**TITLE PAGE**

**What might make nurses stay? A protocol for discrete choice experiments to understand NHS nurses’ preferences at early- and late-career stages.**

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**Keywords**: early-career, late-career, NHS nurses, job preferences, retirement preferences, discrete choice experiment

**Abstract (296 words)**

**Introduction** Like many countries, England has a national shortage of registered nurses. Employers strive to retain existing staff, to ease supply pressures. Disproportionate numbers of nurses leave the National Health Services (NHS) both early in their careers, and later, as they near retirement age. Research is needed to understand the job preferences of early- and late-career nurses working in the NHS, so tailored policies can be developed to better retain these two groups.

**Methods and Analysis** We will collect job preference data for early- and late-career NHS nurses, respectively using two separate discrete choice experiments (DCEs). Findings from the literature, focus groups, academic experts and stakeholder discussions will be used to identify and select the DCE attributes (i.e. job features) and levels. We will generate an orthogonal, fractional factorial design using the experimental software Ngene. The DCEs will be administered through online surveys distributed by the regulator Nursing and Midwifery Council. For each group, we expect to achieve a final sample of 2,500 registered NHS nurses working in England. For early-career nurses, eligible participants will be registered nurses who graduated in the preceding five years (i.e. 2019-2023). Eligible participants for the late-career survey will be registered nurses aged 55 years and above. We will use conditional and mixed logit models to analyse the data. Specifically, Study-1 will estimate the job preferences of early-career nurses and the possible trade-offs. Study-2 will estimate the retirement preferences of late-career NHS nurses and the potential trade-offs.

**Ethics and dissemination** The research protocol was reviewed and approved by the host research organisation [Ethics Committees Research Governance](http://www.southampton.ac.uk/about/governance/policies/ethics.page) (University of Southampton, number 80610). The results will be disseminated via conference presentations, publications in peer-reviewed journals and annual reports to key stakeholders, the Department of Health and Social Care, and NHS England/Improvement retention leaders.

**Registration** on OSF[**https://doi.org/10.17605/OSF.IO/RDN9G**](https://doi.org/10.17605/OSF.IO/RDN9G)

**Article Summary**

**Strengths and limitations of this study**

* To the best of our knowledge, these studies are the first discrete choice experiments (DCE) that will estimate (i) the job and retirement preferences of early- and late-career NHS nurses in England
* The sample will be large and representative of the nurse population as it will be drawn from the Nursing and Midwifery Council – the sole independent regulator for nurses (and midwives) in the UK – making it a more comprehensive source of data than a professional body, trade union or set of employers.
* For each study, we will use a combination of literature searches, qualitative data collection, academic experts and stakeholder consultation to identify the relevant DCE attributes and levels.
* Some important attributes may be excluded if they are not actionable and capable of being traded.
* Nurses who have left the NHS will not be included in these studies, which may bias the results toward the ‘stayers.’

**INTRODUCTION (4957 words)**

Shortages of nurses is a global problem projected to worsen until at least 2030.(1, 2) Having too few registered nurses on duty can have a detrimental impact on the quality of care and patient outcomes.(3, 4) The COVID-19 pandemic also highlighted the limitation of the National Health Services (NHS) in providing high-quality patient care due to the lack of registered nurses. Covering roster gaps with temporary staff and replacing staff who leave is costly; it is estimated that losing and replacing a nurse, costs between 0.31 to 1.3 times the annual salary of a nurse.(5) As an example, a large acute NHS trust with more than 3000 nurses and a typical turnover rate of 10-12% would need to recruit 300 nurses yearly. The replacement cost of a fully-trained nurse has been estimated at up to £12,000 by NHS Workforce Analytics, this corresponds to £3.6m every year.(6) In England, it was reported that 40,365 (11.5%) registered nurses left the NHS in 2022.(7)

Two groups are of particular concern to the NHS – nurses leaving in the first few years of their careers (early-career), and experienced nurses over the age of 55 or with at least 20 years of service (late-career) leaving before retirement.(8-10) Nurses towards the later stages of their careers are important given their rich skills and ability to mentor less experienced staff, including early-career nurses who augment the labour supply. Added to this, there is potential for employers and policy changes to be made (e.g., more flexible retirement, pension changes, offering alternative less burdensome roles, altered working hours) that might encourage nurses to extend their careers – so the opportunity is there. Early-career nurses are also key as their turnover rates are among the highest in the nursing workforce.(11) The loss of recently qualified nurses is significant – when they leave, it causes a gap not just in the current year, but a potential 30+ years of service is removed. Identifying what might help to retain both groups is therefore a policy and employer priority.

Defining career stage and what constitutes an early or late career is complex. A career can be viewed as an ‘evolving sequence of a person’s work experience over time’.(12) This definition accounts for individual differences in career journeys and acknowledges that a career is not always linear, one-directional and directly linked with age. ‘Early-careerists’ face particular challenges, especially regarding their entry and socialisation; which are important cycles influencing individuals’ dis/engagement with their work environment.(13) Entry into a new (or first) work environment can be daunting and represent a major shock, as nurses need to quickly adapt.(13) Socialisation is key to supporting new starters to not only acquire proficiency in their job and role, but also to build relationships and learn the behaviours, power structure and norms of their work environment.(14, 15) ‘Later-careerists’ also have particular challenges that are believed to influence choices, such as the need to create a better work-life balance.(16) A major milestone more directly related to age is the pension threshold, a key factor likely to influence career decisions for many people. However, for nurses, the age at which pensions can be accessed varies from 50 years (for some in the NHS with protected minimum pension age) through to 66 years for state pension entitlement (due to increase to 67 years between 2026-28). From 2023, the picture is more complex with a new partial retirement option becoming available, which enables staff to partially retire or enable retirees to return to work (whilst claiming all or part of their pension, with the ability to work and build up more pension benefits).

