**Full title of project:** Public Health Intervention Responsive Studies Team (PHIRST): Bristol

**Host institutions:** The University of Bristol and Cardiff University wish to host an NIHR Public Health Intervention Responsive Study Team. This application builds upon the highly productive 10-year collaboration between Cardiff and Bristol as the UKCRC funded **DECIPHer** Centre (**D**evelopment and **E**valuation of **C**omplex **I**ntervention for **P**ublic **He**alth Imp**r**ovement). We strongly welcome the PHIRST teams' initiation and their focus on co-producing responsive research at the local level which we see as critical to ensuring the translation of timely, effective, and sustainable public health interventions into practice.

Bristol has an international reputation for excellence in applied Public Health Research. In Shanghai Ranking's Global Ranking of Academic Subjects, Public Health in Bristol is ranked 2nd in the UK, 3rd in Europe and 8th globally. Our **Centre for Public Health** (**CPH**), led by Prof Rona Campbell, is one of the leading centres within Population Health Sciences (PHS) one of the two departments that make up Bristol Medical School. PHS is led by Professor Matt Hickman and hosts the NIHR School for Public Health Research (SPHR), an NIHR Health Protection Research Unit (HPRU) in Behavioural Science and Evaluation also led by Hickman and an NIHR Academic Research Centre ARC West led by Prof John Macleod. Prof Russ Jago from the **Centre for Exercise, Nutrition & Health Sciences** (**ENHS**) is the Public Health co-lead for ARC West. Bristol is unique in being a member of all three NIHR national research schools in public health, primary care (SPCR) and social care (SSCR) and hosts an NIHR Biomedical Research Centre (BRC). Rona Campbell will direct this Bristol-Cardiff PHIRST team with Russ Jago leading in England.

At Cardiff University, the DECIPHer Centre continues in the School of Social Sciences, directed by Simon Murphy, who will lead the PHIRST team in Wales. DECIPHer includes investigators from the Centre for Trials Research (School of Medicine) and Public Health Wales (PHW). It has an international reputation for developing and evaluating complex interventions and supporting innovative transdisciplinary networks with policy, practice and the public that have diffused across the UK and Europe. These include the Public Health Improvement Research Network (PHIRN) focussing on community settings, Advice Leading to Public Health Improvement (ALPHA), supporting public involvement, and the School Health Research Network (SHRN) as well as collaborations with research centres covering local and national government, the environment, education, crime and security, mental health and social care.

Other members of the wider multi-disciplinary team supporting our PHIRST will include those working in the **CPH** and the **ENHS** in Bristol and those working in **DECIPHer** in Cardiff. Our involvement in the NIHR SPHR, HPRU, ARC, BRC, SPCR, SSCR, UK Prevention Research Partnership (UKPRP), and PHIRN provides access to many potential collaborators where additional expertise is required. It also ensures we have a large pool of researchers to draw on when delivering PHIRST studies.

**Meeting the criteria for a PHIRST team:**

Policy-relevant public health research & high-quality outputs

Rona Campbell is the NIHR SPHR's Deputy Director and Bristol lead. We are therefore very familiar with its Public Health Practice Evaluation Scheme (PHPES), the inspiration for PHIRST, having been commissioned to lead or co-lead seven PHPES projects to date, to a value of £1.4 million. Furthermore, since 2005, the Public Health Improvement Research Network (PHIRN) has worked with policy makers and practitioners throughout Wales to co-create research and promote naturalistic experiments via involvement in policy planning cycles. To date it has supported 195 co-produced studies to a value of over £50 million. Since 2013, the Welsh education Schools Health Research Network (SHRN) has supported 47 studies to a value of £25 million.

Bristol's performance in the 2014 Research Excellence Framework (REF) demonstrates our ability to produce high quality outputs. Eighty-six percent of the research in the unit of assessment including Public Health was rated 4* or 3* (world leading or internationally excellent) giving Bristol a ranking of 4th in the UK. Staff in **ENHS** were ranked first in the UK with 100% of outputs graded as

4* or 3*. In Cardiff, Public Health was included in Education and Sociology which ranked 5th and 3rd respectively in the UK. Since 2009, our DECIPHer collaboration has produced 656 academic publications, many with significant policy impacts as illustrated in the boxes below.

*Examples of policy-relevant public health research resulting in high quality published outputs*

- Our Cochrane review of the WHO Health Promoting Schools policy (1) has been cited in policy guidance from Public Health England (2, 3), the European Commission (4) and WHO (5).
- An RCT of universal free breakfasts in primary schools, co-produced with national and local government in Wales, showed the policy was effective (6), contributed to a reduction in breakfast skipping in the most deprived schools and households (7) and shaped national policy.
- Following the ban on smoking in public, surveys of child exposure to environmental tobacco smoke showed smoking in homes and cars continued particularly affecting children from poorer families (8). Our research was key to new legislation in Wales banning smoking in cars.

