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## **Abstract**

### **Background**

Chronic disease is a significant burden on the global population. The HEALTH Passport is a paper-based approach previously utilised to help adults modify clinical risk factors through lifestyle which may be effective in improving the long-term health of school-age children. This study investigates the feasibility of in-schools use by engaging trainee teachers in primary and secondary education.

### **Method**

256 unique responses were collated to evaluate current teaching of the main health risk factors and HEALTH Passports specifically adapted for schools. Trainees attended workshops with pre- and post-questionnaires used to measure training efficacy and evaluate the Passports' suitability for in-school use. Narrative analysis of feedback was performed.

### **Results**

Feedback received for both Passports was positive overall. Trainees highlighted the need for the Passports to be further age differentiated. Significantly increased confidence ( $p < 0.01$ ) in knowledge of Exercise, Type-2 Diabetes, Weight and Blood pressure was shown. Confidence in smoking, drugs and alcohol knowledge was reduced highlighting the requirement for further teacher training.

### **Conclusion**

The HEALTH Passport has potential as an intervention to improve health literacy in school-age children. Age-adaptation is needed with references to weight measures removed. Emotional wellbeing should be focused on, and data management stringently assessed for child protection.

## Introduction

The global burden of chronic, non-communicable disease (NCD) is a major public health issue. World Health Organisation (WHO) reports 63% of all deaths were due to non-communicable disease that are potentially preventable through key risk factor mediation, the exposure to which often begins in childhood.<sup>1</sup> One third of cancers and 80% of Cardiovascular disease (CVD), Stroke and Type 2 Diabetes Mellitus cases could be prevented by addressing four main risk factors to health; poor diet, lack of physical activity, alcohol misuse and smoking. <sup>1</sup> Furthermore, poor mental health can contribute to 20 years of potential life lost due to mental health disorders increasing the risk of CVD. <sup>2</sup> As these disease are complex and multi-factorial, determining effective methods of risk factor modification is challenging and gauging success of implementation even more difficult given objective measures like BMI are not always indicators of an individual's overall health.<sup>2</sup> It is crucial to address these risk factors to reduce mortality and improve life expectancy in adults<sup>3</sup>, especially given those with high risk modifiable factors like hypertension, poor glycaemic control and much higher BMI at are increased risk of COVID-19 related mortality.<sup>4</sup>

This high prevalence of NCD is also starting to become apparent in paediatric populations; whilst risk factor management in adulthood is vital, targeting health behaviours in younger people may be a way to mitigate risk factors for chronic disease earlier in life. The WHO strategy for NCD<sup>6</sup> reported that if unaddressed, several major risk factors conferred disease in both Primary school (4-11 years old) and Secondary (11-18 years) school level, the most critical of which were weight management and physical activity. Children with obesity were shown to have a 3-times higher risk of hypertension and subsequent CVD, <sup>7</sup> and poor weight management has a significant impact on mental health and health-related quality of life.<sup>8</sup> Additionally children with higher BMIs are at risk of psychological and social adjustment issues<sup>7</sup> due to its links with a myriad of different long-term chronic conditions.

Therefore, there is a need for effective strategies to start addressing these issues at a young age. Although weight management itself is complex, incorporation of physical activity into a child's daily life has significant health benefits and its continuity into adulthood is very effective in improving a child's long-term health. <sup>9</sup> Incorporation of intense physical activity measured at one metabolic equivalent per week has a 20% mortality benefit and inclusion of weight bearing exercise at an early age reduces the risk of osteoporosis and related diseases. <sup>10,11</sup>

Regular fruit and vegetable intake is another critical chronic disease modulator as phytochemicals reduce disease-causing free radicals and a varied diet can be protective against gastrointestinal and genitourinary cancer development later in life.<sup>12,13</sup>. Additionally childhood dysregulation of emotions impacts cardiovascular health in adulthood,<sup>14</sup> and with the prevalence of mental health disorders currently at 15% in children and adolescents globally<sup>15</sup> and likely to continue to rise, teaching children coping strategies from a young age is key.