For this research, we use a broader definition drawn from the literature where individuals are considered to be entering a later phase of their careers from the age of 55 years as this is nearer retirement age (compared to a definition based on people aged 45 years and over).(17, 18) Analysis of staff records from acute Trusts in England shows that older nurses, and those who have served over 20 years, are more likely to leave the NHS.(8) For early-career nurses, we will use the period of graduation (2019-2023), to represent those with less than 5 years of experience.

Before the pandemic, policymakers acknowledged that the significant shortfall of registered nurses relative to societal demand required urgent intervention.(19-21) As an example, in December 2019, the UK Government launched the “N50k Programme”, i.e. plan to increase by 50,000 the total number of registered nurses working in NHS England by 2024. One of its workstreams focuses on reducing the outflow of current staff through improved retention.(22) Retaining early-career nurses could ease supply challenges, whilst extending the working lives of late-career nurses would enable the NHS to retain valuable skills and experience. Retaining staff is key as retention problems are cyclical: shortages create workload pressures which adversely affect staff, increase absence rates and lead to more staff leaving.(23, 24) The knock-on effect of poor retention is a work environment that is less attractive to both current and potential staff. Improving retention is thus vital to enabling workforce growth; to stem the outward flow at the same time as increasing entrants into NHS nursing.

The factors leading to retention or turnover among early and late-career nurses are multi-faceted,(25) but many are within the control of employers. Employers can use job factors to improve the attractiveness of nursing jobs for current and prospective employees. In England, this is even more relevant since NHS nurse wages are relatively inflexible(26, 27) and imperative since COVID-19 has exacerbated the pressure faced by nurses.(28) By taking into consideration the job preferences of early- and late-career nurses, policymakers and employers can foster a work environment conducive to their retention.

**Retention factors among early-career nurses**

Job satisfaction positively influences nurse retention.(29, 30) The international evidence reveals that early-career nurses are more likely to stay in their profession when they benefit from mentorship at the beginning of their career,(31-35) when they are committed(36, 37) and when they perceive a positive work environment,(38, 39) including high-level of cohesion with the medical staff.(36) Tailored interventions to reduce transition shocks from student to nurse status(40-42) or to alleviate burnout(43) decrease the intention to leave among early-career nurses. Nurses also value authentic leadership,(39, 44) opportunities for career advancement (30, 45) and empowering decision-making in patient care.(44-46) Notably, few international studies reported wages as a pull factor for early-career nurses.(47, 48) In contrast, job dissatisfaction(49, 50) and poor working conditions,(51, 52) including job stress(37, 53) and a higher level of transition shocks(40, 54) increase the intention to leave of early-career nurses. There is also evidence that the lack of team support,(55) lack of vocation(55, 56) or feeling of inadequacy(52) increase the turnover likelihood among early-career nurses. Recent international studies have also shown that male nurses report a higher level of intention to leave compared to female nurses.(49, 51, 57)

**Retention factors among late-career nurses**

Whilst there are complex reasons for nurse retirement decisions, many factors could be influenced by improved working conditions and opportunities. The UK literature suggests that nurses nearing retirement age are more inclined to stay if they can benefit from flexible working conditions, feel valued and are adequately remunerated.(58) In contrast, deteriorating health, job stress and desire to spend more time with family and friends are associated with attrition among late-career nurses.(58) The international evidence suggests that retaining late-career nurses is positively associated with having the opportunity to mentor less experienced staff,(59, 60) receive support from colleagues and managers,(25, 60) experience job satisfaction(25, 61) and feel valued for their experience.(62, 63) Adequate remuneration is also key to retaining late-career nurses(59, 60, 62) as in certain instances they are the main household provider.(59, 64) Late-career nurses are more likely to stay beyond retirement if they can benefit from continuous professional development to keep up with technological advances.(25, 62) They also highlighted the need to ergonomically redesign the workplace to save physical energy and prevent musculoskeletal injuries.(62, 65) Late-career nurses expressed a desire to work after retirement for vocational and patient care reasons,(59, 60, 62) but highlighted the lack of information regarding this option in their workplace.(58, 59)

**Knowledge gap and research contribution**

Whilst research to date has identified a range of factors associated with early- and late-career nurse retention, these findings are largely drawn from the international literature.(25, 62, 66) There is still a knowledge gap which hampers the application of research to the NHS as evidence from England is scant.(58, 63) Additionally, the relative importance of different factors in each group remains unclear. This study protocol aims to fill that knowledge gap. It focuses on the development and design of two Discrete Choice Experiments (DCE) to be conducted as part of the larger ‘Evaluation of the N50k programme’(67) study. This latter aims to evaluate the effectiveness of recruitment and retention initiatives deployed by the NHS to grow the nursing workforce in England by 50,000 Registered Nurses by 2024.(68)

We will use qualitative and economic methods applied in our previous research(69, 70) to estimate the relative importance of the job and retirement factors influencing early- and late-career nurses’ decisions, respectively. DCE can be used to reveal such preferences. In a DCE, respondents are presented with a series of hypothetical job scenarios containing several attributes, each with different levels. Nurses then choose their preferred job package. Hence, the relative importance of pecuniary and non-pecuniary job factors can be estimated. We will also estimate potential trade-offs to know whether/how to compensate them for less attractive job features. DCEs can quantify such trading behaviours.(71, 72) This is important as nurses may engage in such trade-offs in their real jobs. The absence of trade-offs could also reflect nurses’ preferences for the status quo.

Existing DCEs involving nurses have focussed largely on developing countries.(73) The exceptions are four studies from Australia and the US which have examined the job preferences of student nurses, nurses, and midwives.(48, 74, 75) In England, to our knowledge no DCE has been conducted to inform on early and late-career NHS nurses’ job preferences. By quantifying early- and late-career nurses’ job preferences, we will know which job factors are most valued by each respective group at different key career stages. Such results can help inform retention strategies for different groups by prioritising the most valued job factors.