## Production and translation of high-quality public health research to maximise it use and relevance

We have an excellent track record of producing responsive research that meets the requirements of policy and practice at local and national level. We work closely with partners to identify evidence gaps, interventions and policies requiring evaluation, and to co-produce research that addresses these needs. Within **CPH** and **DECIPHer** we have a policy on knowledge exchange and translation by which all research staff are trained to abide, and we have staff working as knowledge brokers. We use innovative approaches to ensure translation of research into practice. Our very successful ASSIST smoking prevention intervention, for example, was developed in response to a request from a public health consultant in Glamorgan for a peer-led intervention to prevent teenage smoking. When our research showed our ASSIST programme to be cost effective (9, 10) we set up a Universities owned not-for profit company which continues to provide intervention materials, training in use of ASSIST and quality assurance thereby enabling it to be disseminated with fidelity. The company also supports implementation of other evidenced-based interventions.

*Examples of our research that has been translated into public health policy and practice*

- Our ASSIST smoking intervention has been recommended in NICE guidance (11) and in health policy in England (12) and the devolved nations (13, 14). Over 160,000 students in 970 schools have received ASSIST which has prevented an estimated 3250 young people from taking up smoking. RCTs of interventions for teenagers based on ASSIST to prevent drug misuse (15) and to promote sexual health and physical activity in girls (16) are now underway.
- Our RCT of a National Exercise Referral Scheme in Wales, co-produced with 12 health boards, showed it to be cost effective (17). Findings were fed back to Welsh Government and it has been delivered across all local 22 Welsh local authorities since 2013.
- Our economic model of child weight management services informed the **NHS public health commissioning plan** by the Bristol Director of Public Health, highlighting the importance of early intervention to prevent obesity and emphasizing the benefit of sustained weight management (18).

## Working with policy & practice communities to co-produce relevant, impactful research

***Working with traditional and non-traditional UK local government:*** We have developed strong partnerships with policy and practice communities in local and national Government and not only those working in public health teams as illustrated in the examples below and in the attached letters of support. We have set up systems, networks, and practices to foster co-production of relevant research and effective knowledge exchange. In Bristol and Cardiff, we have public health consultants (Morgan, MacArthur, Williams, Thomas, Bishop) and researchers who are co-located in Local Authorities (LAs), Public Health England (PHE), Public Health Wales, Welsh Government and at our Universities. In Bristol we work with PHE as an equal partner in our NIHR HPRU and have six-monthly meetings between the **CPH** and all local Directors of Public Health. We also have close links with Welsh Local Government Association via a range of past and ongoing collaborative projects, and with the Local Government Association in England through the SPHR. Our partnerships are intrinsic to our co-productive approach, which emphasises the involvement of policy and practice stakeholders and members of the public in all aspects of the research.

*Examples of research co-produced with traditional and non-traditional local government partners*

- We worked with drug and alcohol services in Bath and North East Somerset to evaluate their DrinkThink intervention which trains those working with young people to deliver an alcohol screening and brief intervention to reduce harmful alcohol use (19).
- We are working with Children's Services and Education in Leicester County Council evaluating their Digital Health Contact where School Nurses follow-up secondary school students whose answers to survey questions indicate support to maintain and improve their health maybe needed.
- Responding to a Welsh Local Government Association request we evaluated a school holiday programme to address food poverty (20). Our findings influenced government policy in Wales to invest in the programme and informed changes to the programme as it was scaled up.
- We are working with Gloucestershire Council to conduct a whole systems evaluation of the Gloucestershire Moves physical activity via the use of an embedded researcher, system mapping, ripple effect mapping and in-depth interviews with key stakeholders

***Upskilling of local government research expertise***: We will upskill through co-producing research as a PHIRST team supported by Bristol Medical School as an academic training base for public health, with 3 public health Academic Clinical Fellows (ACF) and support for 15 public health trainees who are LA based for much of their training. The **CPH** also supports the annual SW Public Health Scientific Conference with the Severn Deanery. We currently have 8 public health local government staff on our MSc in Public Health (including 5 Specialty Registrars). In Wales, **DECIPHer**'s partnership with PHW, supports a joint annual conference and has established strategic boards to link research and practice**. SHRN** is fully integrated with the Healthy Schools Scheme in Wales, includes 100% of secondary schools, and supports a biennial survey of pupil health which achieves 70% population coverage. This enables us to provide population data to LAs for health-needs planning and provides low-cost baseline and follow-up evaluation, and contributes research skills development in schools and local government.