Although there are separate NICE guidelines that provide evidence-based advice to improve health in the paediatric population, <sup>16-18</sup> the guidelines do not address paediatric health holistically. The Helping Everyone Achieve Long Term Health (HEALTH) Passport <sup>19</sup> is an economic, paper-based tool previously used as a method of health promotion and behaviour modification in vulnerable patients. The Passport highlights 10 key modifiable risk factors (Supplemental Table 1) for chronic disease and through evidence-based fact provision improves health literacy and gives patients simple steps to facilitate lifestyle changes. This approach was received positively when implemented in a psychiatric population with 84% of participants liking the tool and 62% of those involved demonstrating interest in sharing this method of health monitoring.<sup>19,20</sup>

Due to the positive reception and low-cost nature of this intervention it was postulated that a similar approach might be beneficial in paediatric populations to provide consistent health promotion messaging. Two new HEALTH Passports were designed for Primary (Appendix 1.a) and Secondary (Appendix 1.b) school children respectively. Several factors from the original Passport were excluded (Figure 2, Supplemental Table 1) as they were not age appropriate. As schools-based interventions have previously been effective in tracking and engaging children with lifestyle change,<sup>21</sup> it was proposed that teachers should be involved and engaged in the delivery process. Although the Personal, Social and Health Education (PSHE) curriculum does provide some information on the different aspects of personal health, its delivery varies between schools and therefore appropriate training would need to be provided to enable teachers to facilitate of student understanding and engagement with the HEALTH Passport. As schools were mid-way through the academic year at the time of this project, it was proposed that a cross-phase education conference could be held for trainee teachers with the dual purpose of enhancing trainee teachers' understanding of health for PSHE and to evaluate the potential utility the newly adapted HEALTH Passports.

The aims of the conference were to:

1. Assess trainees' understanding of key risk factors to chronic health via a pre-test questionnaire, provide relevant teaching and re-assess in a post-test.
2. Identify any gaps in current school teaching on risk factors.
3. Evaluate the new HEALTH Passports and solicit feedback and any potential improvements.
4. Identify important considerations of deploying this style of intervention in schools.

This paper reports on the result of this conference with respect to teacher confidence in health risk factor knowledge, feedback on the passports and how best to implement this intervention in schools. Detailed ethical approval is included in the supplemental information.

## **Methodology:**

350 trainee Primary and Secondary school teachers were involved as part of a “cross-phase” teaching day with a focus on Personal, Social and Health Education (PSHE). All trainees attended a health lecture, followed by a workshop in smaller groups to explore and evaluate the HEALTH Passport on content, design and age-appropriateness. Participants were asked to rank the health factors according to their perceived importance and how well they thought their schools dealt with these issues within the PSHE curriculum. Qualitative, free-text responses were thematically analysed in NVivo. The lecture and workshops were an essential part of teacher training, but the Passport evaluation was entirely voluntary, and the trainees were under no obligation to submit their data. Participants were invited to complete a short questionnaire prior to the lecture, using Qualtrics on their personal devices. This self-report questionnaire asked participants to rate on a simple 5-point Likert scale their confidence in teaching several health-related issues: General health; diet, physical exercise; optimal weight and blood pressure monitoring; Diabetes Type 2 prevention; safe sex; smoking, alcohol and drugs; and emotional wellbeing. Participants completed a similar questionnaire after the workshop to measure the efficacy of the teaching intervention in improving their confidence in teaching children about health. Questionnaire responses could be submitted anonymously, or students could include their university identification to pair responses. In the post-test questionnaire, participants were asked to rate the effectiveness of the lecture in improving their health literacy, and to evaluate the appropriateness of the HEALTH Passport use in their teaching classes.

## **Results:**

This project adopted a mixed-methods design, triangulating quantitative data from pre- and post-test questionnaires with qualitative data in the form of free-text responses as feedback to the HEALTH Passport. Narrative analysis conducted following the conference elucidated three key themes including:

- Gaps in current teaching
- Primary and Secondary HEALTH Passport potential with sub themes of:
  - Exclusion of BMI and weight
  - Key Stage differentiation
- Challenges to implementation

### *Teaching Confidence*

Quantitative analysis was performed on the pre-and post- questionnaires to ascertain teaching confidence of each risk factor. The pre-test questionnaire received 256 unique responses, representing a response rate of over 70% (it is hard to know exactly as the research team were not permitted to access the registration information for the trainee teacher cohort to know exactly how many were in attendance). The post-test questionnaire received 132 unique responses, of which 53 could be paired to pre-test responses using the identification numbers. A paired, one-tailed t-test was conducted in Excel with an alpha value of 0.05, to compare questionnaire responses before and after the teaching intervention and HEALTH Passport training session.

The sample of trainee teachers exhibited an increase in mean confidence in teaching six of the health factors, with the only exceptions being “safe sex” (no change) and “smoking, drugs and alcohol” (slight decrease). Several results are statistically significant: “Physical exercise” and “Type 2 Diabetes” ( $P < 0.01$ ) and “Optimal weight and blood pressure” ( $P < 0.05$ ), although effect sizes measured by Cohen’s  $d$  test are small<sup>22</sup>. Trainees demonstrated a reduced confidence in smoking, alcohol, and drug usage post-presentation; however, this may be due to inclusion of extra scientific information on these topics highlighting potential gaps in knowledge that could improve the health literacy of the trainees themselves.

