provide internal controls for future cross sectional studies such as this.

The enrolment criterion regarding the ability to complete the questionnaire in English is a further limitation of the study.

3.6. Conclusions

This study has delivered a methodology and set of measures for the collection for data for hospital inpatients and the staff looking after them, and in doing so has met the overall aim. This is a significant contribution to the field and will enable further research to build upon these tested approaches to an emerging area of interest. Each of the main objectives were also met.

The life satisfaction of patients was shown to be significantly affected by severe levels of EQ5D states of pain/discomfort, anxiety/depression and self-care. The happiness of patients (happiness yesterday dimension of SWB) was significantly affected by severe anxiety and also by moderate or severe impairment in mobility. The most severe EQ5D level of anxiety was in fact seen to affect all dimensions of SWB and this represents an important area for all those working in hospitals to be more aware of.

There was no significant impact on any of the domains of patient satisfaction on any dimension of SWB. This finding has implications in terms of the appropriateness of continuing to collect these data. Energy levels were shown to be important for patients, both in terms of their significant associations with SWB as measured by life satisfaction and its negative association with the anxiety yesterday dimension of SWB. Policy makers should take note of this as it is an important determinant of SWB but omitted from the EQ5D health state classification tool.

For the nursing population it was seen that overall job satisfaction was a significant determinant of overall life satisfaction. It was also seen within the entire population that SWB was generally higher in the summer sample when compared to the winter. The final important output from this study was that when considering the data on a ward-by-ward basis, it was shown that nurses health and job satisfaction were important determinants of patient SWB. It is not possible to say that a happy nurse will have a happy patient, but a healthy nurse (that is satisfied with their job) is more likely to.

List Of Abbreviations

BHPS	British Household Panel Survey
CABG	Coronary Artery Bypass Graft
CBA	Cost Benefit Analysis
EQ5D	EuroQol standardised instrument for use as a measure of health outcome
ICER	Incremental Cost Effectiveness Ratio
HRQoL	Health Related Quality of Life
HIV	Human Immunodeficiency Virus
NICE	National Institute for Health and Care Excellence
PGI	Patient Generated Index
PROMS	Patient Reported Outcome Measures
PTCA	Percutaneous Transluminal Coronary Angioplasty
QALY	Quality Adjusted Life Year
SEIQOL	Schedule for the Evaluation of Individualised Quality of Life
SF6D	Short Form 6 Dimensions measure
SWB	Subjective Wellbeing

Declarations

- Ethical Approval and Consent to participate

Ethical approval was sought for the study, but the Imperial College London's Research Ethics Committee deemed that none was necessary as no novel intervention or change in procedure was being investigated.

The study was discussed with the patient experience team and the senior nursing team ahead of the study, and both groups were supportive of the work. A consent signature was included in the first page of the study to ensure the work was carried out to best practise principles.

- Consent for publication

All authors give their consent for publication.

- Availability of supporting data

The data is available upon request.

- Competing interests

Henry Lee has nothing to disclose. Paul Dolan has nothing to disclose. Ivo Vlaev has nothing to disclose. Ara Darzi has nothing to disclose.

- Funding

Not applicable.

- Authors' contributions

HL designed and conducted the study, analysed the data and prepared the manuscript. PD contributed to the design of the study, interpretation of the results, and writing of the manuscript. IV contributed to the design, the analysis and interpretation of the results, and the writing up of the manuscript. AD contributed to the design of the study and reviewed the manuscript.

- Acknowledgements

We are extremely grateful to the Management and Patient Experience teams at Imperial College Healthcare NHS Trust for their help in approving and running the empirical work.