An extensive programme of short courses in research methods is provided in Bristol and Cardiff which are accessed by those working in public health policy and practice including those working in local government. We are involved in the development of regional public health research and evaluation hubs and have representation (Ruth Kipping) on the Steering Group of the SW hub.

***Co-production***: Our approach to co-production has evolved over time and is captured in papers we have published including about the complex adaptive systems approach that has underpinned the development of our transdisciplinary networks PHIRN and SHRN (21), and our approach to the co-production of public health interventions (22). It has also been embedded in policies we have written and operationalised within DECIPHer and been informed by our involvement in the development of current NIHR SPHR polices for policy and practice collaboration and public involvement and engagement. Finally, it is shaped by our experience on many different research projects and reading of relevant literature and guidance, particularly that produced by INVOLVE. Suffused throughout this work is a set of operating principles which will guide our PHIRST team's approach to coproduction. Thus, we will aim to:

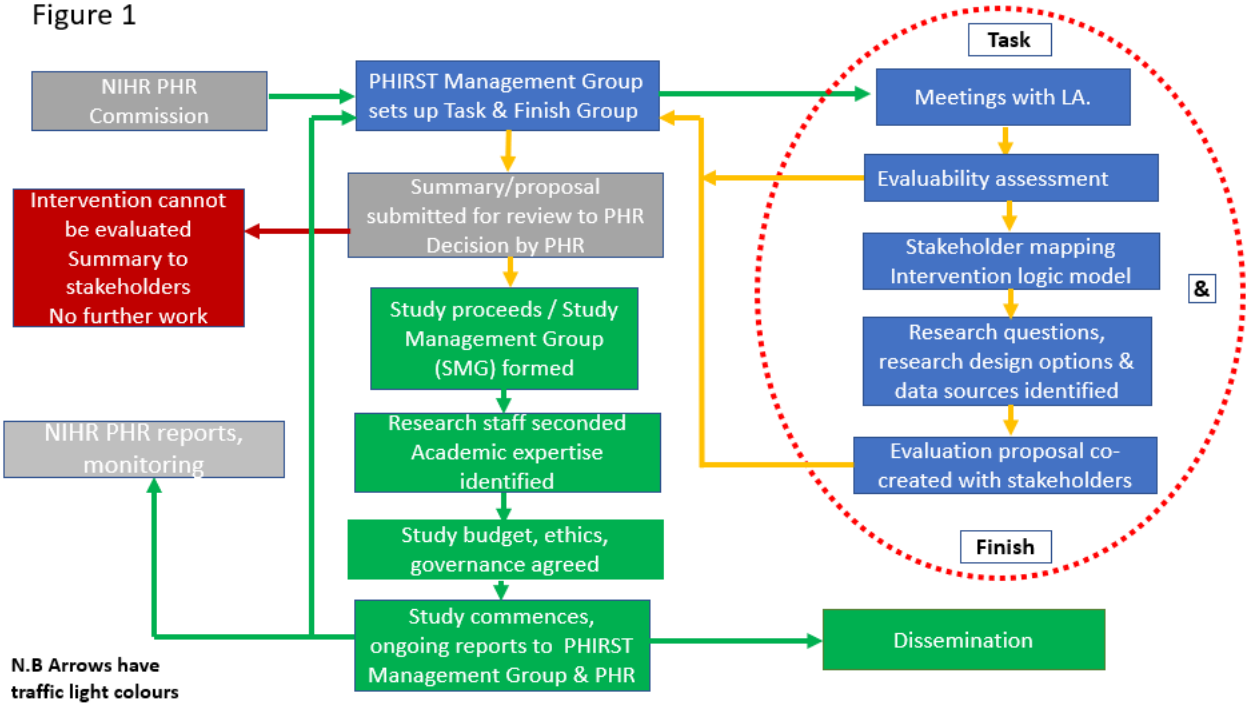
1. Involve public and practice stakeholders in all aspects of the plan of work, recognising that consulting is not the same as involving.
2. Identify the appropriate practice and public stakeholders for each evaluation study, paying attention to including those who may be marginalised in society and to incorporating diversity.
3. Work at building and sustaining relationships by developing trust and shared understanding between the researchers and stakeholders.
4. Work together in ways that ensure that everyone is benefitting from their involvement.
5. Ensure practitioner and public stakeholders are involved in decision making, share responsibility for the research and where appropriate work as co-researchers.
6. Engender an understanding between practitioner and public stakeholders and researchers that each brings different knowledges, skills and experiences which are of equal value.
7. Ensure that everyone has enough training in co-production to enable them to contribute to the research fully and comfortably.

8. Establish ground rules at the first meeting of any new group so that there is a shared, agreed understanding and expectation of roles and responsibilities and of ways of working.
9. Reflect and seek feedback on how well we are adhering to our co-production principles so that we can continually improve our practice.

How these principles will be operationalised in practice is described in the next section.