#### *Gaps in current teaching*

Trainee assessment of risk factor teaching was dependent on their subject specialism and exposure to the whole school population. Whilst teaching on factors like physical activity and smoking were regularly timetabled into the curriculum, teaching on other risk factors like food and diet, and obesity was more nebulous. In Primary schools, food and diet was included in the science curriculum, along with “healthy eating [being] promoted in the canteen” through the use of fruit and vegetable trolleys, or in some cases “lunchbox inspections”. Several trainees felt food and diet teaching “could be improved” as there was insufficient focus on the links between diet, physical activity and weight management.

Several trainees felt unable to assess the standard of health teaching on placements (23.18%) due to their training being focused on their specialist subject with limited exposure to pastoral care. Additionally, at the time of the conference, most trainees had just started a new placement, and thus felt unable to comment as to how effectively their schools triaged individual child health needs and implemented Primary prevention strategies.

#### *Potential of the Primary and Secondary HEALTH Passports*

The feedback on both HEALTH Passports was mostly positive with the most common feedbacks included in Table 2. Trainees were asked to rate the potential of the Passport on a 10-point scale (Appendix 2), with 80% of respondents expressing that this style of intervention had between some benefit [4-6] and high

potential [9-10] (Figure 1) and that early student exposure could maximise changes to health behaviours by encouraging ideas and conversations about health maintenance (Table 2). In the free text feedback, a significant number of comments were not related to the Passport approach, however of those collated 77.5% were positive and in favour of the approach. 15% were negative, with 7.5% were comprised of both negative and positive components. Additionally, the inclusion of screen time, sleep and personal hygiene was suggested. Despite this positive feedback, trainees raised some important changes for consideration.

#### *Exclusion of BMI and weight*

Trainees had a strong negative reaction to BMI inclusion in the Passport, stating that focusing students on numbers-based measure was problematic and could [lead] “to disordered eating” and “negative relationship with food later in life”. Several trainees expressed concern that it could be “damaging for body image” and if students felt ashamed of their weight this could “impact their mental health”. Whilst Healthcare Professionals (HCPs) may use BMI and weight to guide patients in lifestyle modifications, trainees viewed their students in a more holistic manner and were more focused on the overall benefit of a child having a positive body image. This is an important consideration as the negative mental health experienced by children with body dysmorphic disorders and low self-esteem may be much more impactful than a movement towards a traditionally ‘healthier’ weight in a paediatric population.

Trainees also identified that the action of writing this on a paper may cause bullying and negative peer pressure which might encourage them to lie about health behaviours to fit in with social norms. This, in conjunction with the fact that most children “have little control over their diets until their late teens” made it clear that weight measurement would not be suitable on any prospective Passport provided to children.

#### *Passport differentiation at different key stages (KS) of education*

Trainees also noted there was a requirement for the HEALTH Passport to be depending on which Key Learning Stage (KS) it would be utilised in, and additionally adapted to school specific requirements (such as modification of sexual health teaching in Faith schools).

At Primary level (KS1-2) this would involve removing any technical language, and making it clear that any diagrammatic or pictographic was not taken as being entirely literal (e.g. if there was a list of fruit and vegetables, make sure students are aware it didn’t *only* include what was depicted. See Appendix 1a for examples.) One trainee suggested ‘gamifying’ the Passport to facilitate student engagement.

At Secondary level (KS3-5) this would involve providing resources related on key sensitive topics such as smoking, alcohol and drug use, and sexual health. The scales (Appendix 1.b.) would need to be modified to prevent any child protection issues and instead focus on open classroom discussions whilst embedding with other parts of the curriculum (e.g., delivering the HEALTH Passport alongside teaching the

dangers of smoking in biology). Trainees highlighted that there was a need for continuity in the more secondary relevant risk factors, where teaching was often “covered in tutor time irregularly”.

### *Challenges to implementation*

Several challenges to implementing a paediatric HEALTH Passport were highlighted throughout the conference. The most important and consideration raised was the necessity of parental support. Trainees identified that behavioural change would need to be instituted sensitively in partnership with parents to improve impact and overall longevity (some suggested inclusion of a session with an HCP may encourage parental support). Trainees also mentioned there were some child protection concerns with having written references to measures with legal implications such as alcohol or drug use and that having paper-based records may encourage children to lie to avoid getting ‘in trouble’. Additionally, this style of intervention was a “time consuming” measure due to its requirement for adjunct teaching delivery to help children (and parents) understand and engage with the Passports aims. This could be a particularly salient consideration given the crowded nature of the PSHE curriculum and the significant disruption to schooling during the COVID-19 pandemic.

