Return on Investment for public health interventions:

social isolation, sexual health, health visiting, mental health and NHS Health Checks

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Produced by

Amber Povey: Operational Research (amber.povey@kent.gov.uk)
Correspondence to: Gerrard Abi-Aad (gerrard.abi-aad@kent.gov.uk)

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2.1 ROI in a public health context

The return on investment (ROI) of a public health intervention is a method that monetises the benefits gained, if any, and expresses them compared to the initial investment. For example, for every £1 that is spent on a specific public health intervention, how much of a return can be expected? Some of these benefits are expressed in terms of health, e.g. diagnoses averted, but some are expressed in a social gain context, such as a productivity gain. ROI allows the returns from different interventions to be compared and gives merit to those that are not necessarily cost-saving, but that result in societal benefits.

This report will also talk about the cost-effectiveness evidence of public health interventions which compares the relative costs and outcomes of two or more courses of action. In health economics, the most common way to assess cost effectiveness is to complete cost-utility analysis, where the benefits are expressed in terms of quality-adjusted life years (QALYs) gained. A QALY is equivalent to one year of life in perfect health and is calculated by estimating the years of life a person has left after an intervention and weighting every year with a quality of life score from 0 to 1. This is based on the persons ability to carry out daily activities and freedom from pain and mental disturbance. NICE recommends that any treatment under the threshold of £20,000 to £30,000 can be considered cost effective[1].

It is important to consider ROI in a public health context alongside other methods of appraisal. Using ROI as a measure of an interventions effectiveness allows consideration to be given to the effectiveness – how well an intervention works in a specific setting, the time period over which the benefits will materialise, the initial cost of setting up the intervention as well as the running costs and the 'perspective' of the analysis which details the costs and benefits included and who these are attributed to. The advantage of this the ability to attribute any benefits to different sectors of society, for example the local authority or central government[2].

This review of economic evidence focuses on six types of public health intervention; social isolation, sexual health, health visiting, mental health, smoking & tobacco, and health

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[1] NICE Glossary. https://www.nice.org.uk/glossary?letter=q
[2] NICE, Incorporating health economics. https://www.nice.org.uk/process/pmg4/chapter/incorporating-health-economics

checks. These areas have been identified as important from a Kent perspective, therefore a summary of the cost effectiveness evidence would be beneficial.

2.2   Health economics: evidence resource

The main basis of the economic evidence presented in this report is Public Health England's (PHE) Health Economics Evidence Resource (HEER)[3]. This resource is a collection of the latest cost-effectiveness and return on investment evidence for several public health interventions. The HEER was published in September 2017 and all the evidence included had been quality assured by PHE.

The HEER holds evidence related to interventions across activities in the ringfenced public health grant and contains relevant, localised cost-effectiveness evidence. In order to ensure the evidence presented is of a good quality, PHE have only included sources that:

- Have been published in the last five years
- Are widely referenced in public health research
- Have been quality assured by the PHE Health Economics team and policy teams

The whole of the HEER has also been quality assured by external academics to ensure the validity of the evidence included.

When studying the evidence included in the HEER, PHE recommend that it is important to consider:

- Where the study was conducted
- The target population
- The costs and benefits included
- How costs and benefits are discounted
- How long the intervention lasted and was evaluated for
- The similarity of the setting of the study to the target setting

Consideration of these factors will ensure that any cost-effectiveness analysis or return on investment estimate translated well to the chosen setting. For example, these things would need to be taken into account when looking at the evidence provided in a Kent context.

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[3] Public Health England, Health economics: evidence resource.
https://www.gov.uk/government/publications/health-economics-evidence-resource
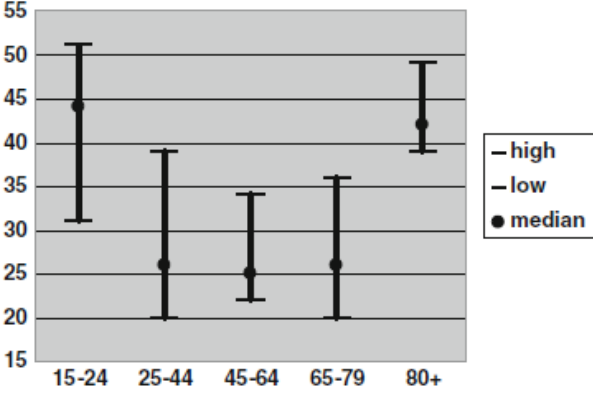
| 3. ROI Evidence