**Aims**

We will conduct two separate DCEs for each nurse group, i.e., early and late-career nurses in the NHS. Specifically, Study-1 will estimate the job preferences of NHS nurses at the early stage of their careers and the potential trade-offs. Study-2 will estimate the retirement preferences among late-career nurses and the potential trade-offs. Specifically, our studies will explore:

1. The factors contributing to the retention of early-career NHS nurses
2. The relative importance of these factors and the potential trade-offs
3. The factors that contribute to the retention of late-career nurses when approaching retirement
4. The relative importance of these factors and the potential trade-offs
5. For each nurse group, the preference heterogeneity will be accounted for and based on the nurses’ circumstances (e.g. age, biological sex, country of training or pension status for late-career nurses).

**METHODS AND ANALYSIS**

**Overview of the DCE**

Our studies will use both qualitative (focus groups and one-to-one interviews) and quantitative methods (i.e. DCE) to understand career choices among early- and late-career NHS nurses. A DCE is a survey technique enabling nurse preferences to be elicited by presenting them with alternative job package options.(72, 76) The DCEs can also include job attributes not yet offered to allow modelling jobs responding to nurses’ preferences. Nurses then choose their preferred job package. These choices stem from Lancaster’s economic theory of value(77) and McFadden’s extended work on random utility theory.(78) According to Lancaster, individuals derive utility (i.e. satisfaction) not from a good but from its attributes and levels.(77) The random utility theory further asserts that utility is an additive function composed of observable and unobservable random components, such as measurement errors and therefore overall utility is latent.(78) Therefore, DCEs inform on the relative importance of these attributes and the trade-offs operated.(72, 77, 78)

**Qualitative research to inform the DCE**

A robust qualitative approach must precede the development of the DCEs to ensure they have a strong foundation and are reliable.(72)

We will conduct a literature review to generate a comprehensive list of factors that influence early- and late-career nurses’ career decisions, respectively. This will entail searching the medical databases CINHAL, Medline, PsycINFO, AMED and Scopus. For each group, we will search empirical papers exploring the push-pull factors associated with nurses’ decisions to leave, stay or return to nursing. We will include qualitative, quantitative, and mixed-methods papers, as well as meta-analyses and systematic reviews. Discussion or opinion papers will be excluded. For each group, we will use keywords enabling us to gather evidence on the factors influencing career decisions. For instance, for early-career nurses key words will include – but are not limited to – graduate nurse, early-career nurses, retention, turnover, intent to stay, etc (Table 1). We will use Boolean operators ‘AND’ and ‘OR’ to combine or exclude keywords in the search, allowing for more focused and productive results.

We will also use the Index of Grey Literature(79) to identify key reports, including King’s Fund, the Health Foundation, Nuffield Trust and the Royal College of Nursing. We will include peer-reviewed papers and policy reports on the successful strategies to retain these nurse groups, as well as papers exploring the push and pull factors among early- and late-career nurses, respectively. English-published literature will be included (e.g. papers in other languages excluded) and focus on publications in the last 10 years (2013-) to better capture current retention issues. Earlier literature may be less relevant to nurses’ current context. The comprehensive list will guide the development of the topic guides to be used in the semi-structured focus groups and interviews.

**Table 1 Search words for the literature on push-pull factors for early- and late-career nurses**

|  |  |
| --- | --- |
| **Early-career nurses** | **Late-career nurses** |
| Undergraduate nurse  Graduate nurse  Nurse degree apprenticeship  Student nurse  Early career nurse  Pre-registration nurse  Retention  Intent to stay  Intention to leave  Recruitment  Push and pull factors  Attrition  Turnover | Older nurse  End of career nurse  Late career nurse  Early retirement  Recruitment  Retention  Return to practice  Intent to stay  Intention to leave  Push and pull factors  Attrition  Turnover |

**Focus groups**

Following established DCE practice,(72, 76) we will use both qualitative and quantitative research methods to identify and select the attributes for each nurse group. These studies will provide new insights into research questions 1 and 3 by conducting an in-depth qualitative study with early- and late-career nurses working across different settings (acute, community, and mental health NHS Trusts in England). We will follow an exploratory qualitative design(80) where participants within each group will have common experiences (e.g. mentoring support when starting a new job, patient care and workload, work after retirement), which should generate in-depth discussions about their work experience, barriers and facilitators to retain them. These studies also expand previous qualitative research on nurse retention in England(81, 82) by recruiting early- and late-career nurses (i) located in different geographic areas in England (including rural areas), (ii) working in different departments/specialities, (iii) and having a diverse sample (e.g. age, biological sex, ethnicity).

For each nurse cohort (i.e. early- and late-career NHS nurses), we will use a purposive sampling approach(83) by conducting focus groups with a sample of the nurse population in England. We will use various recruitment channels, including advertising on social media (e.g. Twitter), and inviting eligible nurses who participated in our nurse career survey (Summer 2023) and indicated willingness to be invited to take part in future research. Nurses expressing an interest in participating in the qualitative study will be invited to complete an ‘Expression of Interest in Research Participation’ form. Participants’ responses will ensure they fulfil the basic inclusion criteria (as above), as well as ensure our sample has a good mix, with no obvious bias in terms of demographic and career profiles. We will use data from the NMC to identify the characteristics of the national population and enable us to ensure we have a broadly representative mix and mitigate potential recruitment bias. Ineligible participants will be thanked but declined, explaining that they do not meet the criteria for this particular study. Nurses willing to participate but not available to attend the focus groups will be offered the opportunity to participate in a one-to-one interview.

Each focus group will comprise four to six people and will not exceed 90 minutes. Recruitment will continue until the research team agrees that data saturation is reached, but it is anticipated that a sample size of up to 30 individuals is likely to be sufficiently large to reach data saturation, as well as explore the diversity of experiences and views across the range of participants.(84, 85) For early-career nurses (Study-1), eligible participants will be registered nurses aged 18 years or more who graduated no more than 5 years ago (i.e., 2019-2023) and are currently practising in an NHS Trust in England. Eligible participants for the second group (Study-2) will be registered nurses aged 55 years and above and currently practising in an NHS Trust in England.