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Table

Table1. Summary of measures used in patient and staff study

Domain	Measures
Patient/Staff SWB	4 SWB questions set out by the ONS: <ul style="list-style-type: none"> • Life satisfaction • Happiness yesterday • Anxiety yesterday • Life being worthwhile
Patient/Staff Health	EQ5D EQ5D Visual Analogue Scale Sleep dimension Energy dimension Whether the patient had undergone surgery Whether the patient had been treated for an infection
Patient satisfaction	5 most important patient satisfaction ratings
Staff job satisfaction	Staff job satisfaction ratings
Background demographics	Age Gender Marital status Smoking status Whether the individual has children Length of hospital stay (patients) Length of time as a nurse (nurses)

Figures

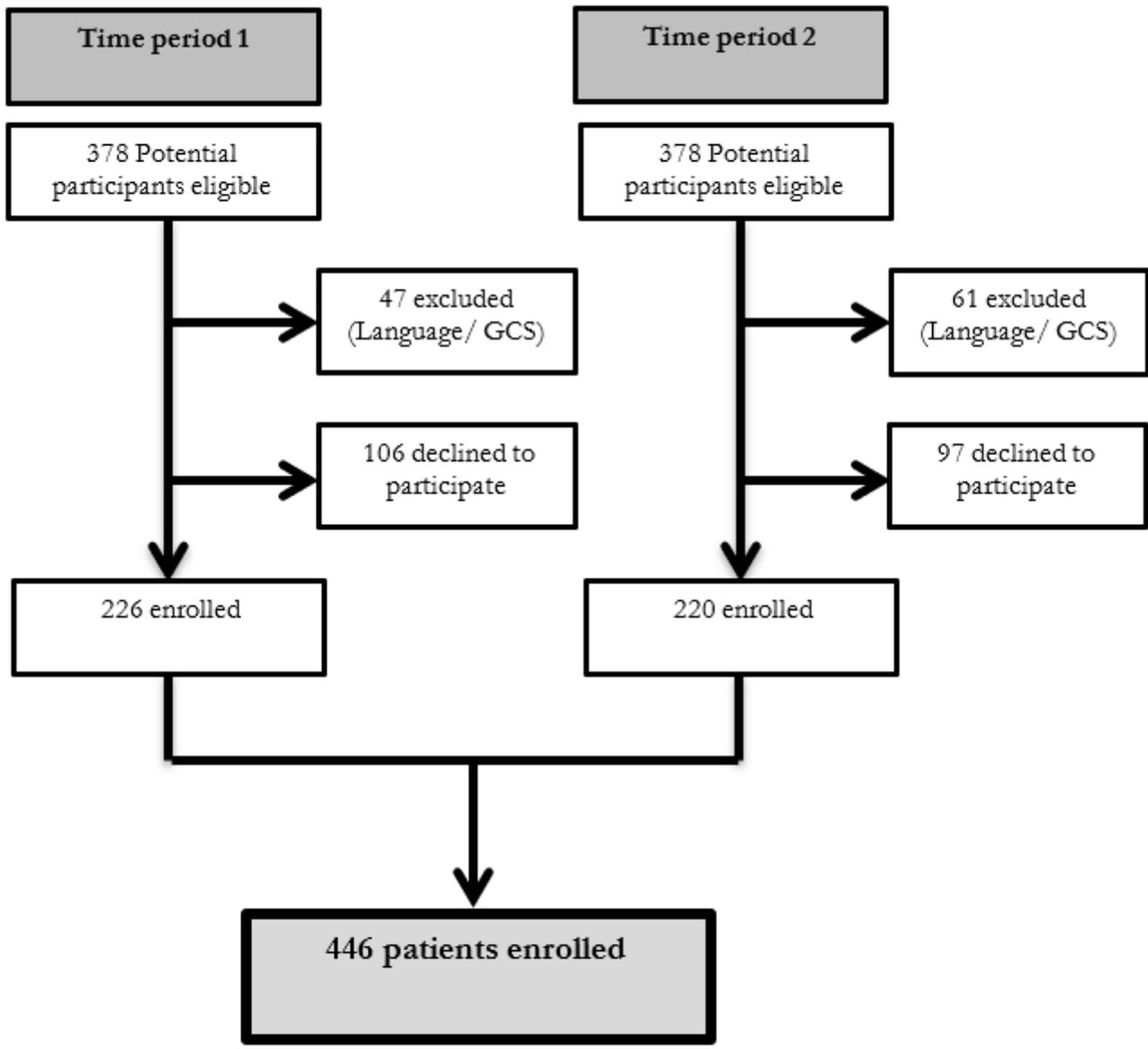


Figure 1

Trial flow diagram – patients

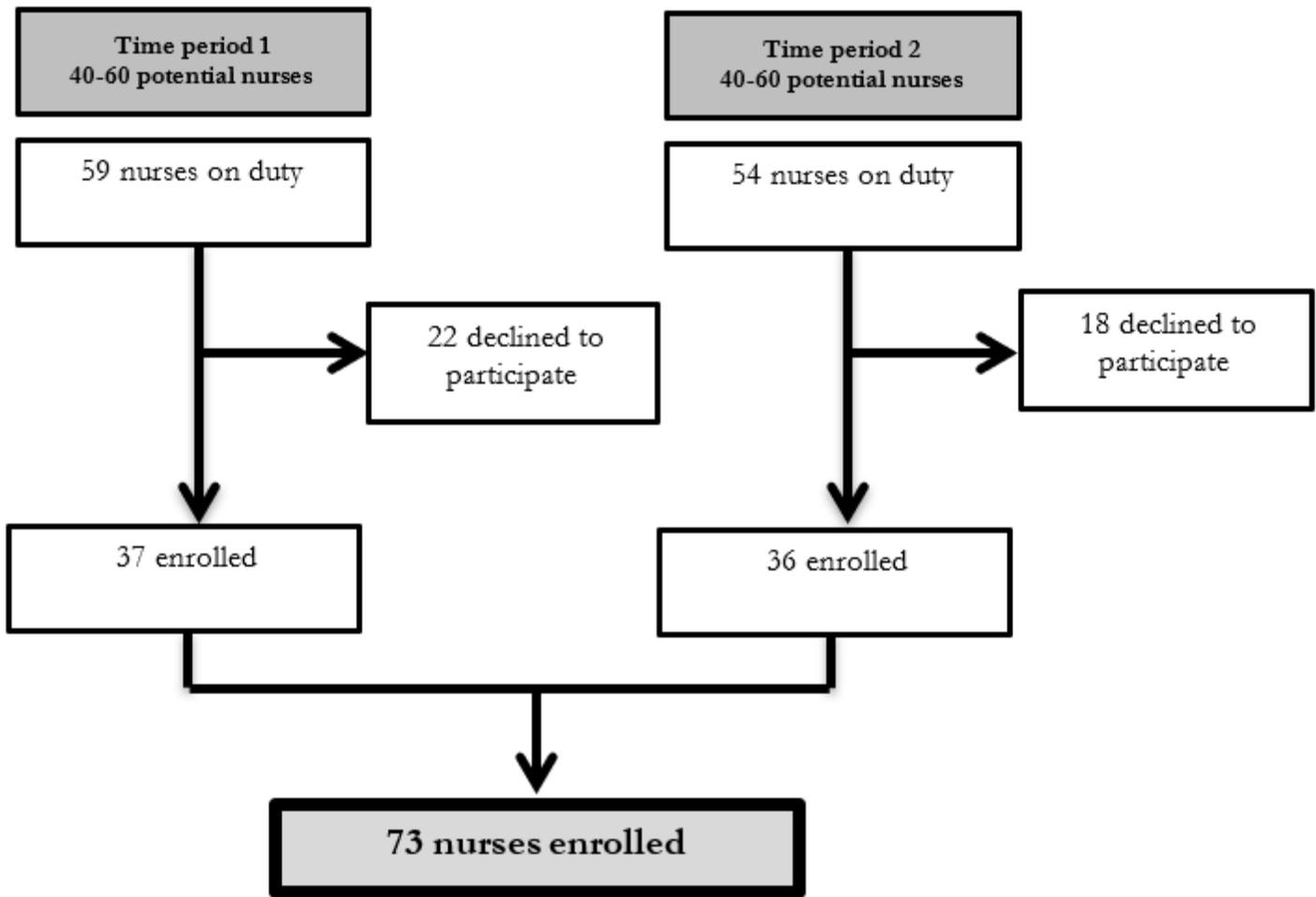


Figure 2

Trial flow diagram – nurses

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