3.1   Social isolation

Social isolation and loneliness have been shown to have an adverse effect on both physical and mental health. Many studies demonstrate the link between social isolation and depression. Loneliness is also a risk factor for physical health conditions such as coronary heart disease and stroke with some studies reporting evidence of an increased risk of premature mortality in people who identify as being highly lonely.[4] Table 1 shows some of the available evidence related to the prevalence of social isolation and/or loneliness. The prevalence varies from study to study but most evidence agrees that loneliness is an issue that needs focus in the UK. One of the main risk factors is shown to be age, with older people much more likely to be socially isolated or identify as lonely. As Kent faces an aging population, it is important to analyse the cost effectiveness evidence for interventions that target social isolation.
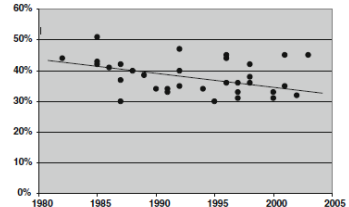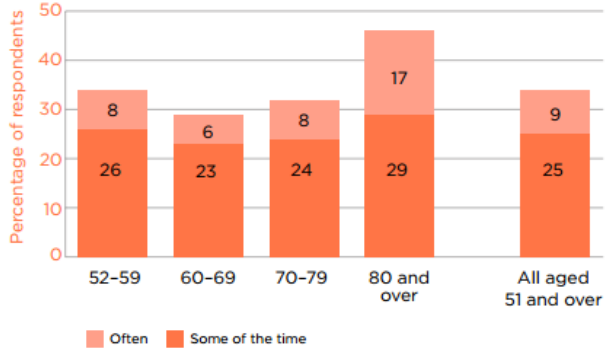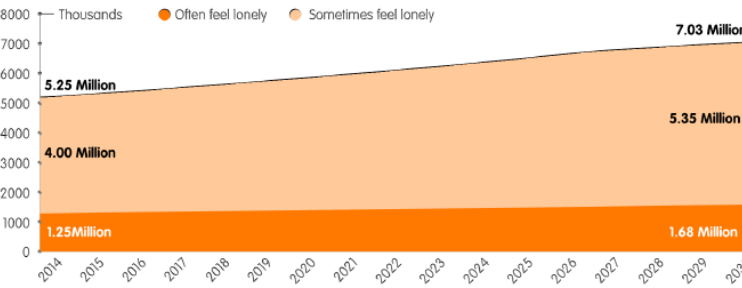
Table 1

Evidence Source	Location	Date	Prevalence	Risk Factors
An overview of systematic reviews on the public health consequences of social isolation and loneliness	Worldwide	29th July 2017	Difficult to gather precise estimates of social isolation prevalence because of variation across the life course, cultural and gender differences, and the use of many different measurement scales. Surveys in Europe and the USA estimate that in the elderly, the prevalence of loneliness ranges from 5% to 43%. The figures are similar for China.	Loneliness may be more common in the elderly, although the included reviews were inclusive. Effect of ethnicity on social isolation and loneliness was also inconclusive.

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[4] McDaid, D., Bauer, A. and Park, A. (2017). Making the economic case for investing in actions to prevent and/or tackle loneliness: a systematic review.

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[Insights into Loneliness, Older People and Well-being](#)	Great Britain	1st October 2015	29.2% of people aged 80 or above report high levels of loneliness (loneliness score of 6 or more out of ten). This is much higher than levels reported by younger people, with 14.8% of 16-64 year olds and 15.5% of 65-79 year olds reporting high levels of loneliness. The average loneliness rating for over 80s is 3.3 out of 10 compared to 2.1 out of 10 for 16-64s and 1.9 out of 10 for 65-79s. Because 1 in 12 of the population is predicted to be aged 80 and over by 2017, loneliness is going to become more of a problem over time.	People who live on their own are more than twice as likely to report feeling lonely (30.8% compared to 12.6%). People who report bad or very bad health are 2.5 times more likely to report feeling lonely (34.7% compared to 13%). People who are widowed are much more likely to report feeling lonely than people who are married (34.7% compared to 9.6%). People who rent from a local authority or housing association are more likely to report feeling lonely than others (21.8%).
[Loneliness in Older Persons: A predictor of functional decline and death](#)	United States	23rd July 2012	Prevalence rates of loneliness may be higher in the elderly. Loneliness was defined as consisting of three elements, feeling left-out, feeling isolated and lacking companionship. 43.2% of participants reported feeling lonely (reporting one of the loneliness items at least some of the time). 13% reported that they felt lonely often.	Age is stated as the main risk factor for being lonely, as prevalence rates have been shown to be higher. Lonely participants were more likely to live alone. Lonely participants were more likely to be depressed.
[Measuring National Well-being - Older people and](#)	England	11th April 2013	Loneliness is widely prevalent throughout society among people in marriages or relationships and among those who have families and successful careers.	A higher percentage of women than men reported feeling lonely some of the time or often in each age group. Those with a long standing illness which

loneliness				limits them in some way were shown to have much higher reported loneliness levels (27% of people with no long standing illness reported feelings on loneliness compared to 45% of those with long standing illness with limitations.) Marital status, household size, health status and disability all has an impact on prevalence of loneliness in over 52s.
			Frequency of feeling lonely: by age group, 2009–10 |	Some of the time	Often
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52–59	26%	8%
60–69	23%	6%
70–79	24%	8%
80 and over	29%	17%
Total 52+	**25%**	**9%**	 Loneliness is more prevalent in women than men for all age groups.	
Older adult loneliness: myths and realities	Europe	4th April 2009	 Fig. 1 Reports of loneliness, by age (%). Based on findings reported in De Jong Gierveld (1998), Perlman and Peplau (1984), Pinquart and Sörensen (2001) Percentage of age groups reporting that they are often	Table 1 Older adults who often feel lonely, by country (%) |	
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Denmark	<5
Finland, Germany, Netherlands, UK	5–9
Belgium, France, Ireland, Luxembourg, Spain	10–14
Italy, former Yugoslavia	15–19
Greece, Portugal	>19	 Based on findings reported in Jylhä and Jokela (1990), Walker (1993) Loneliness prevalence varies hugely by geography.

			lonely.
Fig. 3 Repeated cross-sectional assessments of loneliness in the Netherlands (% lonely). Based on findings reported in Van Tilburg (2005)
Loneliness appears to shown a slight downward trend from 1980 to 2005.
Response to call for evidence on age and social isolation from the Equal Opportunities Committee	Glasgow, Scotland	12th March 2015	Looked at areas of urban deprivation, with 40% of respondents reporting occasional or frequent feelings of loneliness in the preceding fortnight compared to 45% of people in a national survey. However frequent loneliness is higher in the areas of urban deprivation in both men (17% compared with 11%) and women (15% compared with 10%).