We will design topic guides to stimulate discussions about career decisions for each nurse group. Topics for early-career nurses will include the job factors they value, their experiences and motivations, and questions to understand the barriers and facilitators to their retention at the start of their careers. For instance, topics will relate to the role of mentorship at the beginning of their career, the relationships with their managers and colleagues, their perceptions of the work environment, staffing levels and equipment, as well as topics on patient care, working hours and remuneration. Topics for late-career nurses relate to their motivations, experiences, understanding, and plans around retirement, and what factors/issues they consider. In addition, we will discuss the strategies that could incentivise them to delay retirement.

For each nurse cohort, the focus groups will be conducted online via Microsoft Teams. It is the most reliable Voice over Internet Protocol method in terms of data security and privacy according to the Research Integrity and Governance Team (University of Southampton). Participants do not need to download the Microsoft Team software but simply click on the invitation link. It also enables us to conduct focus groups that are not based on the same locality. Should some participants not be available for the focus groups, we will conduct one-to-one interviews. Participants in the focus groups (or interviews) will be thanked for their participation with a high-street voucher (£20).

They will be recorded, transcribed by the research team, and then stored as deidentified documents. Data will be deidentified using identification numbers for the participants to ensure the confidentiality of nurses. Video recordings will be deleted immediately after the transcription. Data will be analysed thematically, drawing on Braun and Clarke’s(86) approach and stages of analysis. Transcripts will be coded inductively, using the thematic qualitative analysis software NVivo to facilitate data management. A draft coding framework will be developed and revised involving members of the wider research team, as undertaken in our previous research.(69) Themes will be identified and refined by grouping related codes and concepts together and using matrices/charts to explore and map comparisons and facilitate the analysis.

**Creating the choice tasks and developing the experimental design**

For each nurse cohort, the DCE attributes will be informed by the findings from the literature review where the results will be incorporated into an overview table where potential attributes will be described. We will also use the results from the focus groups (and interviews), discussions with academic experts and key stakeholders, including the Department of Health and Social Care (DHSC) and NHS England/Improvement (NHSEI). Characteristics that are plausible, actionable, and capable of being traded will be included as attributes.(87, 88) We will not exceed ten attributes(89) and limit the number of choice tasks to a maximum of 16 to 20 per participant to avoid respondents’ cognitive fatigue.(72, 90) Levels assigned to the attributes will be decided by a combination of relevant findings from the literature review and piloting of the DCEs.

Attributes will be quantitative (e.g. reduction of working hours) and qualitative (e.g. work intensity). The DCE will also include a salary attribute to estimate how much money should be offered to early-career nurses to compensate them for less preferred options. Similarly, we will include a ‘year’ attribute to estimate how many years late-career nurses are willing to trade for less preferred options. The alternatives will be generic (e.g. Job A or Job B) to avoid influencing the respondents, whilst the attributes and levels will be context-specific to early- and late-career nurses reducing the cognitive burden and suggesting realistic decisions.(72) [See Figure 1 and Figure 2 for example of the DCE choice tasks]

Using the experimental design software Ngene,(91) we will identify the DCE choice tasks. The attributes and levels will be incorporated into scenarios in a statistically efficient experimental design, meeting the required criteria of orthogonality, level balance with minimum overlap and utility balance.(90, 92) Level balance implies that the attribute’s levels will appear the same number of times, and orthogonality entails that attributes will be independent of each other. The minimum overlap will ensure that any two alternatives will not have the same level, which enables to capture more implicit trade-offs. Finally, the utility balance will guarantee that alternatives within a choice task are of comparable appeal to the participants.

The full factorial design LA with L levels and A attributes can provide the maximum number of combinations. However, the use of a fractional factorial design (i.e. a subset of all possible combinations) will be more practical and reduce the number of choice tasks presented to each respondent, as well as the cognitive complexity.(72, 76) In this latter, the DCE choice tasks will be blocked into several versions with an identical number of choice tasks that the respondent will receive only once. We will incorporate a repeated choice set to check for consistency and rationality,(93) but it will be excluded from the final analysis.(72) Each DCE survey will include sections that are relevant to the respective nurse group, such as working conditions, intention to leave, the role of mentorship, retirement intentions, etc. Additional questions will be incorporated into each survey to collect demographic data.

The DCEs will be tested using a think-aloud approach during interviews with six to eight early- and late-career nurses, respectively, conducted online or in person, as preferred by the participants. Then, a pilot phase will be conducted with selected nurses to refine the attributes and levels if necessary. These steps will be key to ensuring the questionnaires (including the DCE) are reliable, verify and reduce any cognitive burden the survey could generate. Nurses will be identified via the professional network of the research team(94) and/or the Nursing and Midwifery Council (NMC).

**Sample size, recruitment channels and data management**

We will use Louviere’s formula accounting for the number of DCEs choice tasks, alternatives, and levels to estimate the minimum sample size.(95, 96) The NMC will send an invitation – on our behalf – to a random sample of at least 50,000 nurse registrants for each NHS nurse group. Estimating a minimum response rate of 5% (as confirmed in a 2023 survey administered by the NMC) will yield 2,500 respondents in each group. (We have reached a similar response rate with our current cross-sectional survey on employers’ job offers and nurse retention).(97) Using Qualtrics(98) (i.e., comprehensive survey software), the DCEs will be administered as part of the more extensive questionnaires. The survey will be available for at least 8 weeks, during which the NMC will send at least three reminder emails to maximise the response rate. There will be no compensation to participants for their time in completing the survey. We will however offer ‘thank you’ vouchers to focus group participants (given the time commitment involved).

The DCEs and other survey data will be transferred into Stata(99) (or equivalent software) for analysis. We will prepare each dataset separately in the format required for the data analysis. The data preparation includes (but is not limited to) the creation of dummy variables, the verification of missing values and counting the number of responses per respondent.

**Theoretical model for the DCE, data analysis and results**

We will provide descriptive statistics – including frequencies and central measures of tendency – to compare the respondents with the nurse population using the most recent data from the NMC.(100) Descriptive statistics and numerical summaries will be reported in tables and/or in narrative form.