***Ways of working and co-production in practice:*** A summary of our proposed model of working is presented in Figure 1 below. When we receive a commission, each study[1] will begin with a Task and Finish Group. This will be led by RC, RJ or SM, include another member of our team (JK, FdV, JH or KM) and a lay member, and be assisted by a university employed researcher. Where we are working in another country or geographically distant part of England or Wales, we will also invite one of our many UK collaborators to be on the group. It will: (i) work with the LA and stakeholders to generate possible evaluation approaches based on the question(s) to be answered, identify data available and the potential for using various evaluation designs such as process evaluations, natural experiments or economic evaluations; (ii) map the relevant local practice and public stakeholders to ensure they are involved in the co-production of the research as the project proceeds. This will be done with advice from relevant members of our Policy and Practice and Public Advisory Groups (See attached Organisation Chart and earlier PPI section); (iii) develop a preliminary logic model for the intervention or policy to be evaluated and the formal scientific or pragmatic theory underpinning it; and (iv) discuss the preliminary logic model and its underpinning theory, research questions(s) and research design options with stakeholders and co-produce an initial research proposal.

Figure 1




The initial research proposal, which will include indicative timelines and costings, will be shared with our named NIHR-PHR contact with a recommendation to either proceed to development of a full study proposal or cease work. Based on our experience with **PHPES** and **PHIRN** it is helpful to have the option of ceasing at this stage if, for example, it becomes apparent that the intervention is still at too embryonic a stage to permit evaluation, if funding is not guaranteed for the duration of the evaluation, or because it is not possible to access essential data required for the evaluation. In these circumstances the preliminary work, for example development of a logic model and

[1] The word **study** is used in this proposal based on the advice of our public representatives. They advised that the term more clearly signalled that this was research work than the term project which is used to describe many activities.

underpinning theory, may help the local authority further develop the intervention which could be evaluated at a later stage.

If the NIHR-PHR is content for the study to proceed, a detailed proposal, including a fully theorised logic model, will be further developed and co-produced with local stakeholders, relevant academic expertise and with a member of our PHIRST team (JK, FdV, JH, KM) acting as the lead for the study and a researcher appointed or seconded to work on it for the duration. These researchers would, with public and practice stakeholders, become the Study Management Group. Once a study budget has been agreed, and ethical approvals plus the governance necessary for the study (for example a data sharing agreement about provision of data to the study team), have been secured, and the full proposal approved, the study will commence. The PHIRST Management Group will monitor study progress and each study will provide quarterly reports, including a financial report. This will be discussed by the PHIRST Executive and be the basis of reports required by NIHR-PHR. Depending on the nature of the study, and if it would improve the research, there will be the option for stakeholders to work as co-researchers and for the University employed researcher to spend time embedded with the LA. These are further ways in which upskilling of LA research expertise could be achieved and public partners be provided with new skills.

Our co-production approach is illustrated in the attached flow chart/ logic model. Below we provide examples of work that we have undertaken with public health practitioners, members of the public and other relevant stakeholders to develop intervention logic models and system maps.

*Examples of our research developing intervention logic models and system mapping*

- With young people and teachers in secondary schools, the NSPCC, and Rape Crisis we developed the logic model for an intervention Project Respect to prevent dating and relationship violence which was then implemented in a feasibility study including a pilot RCT (23).
- The Safety Management in Licenced Environments (SMILE) intervention, delivered by environmental health officers, to address violence in the night-time economy was co-produced with expert stakeholder groups through a process of system mapping and logic modelling. In an RCT in all 22 LAs in Wales it was shown to increase the incidence of violence in premises (24).
- Formative research with children, parents and teachers involved development of a logic model for a school-based, community-linked physical activity role model programme for girls (25).

## Public health evaluation expertise

Across our two institutions we have considerable **methodological strengths**. We have helped develop some of the methods listed below and the MRC guidance and international literature describing them (26-29). We also have world leading expertise in quantitative and qualitative systematic reviewing and evidence synthesis (Higgins), mathematical modelling (Vickerman) and the objective measurement of physical activity and nutrition (Jago).