Loneliness was most common for people living alone or with long-term conditions or disabilities (25% of single adults and 20% of single people over 60 years old were frequently lonely) and those of working age, those with no qualifications and those not in employment, training or education. | Those living in the most deprived 20% of neighbourhoods reported higher levels of social isolation (10%) in comparison with those living in the least deprived neighbourhoods (6%).

People who used less local amenities and those who rated their neighbourhood environment as lower quality were more likely to report occasional or frequent loneliness.

Those who reported more antisocial behaviour problems in their area, or felt unsafe walking at night, were more likely to report loneliness.

Those who had contact with family members once a month or less were 90% more likely to feel frequently lonely than those who had contact most days. |

| Social isolation and loneliness in the UK with a focus on the use of technology to tackle these conditions | United Kingdom | 21st April 2017 | Source: *English Longitudinal Study of Ageing*, Wave 5, 2009–10.

Frequency of loneliness in people in the UK. More prevalent in the older generations, however can occur at all staged of life-course.

Forecast of Numbers of 60s suffering loneliness, 2014-2030:

 | People aged over 80 are more than twice as likely to suffer severe loneliness when compared to younger age groups.

4% of those married and aged over 50 reported being regularly lonely, 22% of widows are often lonely.

Low income is an important predictor of loneliness: lower levels of mobility, less access to technology and reduced ability to participate in leisure activities.

23% of disabled people feel lonely most days, rising to 38% for young disabled people. |
| The Lonely Society? | United Kingdom | 2nd May 2010 | | Pensioners are more at risk due to bereavement, ill health and poverty. Elderly people may be less socially engaged than previously. |

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			11% say they feel lonely often, 10% don't have company when they want it. 24% worry about feeling lonely, this is more commonly felt by those aged 18-34 (36%, compared to 17% of those over 55).	Social isolation can lead to feelings of loneliness but people who are socially isolated are not necessarily lonely.

Table 2 shows the evidence for different interventions targeting social isolation, taken from a systematic review of the evidence conducted by the LSE Personal Social Services Research Unit.[5] The review looks at three types of intervention; befriending, participation in social and health lifestyle activities and signposting/navigation services. In general, the cost effectiveness evidence is mixed, with signposting and navigation services offering the most promising ROI figures when robustness of the evidence is considered.

Table 2

Intervention programme	Type of intervention	Location	Scale of return on investment	Evidence Source
Provide friendship to recently bereaved widows and widowers	Befriending	The Netherlands	Cost per QALY gained of less than £6,390, well under the conventional threshold of £20,000 per QALY gained. When assumptions around the level of effectiveness and costs were varied, 70% of the interventions were still cost effective.	Onrust et al., 2008

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[5] McDaid, D., Bauer, A. and Park, A. (2017). Making the economic case for investing in actions to prevent and/or tackle loneliness: a systematic review.

Initiative for family carers of people with dementia	Befriending	United Kingdom (Norfolk, Suffolk, and the London Borough of Havering)	Highly cost ineffective - The mean incremental cost per incremental QALY gained was in excess of £100,000. Uptake of befriending services was not high.	Charlesworth et al., 2008
'GoodGyms' programme brings together runners and older non-runners	Befriending	United Kingdom (Areas across London and Bristol)	Cost per QALY gained of less than £8,000, under the conventional threshold of £20,000 per QALY gained. Conservative return on every £1 invested of up to £4.56 which only looks at health and economic benefits for runners and doesn't consider additional benefits if loneliness is reduced.	Ecorys, 2017
Befriending and Re-ablement Service (BARS) including the utilisation of BARS officers	Befriending	United Kingdom (Merseyside)	Potential return on investment estimate of up to £24 for every £1 invested. However, estimates are based on small scale qualitative data and use different assumptions on potential benefits of befriending rather than actual impacts on health or utilisation of other services	McGoldrick, Barrett and Cook, 2017
Community café targeting lonely and isolated people	Befriending	United Kingdom (Glasgow)	Evaluated using social return on investment approach which estimated a return of more than £8 generated for every £1 invested, however this is an unconventional approach focussing on subjective concepts.	Social Value Lab, 2011
Participation in a range of group activities by lonely and isolated older people in day care centres. These included therapeutic writing, group psychotherapy, group exercise and discussions	Participation in social and healthy lifestyle activities	Finland	Costs avoided were greater than the costs of delivering the intervention; however, the study did not specifically measure any changes in loneliness. The intervention group showed a significant improvement in subjective health, thus resulting in significantly lower health care costs during the follow-up	Pitkala et al., 2009

and art activities				
Participation in a programme to promote better health and wellbeing	Participation in social and healthy lifestyle activities	United Kingdom (rural North Wales and a large urban city in Northern England)	Costs were reduced but the programme led to poorer quality of life outcomes than routine access to health advice. The intervention was designed to improve mental wellbeing rather than tackle loneliness and loneliness was a secondary outcome measure	Mountain et al., 2017
Signposting to various activities targeted at older people who self-identify as lonely	Signposting / navigation services	United Kingdom (different areas in England)	Reported a modest but positive return on investment of £1.26 for every £1 invested over a five-year period when only benefits to related to better mental health are included. When a range of benefits linked to improved physical health and potential delay in cognitive decline are included, return on investment varies between £2 and £3 per £1 invested.	McDaid, Park and Knapp, 2017

3.2   Sexual health

It is important to understand the ROI evidence about sexual health, due to the cost of treatment and complications associated with late diagnosis of sexually transmitted diseases. It has been estimated that the cost to the NHS of unplanned pregnancies is around £240m per year[6], so the evidence surrounding contraception provision is also incredibly relevant. From a Kent viewpoint, it would be beneficial to look at the evidence related to sexual health interventions. This is because of the complexity of the services provided from a local authority perspective, including the variety of different interventions and providers.