As with our previous research,(70) we will use the random utility model, which is the theoretical basis for DCE data analysis.(78) Individuals choose the option with the highest utility (i.e., preference) level. The utility of a given job, (i.e., the dependent variable) is a combination of the deterministic and random components. The deterministic component corresponds to the observable job attributes, whilst the random component (i.e., error term) corresponds to the individual-level variations in unobserved job attributes. Hence, we will estimate nurses’ preferences based on the job package on offer. The effect of each characteristic on the probability of the job package being chosen is measured by the ratio of the alternative in relation to every other job choice on offer. It is a formula accounting for individuals’ utility and the associated regression coefficients.

The conditional logit model will be used as a base model to estimate early- and late-career nurses’ preferences. The coefficients will determine the importance of job attributes through statistical significance, direction and size of the estimated parameters. The direction of the coefficients will be used as internal validity to verify whether the results align with previous research findings. The salary and year attributes will be used to estimate the trade-offs early- and late-career nurses make with the job attributes, respectively.

A mixed logit model will also be used to determine whether there is unobserved preference heterogeneity across each sample. The distribution of the random coefficients will be estimated with two parameters: the mean of the coefficients distribution and the standard deviation which represents the distribution of individuals’ coefficients relative to the average in the population. This standard deviation indicates the extent to which preferences vary across individuals. The parameters will be estimated using a simulated maximum likelihood estimator, such as Halton draws. The mixed logit model also relaxes the independence of irrelevant alternatives (IIA) property.(76) This property implies that the odds ratio between the choice probabilities of two alternatives remains the same regardless of other alternatives. This property may be difficult to justify when some alternatives are more similar to each other than another (e.g., choice between two jobs and an opt-out option measuring preferences for the status quo).(75)

We will summarise and explain the major findings, which will also be discussed in the context of England and international retention of early- and late-career nurse retention, respectively. Research gaps and opportunities for further research will also be identified and summarised.

**Consultation with stakeholders in the nursing workforce**

Throughout the study, we will engage with relevant stakeholders, including N50k programme leaders, the DHSC and NHSEI, to contribute towards the interpretation of the results and the policy implications for nurse retention. We have already held a meeting in November 2022 to discuss the format and purpose of the DCEs and related surveys. We will also seek opportunities to disseminate our findings with other key stakeholders (e.g. Unisons, Royal College of Nursing, Advisory Research Groups) to optimise knowledge exchange and policy impact.

**Patient and Public Involvement (PPI)**

Patients and the public (including nurses currently practising) have been involved in the design and development of each study. We will continue to meet at different stages of each study to ensure PPI contribute to the research being conducted.

**ETHICS AND DISSEMINATION**

The research protocol, including the consent form, participation information sheet, recruitment emails/advert and semi-structured forms for the focus groups/interviews were reviewed and approved by the host research organisation [Ethics Committees Research Governance](http://www.southampton.ac.uk/about/governance/policies/ethics.page) (ERGO, University of Southampton, number 80610). Approvals from the Integrated Research Application System (IRAS) and the [Health Research Authority](https://www.hra.nhs.uk/approvals-amendments/what-approvals-do-i-need/hra-approval/) (HRA) will not be required as the research is not directly involving NHS Trusts.

Participation will be based on informed consent. Participants will be informed of the voluntary nature of the focus groups/interviews and the online DCEs. They will be able to withdraw from the study at any time without providing a reason.

Results will be summarised and published in relevant peer-reviewed journals in the field of Health Economics or Health Services. Additionally, the results of each study will be communicated to the leaders of the N50k programme through annual progress reports and a final report within 6 months after the completion of the overall study.

**DISCUSSION**

To the best of our knowledge, our studies will be the first to design two separate DCEs analysing the preferences of early- and late-career NHS nurses' job/retirement decisions in England.

A strength of the studies is that the identification of the relevant attributes will not only be based on the literature review, but it will incorporate the views and opinions of early and late-career nurses via the focus group and interviews, as well as academic experts and key stakeholders including leaders of the N50k programme(67) and DHSC. However, the final list of attributes will account for the evidence from the literature review, the results from the focus groups (and interviews) and the recommended guidelines to find the optimal number of attributes.(72) Since only plausible, actionable and characteristics that have the capacity of being traded can be included, it is possible that attributes of high importance cannot be considered. The “think-aloud” sessions and piloting may indicate whether important attributes are missing.

Another strength is the recruitment channel for the survey which will allow us to recruit early- and late-career nurses from the NMC, which is the only registration body for all nurses in the UK. To optimise the response rate, we will design an appealing, clear and concise survey not exceeding 20 minutes to complete. In addition, the understanding of the DCE will be tested during the think-aloud sessions. Since the NMC will be the gatekeeper, we will not be able to conduct a non-responder analysis. However, we will compare our sample to that of the nurse population using the most recent NMC data.(100)

We expect the results of each study to help inform retention strategies by (i) providing the relative importance of the factors influencing early-career nurses to stay in nursing and the possible trade-offs, and (ii) eliciting the preferences of late-career nurses to delay their retirement decisions and possible trade-offs.

**REFERENCES**

1. Simoens S, Villeneuve M, Hurst J. Tackling nurse shortages in OECD countries. 2005.

2. Scheffler RM, Arnold DR. Projecting shortages and surpluses of doctors and nurses in the OECD: what looms ahead. Health Economics, Policy and Law. 2019;14(2):274-90.

3. Kane RL, Shamliyan TA, Mueller C, Duval S, Wilt TJ. The association of registered nurse staffing levels and patient outcomes: systematic review and meta-analysis. Med Care. 2007;45(12):1195-204.

4. Ball JE, Griffiths P. Consensus Development Project (CDP): An overview of staffing for safe and effective nursing care. Nurs Open. 2022;9(2):872-9.

5. Li Y, Jones CB. A literature review of nursing turnover costs. Journal of Nursing Management,. 2013;21(3):405-18.

6. NHS. Workforce Analytics - New data science solution enables NHS organisations to predict which employees are at risk of leaving. 2022.