| Methodological expertise | University of Bristol and Cardiff University researchers |
|---|---|
| Feasibility studies with pilot RCTs & definitive, individually randomised and cluster RCTs | Judi Kidger, Russ Jago, Ruth Kipping, Rona Campbell, Simon Murphy, Jemma Hawkins, Graham Moore, Mike Robling, Honor Young |
| Natural experiments and observational methods | Frank de Vocht, Yoav Ben Shlomo, Graham Moore, Matt Hickman, John Macleod |
| Mixed methods process evaluation | Graham Moore, Judi Kidger, Jemma Hawkins, Rhiannon Evans, Rona Campbell, Tricia Jessiman |
| Realist evaluation | Rhiannon Evans, Graham Moore, Simon Murphy |
| Systems mapping and evaluation & taking account of context | Frank de Vocht, Tricia Jessiman, Rona Campbell, Judi Kidger, Graham Moore |
| Behavioural science | Lucy Yardley, Marcus Munafò |
| Web and social media-based evaluation | Lucy Yardley |
| Systematic review and evidence synthesis methods | Julian Higgins, Rona Campbell, Deborah Caldwell, Jonathan Sterne, Rhiannon Evans |
| Health Data Research | John Macleod, Kelly Morgan |
| Transdisciplinary action research | Simon Murphy, Jemma Hawkins, Gillian Hewitt |

| | |
|---|---|
| Health economics and cost-effectiveness modelling | Will Hollingworth, Nicky Welton, Jo Coast, Peter Vickerman, Hannah Christensen, Katie Breheny |
| Dynamic modelling | Peter Vickerman, Hannah Christensen, |
| Co-production and public involvement | Jemma Hawkins, Judi Kidger, Rachel Brown, Simon Murphy, |
| Knowledge Exchange and Translation | Joan Roberts, Jemma Hawkins, Kelly Morgan |

Public Health topic expertise

The wide breadth of substantive **public health research expertise** that we will be able to draw on from within our two Universities is illustrated in the table below.

| **Substantive research area** | **University of Bristol and Cardiff University researchers** |
|---|---|
| Health inequality and inequity | Yoav Ben-Shlomo, Rona Campbell, Matt Hickman, Graham Moore |
| Alcohol/ smoking/ drug misuse | Matt Hickman, John Macleod, Graham Moore, Marcus Munafò, Rona Campbell, Frank de Vocht, Rachel Brown, Kyla Thomas, Georgie MacArthur |
| Physical activity/ nutrition/ obesity prevention/cardiovascular health | Russ Jago, Ruth Kipping, Jemma Hawkins, Kelly Morgan |
| Cancer screening and prevention | Richard Martin, Caroline Wright |
| Public mental health/self-injurious behaviours/suicide prevention | Judi Kidger, Deborah Caldwell, Nicola Wiles, Rhiannon Evans |
| Health protection/ infectious disease/ vaccination | Matt Hickman, Katrina Turner, Hannah Christensen, Peter Vickerman, Isabelle Oliver, Alastair Hay, Clare French |
| Relationships/ sexual health/ sexually transmitted infections | Paddy Horner, Rona Campbell, John Macleod, Jonathan Sterne, Honor Young |
| Intimate partner/ dating violence | Gene Feder, Rona Campbell, Gemma Morgan, Honor Young, Rhiannon Evans, Kelly Buckley, |
| Child development/social care and welfare/ looked-after children | Geraldine Macdonald, John Macleod, Rhiannon Evans, Tricia Jessiman, Rona Campbell, Ruth Kipping, Mike Robling |
| Adult social care/ health in later life/ Frailty, Multi morbidity | Yoav Ben-Shlomo, Gemma Morgan, David Abbott, Chris Salisbury |
| Learning/ physical disabilities | David Abbott, Geraldine Macdonald |
| Occupational & environmental public health | Frank de Vocht, Patricia Albers, Jemma Hawkins |
| Healthy cities/ urban planning/ built environment | Matt Hickman, Gabriel Scally |
| Health behaviour change | Marcus Munafò, Lucy Yardley |
| Health promotion in schools and educational settings | Rona Campbell, Ruth Kipping, Russ Jago, Judi Kidger, Joan Roberts, Gillian Hewitt, Kelly Morgan |
| Health in prisons and young offender institutions | Matt Hickman, Hayley Jones, Peter Vickerman, Jack Stone |
| Health services research | Sabi Redwood, Kelly Morgan |
| Public health law and ethics | John Coggon, Centre for Ethics in Medicine |

Timescales: Many **DECIPHer**, SPHR, HPRU and ARC-West projects have relatively short timescales and we have a proven track record in delivering high quality outputs on time. For example, we conducted an 18-month elite interview project involving a collaboration between three academic institutions and national and local policy and practice partners, examining how we could work effectively with multi-Academy School Trusts to improve children's, young people's and staff health. Within this time, we completed the research and reported our findings via a national stakeholder event, a journal article (30) and a webinar.

Working across the UK with local and national government public health policy and practice

Our team is located in England and Wales and we have long-established relationships and work across the UK via: (i) the NIHR SPHR, with RC as its Deputy Director; (ii) former UKCRC public health research centres e.g. FUSE and CEDAR ; (iii) the UKPRP consortia, one of which, TRU$^3$D, is based in Bristol and involves RC and JK and (iv) our membership of the NIHR HPRU, ARC, SPCR and SSCR. Our extensive network of UK collaborators and engagement with policy and practice structures in the four countries, evidenced below, means we are well placed to take on commissions from any part of the UK. If we were asked to take on a commission in Northern Ireland (NI) or Scotland, or from geographically distant parts of England and Wales, we will invite appropriate members of our network of collaborators to join the Task and Finish Group (see our organisational chart) ensuring the study is co-produced within that context from the outset. We will also explore with them options for seconding or employing locally based research staff.