Table 3

Intervention	Evidence Source	Details	Benefit-cost ratio?
Contraception –	Bayer HealthCare -	Local authorities are responsible for commissioning most	£11.09: £1

[6] Public Health England (2016). Local Health and Care Planning: Menu of preventative interventions.

Provision of contraception by local authorities, CCGs and NHS England.	[Contraception Atlas](#), 2013	contraceptive services and all prescribing costs, but not GP additionally-provided contraception. Using existing methodology, it is possible to estimate that, based on up-to-date costs of the different contraceptive methods and the proportion of women using each method, for every £1 invested in contraception over £11.09 is saved, whilst that rises to £13.42 for every £1 invested in LARC methods of contraception. The total saving for the NHS in England as a direct result of investment in contraception has been estimated at £6.2 billion in averted outcomes when compared to no contraception. These figures take into account the healthcare costs saved due to unplanned pregnancies avoided in terms of terminations, antenatal and maternity care for NHS England.	For contraception £13.42: £1 For LARC methods of contraception
Contraception - School based group education	[Matrix Insight - Prioritising investments in preventative health](#), 2009	School based group education for increasing rates of condom use and reducing STIs and unwanted pregnancy which cost £157.15 per person. Intervention involved weekly lessons following a health curriculum that highlights the impacts of drug and alcohol use, violence, and sexual behaviour on health. Teaching staff were trained to deliver the program. This resulted in an increase in condom use in sexually active 14-year-old pupils of 9.36 per cent compared to no intervention. Benefits were an additional 0.156 QALYs per sexually active 11-16-year-old receiving the intervention and cost savings of £934 per sexually active 11-16-year-old receiving the intervention due to reduced transmission of chlamydia and associated complications. Cost per QALY gained is £4,965; however, this evidence has been rated as low quality and benefits are assumed to occur more than 5 years after the intervention.	Cost £157.15 per person. Saving of £934 per sexually active 11-16. £5.94: £1 *Provided only sexually active 11-16-year olds are targeted.*
Contraception – Provision of long-acting reversible	[Mavranezouli I - The cost-effectiveness of long-acting reversible](#)	Evaluates cost effectiveness of the implant (most effective LARC method) versus the IUD (cheapest LARC method). Costs were estimated from the perspective of the NHS. They included the cost of	ICER of implant versus IUD is £13206 per

contraception	[contraceptive methods in the UK](#), 2008	contraceptive provision and costs associated with outcomes of unintended pregnancy. The overall effect of each evaluated method was determined by its clinical effectiveness and its discontinuation rate. All LARC methods were more effective and less costly than the combined oral contraceptive pill. The incremental cost-effectiveness ratio of implant versus IUD was £13 206 per pregnancy averted at one year of use.	pregnancy averted
Contraception – Intervention to encourage women to use LARC instead of the oral contraceptive pill	[Public Health England - Local Health and Care Planning: Menu of preventative interventions](#), 2016	An integrated commissioning team was set up between Wigan Borough CCG and Wigan Council. They utilise pooled and aligned budgets to commission services effectively, including sexual health. Significant savings to the CCG have been realised since the collaborative commissioning arrangements began, with improvements in uptake of LARC. Provision of LARC for one user over five years costs £514; the oral contraceptive pill costs £456 over the same time period. The intervention would cost around £12 per year per woman moving to LARC from the oral contraceptive pill, plus training costs of £8 per year per woman. For every 1000 women switching to LARC, 291 unplanned pregnancies could be avoided. This represents an average net saving to the NHS of £143 per woman over five years.	Intervention costs £100 per woman over five years with a net saving of £143 *£1.43: £1* *Savings by unplanned pregnancies averted*
Sexual health advice, promotion and prevention activities – Contraception provision to avert Teenage Pregnancy	[Teenage Pregnancy Associates - Teenage Pregnancy: The Evidence](#), 2012	For every £1 the NHS spends on contraception, £11 is saved in abortion, ante-natal and maternity costs. The evidence doesn't go into any further detail about where this figure comes from so might be difficult to attribute this to anything commissioned in Kent. http://teenagepregnancyassociates.co.uk/tpa-evidence.pdf. TPA site no longer exists therefore unable to report any more detail than the above.	£11: £1
Sexual health	[NERA Economic](#)	Local authorities commission specialist services, including young	Various different

advice, promotion and prevention activities – Counselling	Consulting - Economic Modelling of Interventions to Reduce the Transmission of Chlamydia and other Sexually Transmitted Infections and to Reduce the Rate of Under Eighteen Conceptions, 2006	people's sexual health, teenage pregnancy services, outreach, HIV prevention, sexual health promotion, services in schools, college, and pharmacies. Various counselling methods were looked at and a cost-utility analysis was performed.	QALY costs for the counselling methods.
		- Tailored Skill Sessions, there was an incremental cost for 1000 people receiving the intervention of £16,000 which averted a total of 50 STIs, 5 QALYs were gained. This means an incremental cost per QALY gained of £3,200. - Information and Behaviour Skills, there was an incremental cost for 1000 people receiving the intervention of £72,000 which averted a total of 70 STIs, 7 QALYs were gained. This means an incremental cost per QALY gained of £10,286. - Brief Counselling, there was an incremental cost for 1000 people receiving the intervention of £32,000 which averted a total of 26 STI infections, 3 QALYs were gained. This means an incremental cost per QALY gained of £12,194. - Information, motivation and behaviour skills, there was an incremental cost for 1000 people receiving the intervention of £72,000 which averted a total of 70 STI infections for woman (gaining 7 QALYs) or 40 STI infections for men (gaining 4 QALYs). This means a median estimated cost per QALY gained of £14,143. - Intensive counselling, there was an incremental cost for 1000 people receiving the intervention of £96,000 which averted 40 STI infections. This means a cost per QALY gained of £24,000. - Enhanced Counselling, there was median cost per 1000 people receiving the intervention of £159,200 which averted a median estimate of 36 STI infections, 3.5 QALYs gained. This means an incremental cost per QALY gained of £45,606 - Behavioural Skills Counselling, there was an incremental cost for	