7. Palmer W, Rolewicz L, Trust N. Peak leaving? A spotlight on nurse leaver rates in the UK. Nuffield Trust,. 2022.

8. Kelly E, Stoye, G., Warner, M.,. Factors associated with staff retention in the NHS acute sector. Institute for Fiscal Studies; 2022.

9. Stockton I. Nurses leaving the NHS acute and community sectors (PDF). Institute for Fiscal Studies; 2021.

10. HCHS Nurses and health visitors turnover by age and ethnicity. Available online at: h<ttps://digital.nhs.uk/supplementary-information/2022/hchs-nurses-and-hvs-turnover-by-age-and-ethnicity-jun17-to-jun22_ah4298> [Internet]. 2022 [cited 26 January 2023].

11. Holmes J, Fund Ks. The NHS nursing workforce–have the floodgates opened? 2022.

12. Arthur MB, Hall DT, Lawrence BS. Generating new directions in career theory: The case for a transdisciplinary approach. Handbook of Career Theory,. 1989;7:25.

13. Wanous JP, Poland TD, Premack SL, Davis KS. The effects of met expectations on newcomer attitudes and behaviors: a review and meta-analysis. Journal of Applied Psychology,. 1992;77(3):288.

14. Chao GT, O'Leary-Kelly AM, Wolf S, Klein HJ, Gardner PD. Organizational socialization: Its content and consequences. Journal of Applied Psychology,. 1994;79(5):730.

15. Martin J. Cultures in organizations: Three perspectives: Oxford University Press; 1992.

16. Barham L. Career management skills and the older workforce. A Report for UFi Charitable Trust,. 2008.

17. Walker L. Coaching during late career reinvention: The Discovering Model. International Journal of Evidence Based Coaching & Mentoring. 2019;17.

18. Levinson DJ, Darrow C, Klein E, Levinson M, McKee B. The seasons of a man's life. New York: AlfredA. Knopf; 1978.

19. Buchan J, Ball J, Shembavnekar N, Charlesworth A. Building the NHS nursing workforce REAL Centre: Workforce Pressure Points. 8 Salisbury Square. EC4Y 8AP: Health Foundation[Google Scholar]. 2020.

20. Buchan J, Charlesworth A, Gershlick B, Seccombe I. Rising pressure: the NHS workforce challenge. Workforce Profile and Trends of the NHS in England London: The Health Foundation. 2017.

21. Buchan J, Gershlick B, Charlesworth A, Seccombe I. Falling short: the NHS workforce challenge: Health Foundation; 2019.

22. Department of Health and Social Care. 50,000 Nurses Programme: delivery update: GOV.UK; 2022 [updated 7 March 2022. Available from: h<ttps://www.gov.uk/government/publications/50000-nurses-programme-delivery-update/50000-nurses-programme-delivery-update.>

23. Morgan B. NHS staffing shortages: why do politicians struggle to give the NHS the staff it needs? The King's Fund. 2022.

24. Waitzman E. Staff shortages in the NHS and social care sectors. In Focus, House of Lords Library. 2022.

25. Markowski M, Cleaver K, Weldon SM. An integrative review of the factors influencing older nurses' timing of retirement. Journal of Advanced Nursing,. 2020;76(9):2266-85.

26. NHS Employers. NHS Terms and Conditions (AfC) pay scales - Annual 2021 [Available from: h<ttps://www.nhsemployers.org/pay-pensions-and-reward/nhs-terms-and-conditions-of-service---agenda-for-change/pay-scales/annual.>

27. Elliott R, Ma A, Sutton M, Skatun D, Rice N, Morris S, et al. The role of the staff MFF in distributing NHS funding: taking account of differences in local labour market conditions. Health Economics,. 2010;19(5):532-48.

28. Nursing Times. Nursing Times survey reveals extent of Covid-19 workforce pressures 2021 [Available from: h<ttps://www.nursingtimes.net/news/workforce/nursing-times-survey-reveals-extent-of-covid-19-workforce-pressures-03-02-2021/.>

29. Rodriguez-Garcia MC, Marquez-Hernandez VV, Granados-Gamez G, Aguilera-Manrique G, Gutierrez-Puertas L. Magnet hospital attributes in nursing work environment and its relationship to nursing students' clinical learning environment and satisfaction. Journal of Advanced Nursing,. 2020.

30. Yarbrough S, Martin P, Alfred D, McNeill C. Professional values, job satisfaction, career development, and intent to stay. Nursing Ethics,. 2017;24(6):675-85.

31. Gularte-Rinaldo J, Baumgardner R, Tilton T, Brailoff V. Mentorship ReSPeCT study: a nurse mentorship program's impact on transition to practice and decision to remain in nursing for newly graduated nurses. Nurse Leader. 2022.

32. Zhang Y-p, Huang X, Xu S-y, Xu C-j, Feng X-q, Jin J-f. Can a one-on-one mentorship program reduce the turnover rate of new graduate nurses in China? A longitudinal study. Nurse Education in Practice,. 2019;40:N.PAG-N.PAG.

33. Schroyer CC, Zellers R, Abraham S. Increasing registered nurse retention using mentors in critical care services. Health Care Manager. 2020;39(2):85-99.

34. Brook J, Aitken L, Webb R, MacLaren J, Salmon D. Characteristics of successful interventions to reduce turnover and increase retention of early career nurses: A systematic review. International Journal of Nursing Studies. 2019;91:47-59.

35. Van Camp J, Chappy S. The effectiveness of nurse residency programs on retention: a systematic review. AORN Journal,. 2017;106(2):128-44.

36. Tarhan M, Doğan P, Kürklü A. Nurse‐physician collaboration, intention to leave job, and professional commitment among new graduate nurses. Nursing Forum. 2022;57(2):252-9.

37. Yu M, Lee H. Impact of resilience and job involvement on turnover intention of new graduate nurses using structural equation modeling. Japan Journal of Nursing Science. 2018;15(4):351-62.