In the NIHR SPHR we collaborate across England on projects focussing on improving local public health practice. An example is de Vocht's co-produced NIHR SPHR work in which a synthetic control designed natural experiment was used to evaluate the impact of local licencing decisions on health and crime in different local neighbourhoods (31). Through all our projects we work in partnership with local and national structures.

Our knowledge of public health structures in Scotland and Northern Ireland (NI) are demonstrated by our track record of successful collaborative infrastructure partnerships and dissemination of good practice. Examples include:

- *Supporting successful translation and diffusion of the PHIRN approach to Northern Ireland* PHIRN was developed in Wales in 2005 to facilitate a step change in its transdisciplinary public health structures. We provided guidance to NI on how the approach could be adapted to their public health system, expertise in developing their network systems and structures, participated in engagement events for NI policy and practice stakeholders and provided on-call advice system for emerging issues. The Northern Ireland Public Health Research Network is now a key element of the NI public health infrastructure to which our PHIRST team has ready access.
- *Successful translation and diffusion of SHRN to Scotland* by supporting the development of cross policy support, identifying how fidelity of processes could be maintained in a different context, and on the ground operational support from our network manager, teachers, and researchers. This work has included policy briefings, public health workforce engagement events, joint capacity development and membership of Strategic Advisory Boards. SHINE is now successfully established and continues to diffuse across Scotland.
- *Dissemination of good practice in public involvement and engagement* ALPHA and our Involving Young People's Officer helped develop public involvement capacity and structures in Scotland and NI via the ESRC TRIUMPH network for youth mental health.

Other engagement in Scotland and NI include RC and SM's membership of the Scottish Collaboration for Public Health Research Advisory Council, RC as a member of the Institute of Health and Wellbeing International Scientific Advisory Board, University of Glasgow and SM as an Invited Expert for Northern Ireland Reorganisation of National Exercise Referral.

*Examples of RCTs and cross border translational studies conducted throughout the UK further demonstrating the geographic reach of our work*

- Jack Trial - A four nation randomised trial of an intervention to reduce teenage pregnancy and promote positive sexual health (32)
- Help Me Do It - Cross border feasibility study of social support intervention for weight loss (33)
- Building Blocks in Scotland a Family Nurse Partnership Evaluation of parenting support programme to reduce maltreatment in young children
- ASSIST - Translating the successful peer smoking intervention to a Scottish context (34)
- WISE Cross-border RCT of an intervention to improve the support for teachers' mental health and wellbeing in secondary schools (35)
- FRANK Friends Cross-border RCT of drug misuse intervention for use in secondary schools
- NAPSACC UK – Cross-border RTC of an intervention to promote physical activity and nutrition in nurseries with pre-school children

Translating evidence to action: We have a strong track record of using a range of different methods to translate evidence into policy and practice. In addition to academic papers and conferences, we produce lay summaries, videos and disseminate findings to stakeholders at project specific local and national meetings. We led the national review of physical activity guidelines for the UK Chief Medical Officers and the production of infographics to share the guidelines with health professionals and the public which are some of the mostly widely accessed documents on the DHSC website. We collaborate with PolicyBristol to produce briefings for policy makers such as our recent work on sex and relationships education. A PolicyBristol produced briefing document was used to engage policy makers and sent to 44 MPs and Civil Servants with an interest in the area. This resulted an invitation to attend a consultation on Relationships and Sex Education (RSE) at the Department for Education and to the findings informing a Parliamentary Office of Science and Technology research briefing or POSTnote, citing the research. Following this, UNESCO integrated the research findings into recently a revised edition of the International technical guidance on sexuality education. We also have developed a knowledge broker for our work in SHRN to share findings with users. We will build on all these experiences in our propsed PHIRST.

Socioeconomic position and inequalities: All our research aims to provide robust evidence on effective ways to **improve population health and well-being and reduce health inequalities**. We advocate use of PROGRESS-Plus (36) which indicates disadvantage may be related to place of residence, race/ethnicity, occupation, gender, religion, education, socioeconomic status, and social capital as an aid to thinking about which factors are relevant to the population exposed to a public health intervention, and how personal characteristics associated with discrimination and features of relationships may need to be considered. Additionally, for all PHIRST team proposals we will apply the Health Inequalities Assessment Toolkit (HIAT) developed by NIHR CLAHRC North West Coast, from the outset (i.e. in our Task and Finish Group) to ensure that we maintain a focus on reducing health inequalities throughout each study. Below we provide examples of further recent work which has had a focus on health inequalities in addition to the examples cited earlier of our policy relevant work.