		1000 people receiving the intervention of £192,000 which averted 20 STI infections, 2 QALYs gained. This means a cost per QALY gained of £96,000. All the benefits (STI aversion) are expressed over a lifetime.	
STI Diagnosis and Treatment – HIV testing	PLOS ONE – The Cost-Effectiveness of Early Access to HIV Services and Starting cART in the UK 1996–2008, 2011 PHE – Local Health and Care Planning: Menu of preventative interventions, 2016.	Local authorities commission sexually transmitted infections (STI) testing and treatment, chlamydia screening and HIV testing. Study based in the UK 1996-2008. Pre-cART HIV services for patients diagnosed early are cost effective with a cost per life year gained of £1,776. Early diagnosis provides better outcomes for cART treatments and is cost effective with a cost of £4,639 per life year gained. Annual costs for cART treatment are around £2,758 for early diagnosis and £6,407 for late diagnosis. Cost savings accrue due to prevented onward HIV transmission and reduced, expensive late diagnosis. Care costs for late stage diagnosis are estimated at £12,800 per patient per year whereas costs for early stage diagnosis are estimated at £10,500. The menu of interventions estimates costs of a HIV test as part of a general hospital admission as £12 per persons per test or £20 in a GP setting. As a result, increasing HIV screening in GP surgeries and hospitals could save £278 million over a 10 year period.	£4,639 cost per life year gained. Menu of interventions estimates £278 million of savings by increasing HIV screening in the 66 LAs with highest diagnosed HIV prevalence.
STI Diagnosis and Treatment – HIV testing	PLOS ONE – Expanded HIV Testing in Low-Prevalence, High-Income Countries: A Cost-Effectiveness Analysis for the United Kingdom, 2014	Annual HIV testing of all adults could avert 5% of new infections, even with no behaviour change following HIV diagnosis because of earlier ART initiation, or up to 18% if risky behaviour is halved. This strategy costs £67,000–£106,000/QALY gained. Providing annual testing only to MSM, PWID, and people from HIV-endemic countries, and one-time testing for all other adults, prevents 4–15% of infections, requires one-fourth as many tests to diagnose each PLHIV, and costs £17,500/QALY gained. 4-15% of new infections	£17,500 per QALY gained for universal high-risk testing and one time low-risk testing.

		averted. A quarter as many tests are required to diagnose people living with HIV. £0.75 per test; 42,900 QALYs gained. Augmenting this program with increased ART access could add 145,000 QALYs to the population over 10 years, at £26,800/QALY gained. 23% of new infections averted. £0.75 per test; 145,000 QALYs gained.	£26,800 for QALY gained as above with increased ART
STI Diagnosis and Treatment – HIV testing	Hutchinson et al. Return on Public Health Investment: CDC's Expanded HIV Testing Initiative, 2012.	The expanded HIV testing initiative increased health department funding for HIV testing, early diagnosis and linkage to care and prevention services. Health departments were required to focus 80% of their activities on promoting opt-out HIV screening in high morbidity clinical settings and 20% of resources could be used to test high-risk populations in nonclinical settings. Used expenditure and outcome data over three years of the program and a mathematical model of HIV transmission to estimate number of transmissions averted based on number of people tested, diagnosed and linked to care. The total amount invested in the programme was $599m, of which £24m was additional funding from sources such as state and local government. Medical care costs from averted infections were estimated at $1,170m resulting in net benefits of $570m. 2.7 million Persons were tested for HIV over 3 years, there was a newly diagnosed HIV positivity rate of 0.7%, and an estimated 3,381 HIV infections were averted. The lifetime HIV treatment cost (used for each transmission averted) was $367,134. The ROI ranged from $1.46 to $2.01 for the 1-year to 5-year alternative testing intervals. ROI values remained above $1, a positive return on investment, with a prevalence of undiagnosed HIV infection as low as 0.12% and with a 25% reduction in transmissions averted.	$1.95: $1
STI Diagnosis and Treatment –	Low et al. Chlamydia control in Europe:	This literature review looks at different studies from around Europe and found that 9 out of 10 of them said chlamydia screening was cost-effective. The study conducted in the UK was "The cost	Chlamydia screening programmes found

Chlamydia screening	literature review, 2014.	effectiveness of opportunistic chlamydia screening in England" and looked at annual opportunistic screening for men and women under 25 years old. Results were dependent on different PID progression probabilities. This is why the research is under review, the higher the estimated probability, the more QALYs lost and benefits may be overstated. The main finding was that opportunistic chlamydia screening is only cost-effective for under 20s or women under 25. The cost per QALY gained when offering: • Annual screening to women under 20 was £9204 • Annual screening to woman under 20 who have changed partners in last 6 months was £13,640 • Annual screening to woman and men was £14,371 • Annual screening to women under 25 was £18,476 These results were when PID progression probability was estimated to be 10%, anything lower than this and screening is no longer cost effective.	to be cost-effective in 9 out of 10 studies.