38. Kenny P, Reeve R, Hall J. Satisfaction with nursing education, job satisfaction, and work intentions of new graduate nurses. Nurse Education Today,. 2016;36:230-5.

39. Steele-Moses S. Recruitment attributes important to new nurse graduates employed on adult medical-surgical units. Medsburg Nursing. 2018;27(5):310-28.

40. Cao X, Li J, Gong S. Effects of resilience, social support, and work environment on turnover intention in newly graduated nurses: The mediating role of transition shock. Journal of Nursing Management,. 2021;29(8):2585-93.

41. Wolford J, Hampton D, Tharp-Barrie K, Goss C. Establishing a nurse residency program to boost new graduate nurse retention. Nursing Management. 2019;50(3):44-9.

42. Read E, Laschinger HKS. Transition experiences, intrapersonal resources, and job retention of new graduate nurses from accelerated and traditional nursing programs: A cross-sectional comparative study. Nurse Education Today,. 2017;59:53-8.

43. Brook J, Aitken LM, MacLaren J-A, Salmon D. An intervention to decrease burnout and increase retention of early career nurses: a mixed methods study of acceptability and feasibility. BMC Nursing. 2021;20(1):19.

44. Dwyer PA, Hunter Revell SM, Sethares KA, Ayotte BJ. The influence of psychological capital, authentic leadership in preceptors, and structural empowerment on new graduate nurse burnout and turnover intent. Applied Nursing Research. 2019;48:37-44.

45. Mills J, Chamberlain-Salaun J, Harrison H, Yates K, O'Shea A. Retaining early career registered nurses: A case study. BMC Nursing. 2016;15(1).

46. Favaro A, Wong C, Oudshoorn A. Relationships among sex, empowerment, workplace bullying and job turnover intention of new graduate nurses. Journal of Clinical Nursing,. 2021;30(9/10):1273-84.

47. Blegen MA, Spector N, Lynn MR, Barnsteiner J, Ulrich BT. Newly licensed RN retention: Hospital and nurse characteristics. JONA: The Journal of Nursing Administration. 2017;47(10):508-14.

48. Doiron D, Hall J, Kenny P, Street DJ. Job preferences of students and new graduates in nursing. Applied Economics. 2014;46(9):924-39.

49. Park SY, Kim H, Ma C. Factors associated with difficulty in adapting and intent to leave among new graduate nurses in South Korea. Health Care Management Review. 2022;47(2):168-78.

50. Africa L, Trepanier S. The role of the nurse leader in reversing the new graduate nurse intent to leave. Nurse Leader. 2021;19(3):239-45.

51. Kox JHAM, Runhaar J, Groenewoud JH, Bierma-Zeinstra SMA, Bakker EJM, Miedema HS, et al. Do physical work factors and musculoskeletal complaints contribute to the intention to leave or actual dropout in student nurses? A prospective cohort study. Journal of Professional Nursing. 2022;39:26-33.

52. Sandler M. Why are new graduate nurses leaving the profession in their first year of practice and how does this impact on ED nurse staffing? A rapid review of current literature and recommended reading. Canadian Journal of Emergency Nursing. 2018;41(1):23-4.

53. An M, Heo S, Hwang YY, Kim JS, Lee Y. Factor affecting turnover intention among new graduate nurses: focusing on job stress and sleep disturbance. Healthcare. 2022;10(6).

54. Chachula KM, Myrick F, Yonge O. Letting go: How newly graduated registered nurses in Western Canada decide to exit the nursing profession. Nurse Education Today,. 2015;35(7):912-8.

55. Flinkman M, Salanterä S. Early career experiences and perceptions - a qualitative exploration of the turnover of young registered nurses and intention to leave the nursing profession in Finland. Journal of Nursing Management,. 2015;23(8):1050-7.

56. Zhang Y, Wu J, Fang Z, Zhang Y, Wong FKY. Newly graduated nurses' intention to leave in their first year of practice in Shanghai: A longitudinal study. Nursing Outlook. 2017;65(2):202-11.

57. Haririan H, Samadi P, Lalezari E, Habibzadeh S, Porter JE. Nursing and midwifery students' mental health status and intention to leave during Covid-19 pandemic. SAGE Open Nursing. 2022:1-8.

58. Cleaver K, Markowski M, Wels J. Factors influencing older nurses' decision making around the timing of retirement: An explorative mixed-method study. Journal of Nursing Management,. 2022;30(1):169-78.

59. Li H, Sun D, Wan Z, Chen J, Sun J. The perceptions of older nurses regarding continuing to work in a nursing career after retirement: A qualitative study in two Chinese hospitals of different levels. International Journal of Nursing Studies. 2020;105:N.PAG-N.PAG.

60. Voit K, Carson DB. Post-retirement intentions of nurses and midwives living and working in the Northern Territory of Australia. Rural and Remote Health. 2014;14(3).

61. Falk NL, Rudner N, Chapa D, Greene J. Nurse practitioners and intent to retire. Journal of the American Association of Nurse Practitioners. 2017;29(3):130-5.

62. Uthamanuthaman T, Chua TL, Ang SY. Older nurses: A literature review on challenges, factors in early retirement and workforce retention. Proceedings of Singapore Healthcare. 2016;25(1):50-5.

63. Storey C, Cheater F, Ford J, Leese B. Retaining older nurses in primary care and the community. Journal of Advanced Nursing,. 2009;65(7):1400-11.

64. Wargo-Sugleris M, Robbins W, Lane CJ, Phillips LR. Job satisfaction, work environment and successful ageing: Determinants of delaying retirement among acute care nurses. Journal of Advanced Nursing,. 2018;74(4):900-13.

65. Rigby J, O'Connor M. Retaining older staff members in care homes and hospices in England and Australia: the impact of environment. International Journal of Palliative Nursing. 2012;18(5):235-9.

66. Kaewpan W, Peltzer K. Nurses’ intention to work after retirement, work ability and perceptions after retirement: A scoping review. Pan African Medical Journal. 2019;33.