*Additional examples of our work with a particular focus on the wider determinants of health*

- Breakthrough mentoring – we conducted an evaluation of this LA mentoring scheme designed to reduce inequalities by assisting young people a risk of exclusion to stay in school (37).
- Our additional analyses of two Cochrane Reviews concerned with prevention of adolescent multiple health risk behaviour found no evidence of intervention generated inequalities (38).
- Our evaluation of uptake of a free-swimming offer to families by Bristol City Council showed that it contributed to a reduction in health inequalities (39)
- We are currently working with four LAs to evaluate the Health Visitor Oral Health Improvement Pilot, an intervention tackling inequalities in dental disease in young children in the UK.

Familiarity with policy and goals of DHSC and NIHR: As already illustrated in this application, we have considerable experience of working collaboratively with both organisations and will build on this via PHIRST. This extensive engagement ensures we are well briefed on their policies and goals. We provide expert input to many government departments including the DHSC, the Department of Education, Chief Medical Officers advisory groups, Welsh Education, Health and Social Care Ministerial groups, Whitehall Cabinet Office, Committee on the Medical Aspects of Radiation in the Environment, as well as Public Health England and Public Health Wales. We also sit on advisory groups for LA teams and collaborate with third sector organisations such as the NSPCC, Sport England and Sport Wales, Sex Education Forum, Mental Health Foundation, McPin Foundation, ASH Wales and Alcohol Focus Scotland as attested to in our letters of support. RC sits on the MRC PHIND and NIHR PHR funding panels. RJ is Deputy Chair of the latter and FdV is also a member. This provides us with substantial knowledge of, and further opportunities for, public health research collaborations.

**PHIRST team Expertise:**

**Prof Rona Campbell** is Professor of Public Health Research at Bristol, an NIHR Senior Investigator and Fellow of the Faculty of Public Health. She is Head of the Centre for Public Health, and Deputy Director and Bristol lead for the NIHR SPHR. Prof Campbell will Direct the PHIRST and brings extensive expertise in the leadership and management of multidisciplinary evaluations of public health interventions at local and national level. She has published over 200 works, has an H index of 62.

**Prof Russ Jago** is Professor of Physical Activity and Public Health at the University of Bristol and Fellow of the Faculty of Public Health and the International Society of Behavioural Nutrition & Physical Activity. Prof Jago leads the Health Section in the School for Policy Studies and is the Public Health Theme Lead in the NIHR ARC West. Prof Jago will be the English lead for PHIRST and brings leadership in the design and evaluation of public health interventions. He has published over 240 works, has a H Index of 71.

**Prof Simon Murphy** is Professor of Social Interventions and Health in the School of Social Sciences at Cardiff University. He is Director of DECIPHer, leads SHRN and has established expertise in developing transdisciplinary networks and pragmatic evaluations for policy and practice impacts. He has published over 129 articles, has a H index of 52. He will provide leadership in Wales.

**Dr Jemma Hawkins** is Senior Lecturer in Social Sciences and Health at DECIPHer in Cardiff University. She leads DECIPHer's research programme on methodological innovation in public health intervention science, including the Centre's short courses programme, and co-leads PHIRN with Public Health Wales. She has been awarded research funding for studies to develop and evaluate interventions with local authorities and public health organisations.

**Dr Frank de Vocht** is a Reader in Epidemiology and Public Health at the University of Bristol. He leads the NIHR SPHR methodological work on natural experiments for public health and brings expertise on the evaluation of natural experiments and analysis of observational and routine data included local authority data. He has a background in occupational and environmental public health and radiation and is a member of COMARE. He has published over 115 articles and has an H index of 35.

**Dr Kelly Morgan** is a Research Fellow at DECIPHer in Cardiff University. Dr Morgan is currently PI of two Welsh Government studies, co-produced with multiple stakeholders at the local and national level. She has a background in public health and brings expertise in mixed-methods evaluation, data linkage, health services research, intervention development and co-production.

**Dr Judi Kidger** is a Lecturer in Public Health at the University of Bristol. She is co-lead of the NIHR SPHR's Public Mental Health programme, and Bristol lead for the SPHR's PPIE strategy. Dr Kidger is currently PI of two PHPES studies, co-produced with South Gloucestershire local authority and the Mental Health Foundation, respectively. She brings expertise in qualitative methods, intervention development and the development and management of mixed methods evaluations of public health interventions.