3.3   Health visiting

Health visiting is a type of support offered to families with a new baby or a child under 5 years old to offer advice and guidance. The service can be delivered at home, or interventions are delivered in a different setting, such as a children's centre. This included initiatives such as the family nurse partnership. Recent studies have found that investment in early childhood development can lead to long term benefits, both for the child and for wider society, lasting beyond childhood.[7]

Table 4

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[7] The institute of health visiting (2016). The economics of health visiting: a universal preventative child and family health promotion programme

Intervention	Evidence Source	Details	Benefit-cost ratio?
Pre-school programmes	Department for Education – Conception to age 2-the age of opportunity report, 2013.	ROI on well-designed early years' interventions significantly exceed their costs. Nine UK studies showed a similar pattern of results. Social Return on Investment studies showed returns of between £1.37 and £9.20 for every £1 invested (with an average of £3.65).	£1.37-£9.20: £1
Intervention to help young mothers adopt breastfeeding	C4EO – Grasping the nettle: early intervention for children, families and communities, 2010.	903 young mothers from disadvantaged areas in Blackpool were helped to adopt breastfeeding throughout 12 children's centres. This partnership between the PCT and children's centres led to a 16% increase in Blackpool's breastfeeding rates over a three-year period at a cost of £29,811 or £33 per mother per year. This indicates a social return on investment of £1.56 for every £1 invested, with estimated savings to the Department of Health of £57,500 over a two-year period.	£1.56: £1
Intervention to support young people with severe speech, language and communication needs.	C4EO – Grasping the nettle: early intervention for children, families and communities, 2010.	I CAN Early Talk was a targeted, multi-agency approach to supporting young children with severe speech, language and communication needs, so that they could participate in everyday activities and attend their local primary school – empowering parents as co-educators in a programme that could be delivered in a nursery, children's centre or home in Ashford. In 2008-09, 92 per cent of the children supported attended their local primary school and made good progress, rather than requiring specialist language provision. The success of the programme has led to the development of a peripatetic approach in another part of the county, and to a new partnership between the Council, NHS and I CAN to roll out the full Early Talk model in three other areas of Kent. The programme was delivered to 37 children at a project cost of £46,300, indicating a social return on investment of £1.37 for every £1 invested. This	£1.37: £1

		translates into estimated savings of £17,131 over the anticipated extra costs for these children in the absence of this intervention.	
Children's centre supporting children to achieve goals of 'Every Child Matters'	Action for Children and New Economics Foundation - Backing the Future: why investing in children is good for us all, 2009.	Wheatley Children's Centre in Doncaster provides preventative universal services, more specialized services for referred children, and parenting courses to ensure every child is healthy, safe, enjoying and achieving, making a positive contribution and achieving economic well-being.

Predictions for the Wheatley Children's Centre shows that this service is expected to generate £4.60 for every £1 invested. The initial investment used to fund these interventions was recouped within two to three years. (Due to data limitations the SROI calculated on Wheatley Children's Centre is predictive, based on intended outcomes. The principal beneficiary group are low needs children, accounting for 41 per cent of the share of social value. 27 per cent of the total benefit generated by the work of the Centre is for high-needs children. Parents and the state benefit in approximately the same measure from the work of the Centre. | £4.60: £1 |
| Support for families in crisis within children's centres | Action for Children and New Economics Foundation - Backing the Future: why investing in children is good for us all, 2009. | East Dunbartonshire Children's Centre provides short-term, focused and flexible support for children, young people and families in crisis to reduce the number of children being looked after and accommodated, support parents to better meet their children's needs, help children and young people address issues that may be affecting their lives and wellbeing and contribute to assessments of children's needs and parents' capacity to meet these.

For every £1 invested in the East Dunbartonshire Family Service – targeted intervention designed to catch problems early and prevent problems from reoccurring – £9.20 worth of social value is generated. Approximately 93 per cent of the benefits to the state | £9.20: £1 |

		come about through reduction in foster care costs. A further four per cent are saved in other children's costs, resulting in 97 per cent of state savings being gained by the Children, Young People and Social Care sub-division of the Education department. A further three per cent of savings are gained by Justice, Backing the Future 49 with negligible proportions of the savings being gained by the health service or through increased tax revenues and decreased benefits payments.	
Support groups targeted at families with particular needs, such as English as an additional language.	Mason, Salisbury, Mathers – The Value of Early Intervention: findings from Social Return on Investment research with Barnardo's children's centres, 2012.	Stay and Play is a service that is commonly delivered in Barnardo's children's centres, in this case in Bournemouth. Stay and Plays' are play and family support groups for parents and carers with their children. They form part of the universal (open to all) provision to support family learning and offer parents opportunities to: build networks of support with their peers; receive parenting and childcare advice and guidance from Children's Centre staff; and, receive signposting to other services.