## **Discussion**

### **Main finding of this study**

The original HEALTH Passport for adults was an effective tool to help participants reframe their thinking about their long-term health risks and their subsequent behaviours. The two modified Passports may similarly have potential as a cost-effective intervention aimed to engage students in implement healthier habits early, to modulate their risk of developing chronic health conditions in later life. The provision of positive messaging at an early age allows for consistent, evidence-based messaging (Figure 2) that hopefully facilitate the implementation of long-term changes.

If this intervention were to be trialled in Coventry and Warwickshire, it would require a teacher-oriented delivery. This study has demonstrated that trainee teachers are confident in teaching some risk factors to health detailed within the Passport (General health, Emotional wellbeing, Diet and Safe sex) but they may need more education on others to deliver an intervention of this style (Type 2 Diabetes, Physical activity, Smoking, alcohol, drugs and Optimal weight and Blood pressure). The Passport itself would additionally have to be modified for each school and KS for it to be utilised effectively. The Secondary Passport should remove the requirement to fill in components related to child protection issues and instead replaced with relevant resources and contact details to help direct students dealing with such issues. To maximise engagement, stigmatising components of the Passport like BMI should be replaced with functional indicators of health such as ability to complete a fitness activity such as running. Both

parents and teachers would need to be involved at every stage of the intervention to ensure engagement and to facilitate behavioural changes in a positive atmosphere.

Overall, this study has demonstrated that with modifications, the HEALTH Passport may be a useful tool to include in facilitating health promotion in both Primary and Secondary schools, and with the modifications suggested above, it would be worth trialling in the local Coventry and Warwickshire area to determine how effective this method would be in instituting behaviour changes in local children. We are currently exploring the idea of rolling the HEALTH passport to a wider adult population, particularly in settings such as workplaces, to continue this consistent messaging and to support the general population in implementing changes that improve their health long-term. Additionally, if the Passport was implemented in schools there may be scope to develop an application or software for students to utilise for ease of continuity and health behaviour tracking.

### **What is already known on this topic**

The utilisation of HEALTH Passports is a relatively well-known tool that has previously been utilised to track adult health, and more recently in children with complex health needs to share and understand information about their care. This has previously been a beneficial strategy to enable adults with psychiatric needs take a more mindful approach to their health and learn strategies to mitigate their long-term disease risk. To the authors' knowledge this strategy has not been utilised in a paediatric population, nor have HEALTH Passports previously been geared directly towards specific child-related risk factors for potential chronic health conditions.

### **What this study adds**

This study has evaluated a new health management and surveillance tool that could be used in educational settings to facilitate childhood understanding of risk factors that may impact future health. The HEALTH Passport has some promise as an effective tool that bridges the gap between HCP monitoring of risk factors to health and teacher facilitation of learning about health. This project has demonstrated that this style of intervention can be adapted based on current evidence on risk factors to health and be tailored to specific, targeted population fit for both adult and paediatric purpose. Although the Passport is primarily aimed at direct risk factor modulation, by delivering this in schools it acts as a conversation starter to encourage children from an early age to have an awareness of and take responsibility for their health. It provides consistent messaging about the 10 most important risk factors for future health as demonstrated in the psychiatry population<sup>19</sup> from an early age, and due to the nature of parental involvement in a child's health, this begins to create a network of health literacy within a family unit that a person can carry with them throughout their life course (Figure 2). By focusing on nutritional and mental health factors it may

also act as an early red flag system for difficulties in home life that may not otherwise have been discussed or picked up on by pastoral or HCP.

### **What is the limitation of this study?**

There are several limitations of this study that must be considering when analysing the potential of the HEALTH Passport implementation at school level. Firstly, the population of teachers interviewed were trainees with limited exposure to teaching practices through 16-week placements, therefore their attitudes towards health risk factors and how students may perceive a paper-based tool may not be accurate to current teachers of Primary and Secondary education. Additionally, this study was only undertaken at one site, with trainees from the West Midlands alone, so these opinions on sensitive topics such as weight management and parental support of interventions may not reflect the UK wider population.

### **Conflict of interest and funding**

NB and EB have no conflicts of interest. Both NB and EB received a Warwick Medical School INSPIRE Summer Studentship of £800 to undertake this work in partnership with VP and DH. JT received no funding to undertake this work.

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