**Dissemination and Outputs:** We will develop a bespoke Dissemination, Impact, Involvement, Communication and Engagement (DIICE) plan for each topic that we are asked to study. This plan will be co-produced with the key stakeholders (local authority, relevant third sector, participants, and wider groups) by the Study Management Group. These plans will consider how the findings of the research will be disseminated locally, where the work was conducted, as well as to wider regional and national audiences, and those with a special interest in the topic. Plans will be reviewed by the PHIRST Management Group and Public and Practice Advisory Groups and shared with our NIHR-PHR contact. In the sections below we outline the types of outputs we will produce and how we will engage the wider population about the study and its findings.

What we will produce**:** For each study we will identify the most useful output forms. This will include a peer reviewed publication to share academic learning, but we will focus on additional outputs that will have more resonance with LAs such as a policy briefing, webinars, or infographics. We will draw on our previous experience such as our work developing the infographics to communicate the national physical activity guidelines, the dissemination event for our School of Public Health Research funded project on how to work with academy chains to promote adolescent health, our

short film on best practice in relationship and sexual health education, our SHRN webinars and our policy briefings on topics such as local authority healthy eating schemes. We will also share findings at relevant practice-based meetings and identify the most appropriate venue(s) for each presentation such as local, regional, and national public health meetings, PHE interest group meetings and meetings of the Local Government Association (LGA).

How we will engage the wider population with the studies: As noted in other sections of the application, we will ensure widespread public and public health practice involvement in each study. Public partners and local public health colleagues will have an important role in the development and implementation of our DIICE plan and ensuring that we produce outputs that are widely available and readily accessible, and appropriately tailored for the different audiences. This will include, with suitable training and support, our practice and public partners co-authoring outputs and co-presenting at meeting, conferences and in webinars.

How will your outputs enter our health and care system or society as a whole?
We will work proactively with all stakeholders to communicate findings both during and at the end of the project. This will include producing lay summaries and infographics that are shared via the DECIPHer Centre, the Centre for Public Health and local authority Twitter feeds. We recognise, however, that often these methods do not reach key stakeholders so we will also produce blogs and summaries of the studies for use in the newsletters of local authorities and professional groups. We will work with our colleagues in PolicyBristol to identify the key policy makers with an interest in each study. This will include ministers and key committee members in the Westminster and devolved assemblies. We will also identify relevant individuals in the Public Health agencies in each country, third sector groups, as well as local public health and local authority teams with interest in the topic area. We will ensure that these individuals are aware of each study, its aims, and timelines. We will then share key findings as they emerge and seek input into the translation of information as relevant. We will also work with the press team of the University of Bristol, Cardiff University and NIHR-PHR to share key findings with the print and broadcast media and use the well-established networks of these three groups to proactively seek communication options.

**Project Management and Governance:** As illustrated in our attached organisational chart an **Executive Group**, meeting quarterly, will have overall responsibility for the management, governance, and scientific and financial oversight of the contract. It will include representation from DECIPHer, SPHR, ARC West, HPRU, LAs, PHE, PHW and public stakeholders and would co-ordinate with the other PHIRST team and the NIHR as appropriate. A **Management Group** comprising RC, SM, RJ, FdV, JK, JH & KM would meet monthly to consider new project proposals, monitor progress of live studies, review the overall budget, and consider project outputs. The **Study Management Group** would meet bi-weekly to ensure each study keeps to time and budget and to resolve operational issues quickly.

**Ethics and Regulatory Approvals:** As the studies will be conducted outside of the NHS we will apply to the University of Bristol or Cardiff University Research Ethics Committees for approval. Making such applications will be part of the work of the Study Management Group, with the application made by the researcher, under the direction of that group, who will advise on the ethical issues to be considered. We have substantial experience of working with vulnerable groups and on sensitive topics and will bring this experience to bear when seeking ethical approval. All the co-applicant researchers have had recent Enhanced Disclosure and Barring Service checks and we require all researchers working on our studies to have these prior to appointment.

**Patient and Public Involvement:** is embedded in all our work and we have a strong focus on co-production. We will adopt all INVOLVE guidance for all studies and draw on the well-established PPI groups that exist in the Centre for Public Health and DECIPHer and our other NIHR infrastructure investments to ensure we have relevant input for the topic being evaluated. This will include PPI input into the design and delivery of each study and dissemination of findings, and PPI membership of the management teams at all levels. We will work with our public co-applicants and public advisory group to develop ways to engage hard-to-reach groups in particular, making use of existing networks and meetings, and using a range of information sharing strategies including printed posters in accessible formats/languages displayed in places visited by stakeholders as well as social media platforms. To ensure clear and transparent ways of working, we will agree ground

rules with our public partners, which clearly set out what the roles will be of all those involved in relation to the study. We will record and evaluate our PPI activity for each study and provide regular feedback to our public partners regarding the impact of their involvement on the study.

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