The social return on investment generated by the Stay and Play service is around £2 for every £1 invested. The estimated value of outcomes over five years (around £135,000) is more than double the value of investment by Bournemouth Borough Council (of approximately £63,000). Financial proxies were reported for the outcomes of the service which included; improved confidence of parents, improved knowledge of parenting strategies, improved English language skills for children with English as a second language, improved diet, increased access to physical activities, improved progress in child's learning and development and reduced isolation of families. | £2: £1 |

Intensive one-to-one support provided to families with children under 5 who have additional needs.	Mason, Salisbury, Mathers – The Value of Early Intervention: findings from Social Return on Investment research with Barnardo's children's centres, 2012.	Family Support Workers (FSWs) provide families with children under 5 years old who have additional needs with intensive one-to-one support. This service is offered in Barnardo's children's centres in Warwickshire. After families are referred, an initial assessment takes place with two members of staff visiting the family in their home to identify their needs and match them with a FSW. The FSW will then offer a tailored package of support to the family including home visits, group sessions and signposting. The approximate social return on investment generated by the FSW service is around £4.50 for every £1 invested. Over five years the value of benefits produced by the FSW service is around £419,000. Financial proxies were reported for the outcomes of the service which included; improved parenting skills, improved confidence, safe home environment, reduced number of families accessing high level services, less family isolation and improved family relationships.	£4.50: £1
Support for expectant teenage and young mothers and their babies.	Mason, Salisbury, Mathers – The Value of Early Intervention: findings from Social Return on Investment research with Barnardo's children's centres, 2012.	Tiny Toes is a service provided by Hazlemere and Loudwater Children's Centre in Buckinghamshire and provides support for expectant teenage and young mothers and their babies, aiming to improve their outcomes. Weekly half-day session at the children's centre where mothers take part in activities such as supported play, training and talks from professionals about various topics. Approximate social return on investment generated by Tiny Toes is around £3.50 for every £1 invested. Total value of benefits produced by the service over five years is around £73,700. This is likely an underestimate of the value of the service, as it was not possible to establish financial values for a number of outcomes. Financial proxies were reported for the outcomes of the service which included; improved parenting skills, less family isolation, families	£3.50: £1

		receiving necessary healthcare, increased confidence, reduction in level of risk/harm, improved resource management by parents, improved diet and parents being supported in accessing employment, education and training.	
Parenting programme to manage their child's behaviour	Mason, Salisbury, Mathers – The Value of Early Intervention: findings from Social Return on Investment research with Barnardo's children's centres, 2012.	Triple P is a service provided in Brock House children's centre in Somerset which gives additional support to parents to help them manage their child's behaviour. Families are referred to the service and a crèche is provided during weeks where group sessions are delivered. Programme is delivered by a Project Worker from the children's centre in partnership with a Parenting and Family Support Advisor (PFSA) from a local school. During the course, parents are asked to; Monitor and record behaviour at home; Attempt to implement parenting techniques in between group sessions; and, Provide feedback on their successes and difficulties. Approximate social return on investment generated by the Triple P programme at Brock House Children's Centre is around £2.50 for every £1 invested. The total estimated value of outcomes over five years is around £9,293, produced for a very small investment of £3,583 (when the programme is run once a year). Financial proxies were reported for the outcomes of the service which included; improved parenting skills, families feeling less isolated and receiving necessary health care, increased confidence, reduction in level of risk/harm, improved resource management by parents, improved parenting, improved diet and parents supported in accessing employment, education and training.	£2.50: £1
Professionally delivered, intensive home visiting	Barlow, Davis, McIntosh, Kirkpatrick, Peters, Jarrett, Stewart-Brown – The	The Oxfordshire Home Visiting Study evaluated the effectiveness of a professionally delivered, intensive home visiting programme beginning during the antenatal period and continuing for one year	£1.27: £1

programme beginning during the antenatal period to improve parenting and child outcomes including the prevention of abuse and neglect.	[Oxfordshire Home Visiting Study: 3 Year Follow-up](), 2008.	after birth. It thus lasted approximately 18 months, compared with 30 months for the Family Nurse Partnership programme. Designed to improve parenting and child outcomes, including the prevention of abuse and neglect. Not necessarily focused on first-time parents, just looked at high-risk mothers. In the three-year follow-up report, the results suggest that intensive home visiting improved maternal sensitivity at 12 months and better enabled health visitors to identify infants in need of further protection at an incremental cost of £3,985 per woman over 36 months, The present value lifetime cost of child abuse and neglect in the United States as being US $250,000-285,000. This equates at a November 2012 exchange rate to £166,864 in UK money. There were two fewer child deaths in a cohort of 66 mothers receiving the home visiting intervention, and six more children (7%) about whom concern has been registered. This represents a 27% return on investment but ignores the benefits to all other children from improved quality of parenting, or of the value of the health benefits of reducing adverse childhood experiences in the children's lives.	
The Nurse Family Partnership – Registered nurses visit mothers and children in their homes to provide health and parenting information.	[Zero to Three – The Dollars and Cents of Investing Early: Cost-Benefit Analysis in Early Care and Education](), 2006.	The nurse family partnership (NFP) included home visits by registered nurses for parents and children beginning in the womb and continuing to age 2 providing mothers with health and parenting information. Recipients were assessed up until age 15 and compared to a control group. The parents and children who participated in these studies were from disadvantaged families, such as families with low-income and parents with less than a high school education. The findings show that the participant group compared with the control group have: decreased rates of arrest, convictions, probation violations and alcohol use for child by age 15, reductions in welfare costs, child maltreatment, substance abuse and convictions for	$5.06: $1

mothers, higher earnings for mothers. The economic benefits were mainly attributed to increased earnings of participants (and resulting tax revenues) and public savings due to reduced crime, averted crime victim costs and reduced need for rehabilitation and treatment. The NFP substantially reduces crime and builds earning capacity among mothers and children as they grow up.