67. Ball J, Palmer W, Ejebu O, Phillipou J, Rafferty AM, Atherton I, et al. Evaluation of the N50k programme. NIHR Policy Research Programme. 2022 - 2024.

68. Conservative Party. Conservative Party Election Manifesto. Available at h<ttps://www.conservatives.com/our-plan/nhs.> Accessed January 2022. 2019.

69. Cleland J, Porteous T, Ejebu O, Skåtun D. Should I stay or should I go now?: A qualitative study of why UK doctors retire. Medical Education,. 2020;54(9):821-31.

70. Cleland J, Porteous T, Ejebu O, Ryan M, Skåtun D. Won’t you stay a little longer? A Discrete Choice Experiment of UK doctor’s preferences for delaying retirement. Health Policy. 2021;126(1):60-8.

71. Cleland J, Porteous T, Skåtun D. What can discrete choice experiments do for you? Medical Education,. 2018;52(11):1113-24.

72. Ryan M, Gerard K, Amaya-Amaya M. Using discrete choice experiments to value health and health care: Springer Science & Business Media; 2008.

73. Lagarde M, Blaauw D. A review of the application and contribution of discrete choice experiments to inform human resources policy interventions. Human Resources for Health. 2009;7(1):1-10.

74. Doiron D, Yoo HI. Temporal stability of stated preferences: The case of junior nursing jobs. Health Economics,. 2017;26:802-9.

75. Scott A, Witt J, Duffield C, Kalb G. What do nurses and midwives value about their jobs? Results from a discrete choice experiment. Journal of Health Services Research and Policy. 2015;20(1):31-8.

76. de Bekker‐Grob EW, Ryan M, Gerard K. Discrete choice experiments in health economics: a review of the literature. Health Economics,. 2012;21(2):145-72.

77. Lancaster KJ. A new approach to consumer theory. Journal of Political Economy,. 1966;74(2):132-57.

78. McFadden D. Conditional logit analysis of qualitative choice behavior. Berkeley, California1973.

79. UK Health Security Agency. Grey literature: index and alternative sources and resources 2023 [Available from: h<ttps://ukhsalibrary.koha-ptfs.co.uk/greylit/.>

80. Van Manen M. Researching lived experience: Human science for an action sensitive pedagogy: Routledge; 2016.

81. Newman K, Maylor U. The NHS Plan: Nurse satisfaction, commitment and retention strategies. Health Services Management Research,. 2002;15(2):93-105.

82. Wilson C. Why stay in nursing? Nursing Management. 2006;12(9):24-32.

83. Suen L-JW, Huang H-M, Lee H-H. A comparison of convenience sampling and purposive sampling. Hu Li Za Zhi. 2014;61(3):105.

84. Hennink M, Kaiser BN. Sample sizes for saturation in qualitative research: A systematic review of empirical tests. Social Science & Medicine. 2022;292:114523.

85. Polkinghorne DE. Phenomenological research methods. Existential-Phenomenological Perspectives in Psychology. 1989:41-60.

86. Braun V, Clarke V. Using thematic analysis in psychology. Qualitative Research in Psychology. 2006;3(2):77-101.

87. Ryan M. Using consumer preferences in health care decision making: the application of conjoint analysis. Monographs. 1996.

88. Coast J, Al‐Janabi H, Sutton EJ, Horrocks SA, Vosper AJ, Swancutt DR, et al. Using qualitative methods for attribute development for discrete choice experiments: issues and recommendations. Health Economics,. 2012;21(6):730-41.

89. Mangham LJ, Hanson K, McPake B. How to do (or not to do) … Designing a discrete choice experiment for application in a low-income country. Health Policy and Planning. 2009;24(2):151-8.

90. Mühlbacher A, Johnson FR. Choice experiments to quantify preferences for health and healthcare: state of the practice. Applied Health Economics and Health Policy,. 2016;14:253-66.

91. ChoiceMetrics. ChoiceMetrics Ngene h<ttp://www.choice-metrics.com/contact.html.> Sydney, NSW2020.

92. Huber J, Zwerina K. The importance of utility balance in efficient choice designs. Journal of Marketing Research,. 1996;33(3):307-17.

93. Johnson FR, Yang J-C, Reed SD. The internal validity of discrete choice experiment data: a testing tool for quantitative assessments. Value in Health. 2019;22(2):157-60.

94. NIHR ARC Wessex. Our partners. Available online at: h<ttps://www.arc-wx.nihr.ac.uk/about-us/our-partners/.> Accessed: February 2022 2022 [

95. de Bekker-Grob EW, Donkers B, Jonker MF, Stolk EA. Sample size requirements for discrete-choice experiments in healthcare: a practical guide. The Patient-Centered Outcomes Research. 2015;8(5):373-84.

96. Louviere JJ, Hensher DA, Swait JD. Stated Choice Methods: Analysis and Applications: Cambridge University Press; 2000.

97. Ball J, Turnbull J, Ejebu O, On behalf of the N50k team. Employers' offers to recruit and retain nurses in England: A cross-sectional study. Ongoing.

98. Qualtrics. Qualtrics <https://www.qualtrics.com>. Provo, Utah, USA2020.

99. StataCorp. Stata Statistical Software: Release 16. College Station, TX: StataCorp LLC2019.

100. Nursing & Midwifery Council (NMC). The NMC register England mid-year update. 1 April – 30 September 2022. 2023.

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**Funding statement** This work is supported by the National Institute for Health and Care Research Policy Research Programme (NIHR-PRP) (grant number NIHR203842)

**Disclaimer** The funder had no role in the study design, data collection and analysis, interpretation of the data, decision to submit the protocol or results for publication, or writing the manuscript

**Competing interest statement** All authors have completed the ICMJE uniform disclosure form and declare: JB and the N50k study team had financial support from the National Institute for Health and Care Research Policy Research Programme (grant number NIHR203842). All authors declare they have no competing interests.

**Patient and public involvement (PPI)** Patients and the public participated in the design, conduct and dissemination plans of this research. Refer to the PPI section for further detail

**Patient consent for publication** Notapplicable

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