The NFP had average total costs of $7,572 and average total benefits of $38,296 (cost of benefits listed above), resulting in net benefits of $30,724. This translates to a benefit-cost ratio of $50.06 to $1. This evaluation of the NFP takes place when the child is age 15 and may therefore reveal even higher long-term benefits. Although the children and parents participating in the NFP benefitted from free childcare and higher earning, the nonparticipating public benefited more so due to higher tax revenue, reduced crime costs and reductions in special education and grade retention in schools.

The internal rate of return (IRR) is the annual interest rate received for an investment consisting of payments and revenue that occur at regular periods. The IRR is useful when comparing returns among dissimilar public and private investments. The IRR for the NFP was 23% which means it compares favourably with the US stock market which earns, on average, between 5% and 7%. Disadvantaged youth are a better social investment than stock market equity.

| The Nurse-Family Partnership – Intensive visitation by nurses during a woman's pregnancy and the first two years after birth. | Washington State Institute for Public Policy – Benefits and costs of prevention and early intervention programs for youth, 2004. | The Nurse-Family Partnership provides intensive visitation by nurses during a woman's pregnancy and the first two years after birth. The goal is to promote the child's development and provide support and instructive parenting skills to the parents. Designed to serve low-income, at-risk pregnant women bearing their first child. This programme has been implemented in the UK. The measured benefits per youth were $26,298 and the measured costs per youth were $9,118. Benefits were estimated from the reduction in child maltreatment and criminal behaviour. Benefits per dollar of cost were $2.88. Savings are the greatest when NFP is targeted at high risk groups. | $2.88: $1 |

The Place2Be is an integrated, responsive and flexible school-based mental health service.	The Place2Be – [Cost Effective Positive Outcomes for Children and Families: An economic analysis of The Place2Be's integrated school based services for children](#), 2010.	The Place2Be is a whole school mental health solution which includes 1-1 counselling and a self-referral service for children and young people. It also provides support for teaching and non-teaching school-based staff, parents and carers. Seeks to enhance the emotional literacy of the school environment. There are teams based in 172 primary and secondary schools across the UK supporting 58,000 children up to the age of 13, often in areas of great deprivation. Services help children cope with: bereavement, family breakdown, alcohol and drug misuse, domestic violence, physical and emotional abuse, trauma and bullying. Economic analysis shows that counselling services cost £2 million. Benefits were in the form avoidance of long-term mental disorders and mental health problems over their lifetime (estimated at 112 cases), with a consequent saving of some £15 million in health and welfare spending, lost productivity and other costs to the national economy. CBR of 7.5:1 includes reduced costs associated with social services, welfare benefits and the criminal justice system. Costs of the intervention are repaid after 5 years, with cost savings accruing in the years after. These results must be interpreted with caution, as some of the evidence is necessarily speculative and there are gaps in the data.	£7.50: £1

3.4   Mental health

The wider societal costs of mental health problems are estimated to be around £100bn per year, with around £14bn of that cost being associated with the NHS. Physical and mental health have been shown to be linked, with people who have suffered from severe and prolonged

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mental illness dying on average 15-20 years younger than the general population.[8] For this reason, it is important to properly understand the ROI and cost effectiveness of mental health interventions in a Kent context.

Table 5

Intervention	Details	ROI
School based programme (KiVa) supporting young people with the impacts of bullying and cyberbullying. It includes classroom-based lessons to raise awareness and promote strategies supporting the victim as well as targeting specific incidents of bullying.	Model follows 200 hypothetical year 3 pupils, running for four years until the end of primary school. Evidence on effects and costs are taken from previous evaluations in Finland and Wales. For example, impacts on use of CAMHS for victims of bullying. Assumes only children who are intensely bullied would use CAMHS services. Short-term impacts such as absence from school are considered as well as depression, self-harm, and suicide. The costs of implementing the programme will be to the local authority or to the school itself and are taken from the cost of implementing KiVa at a school in Wales. Cost also included GP consultations and parents taking time off work. Net increased costs of £4658 for 4-year programme or £23.39 per child. Conservative ROI of £1.58 for every £1 invested. This is short-term ROI and doesn't include long-term benefits such as higher educational attainment leading to an increase in potential earnings. When loss of earnings for those who have been bullied is factored in, ROI increases to between £3.97 and £16.79.	£1.58: £1 (four years)
School-based social and	Model follows 150 hypothetical year 7 pupils for seven years, until they reach school leaving	£5.05: £1

[8] Public Health England (2016). Local Health and Care Planning: Menu of preventative interventions.

emotional learning programme. Version of the Penn Resilience Programme, aiming to prevent depression by teaching pupils cognitive-behavioural and social problem-solving skills. Delivered by trained school staff classrooms.	age. Assumed the intervention is offered as part of PHSE lessons, with 18 one-hour sessions being delivered a year. All pupils are assumed to be depression-free at the start. The model looks at ROI associated with reduction in new cases of depression after 6 months. After this it is assumed that there is no further impact on risk of developing or remaining in a state of depression. The costs included are A&E and hospital contact, GP services, school nurse/councillor, CAMHS, social workers, other professionals, and absenteeism cost to families. As the programme has no long-term impact on depression, the ROI after year one is only slightly more. Intervention is not cost saving from an education perspective, but additional benefits of importance to schools cannot be easily monetised, for example better school atmosphere and better academic outcomes. In the future, costs of delivering the programme could potentially be much lower as teachers have already received training, provided they stay at the school. There is a lack of long-term evidence of impacts as well as evidence of how well the programme would work in different socio-economic environments.	(one year)
Workplace mental health promotion programme, consisting of a health risk appraisal questionnaire, web portal encouraging healthy lifestyle behaviours, paper-based information packs and seminars.	Deterministic decision tree based on impacts for the business of employees having poor wellbeing was used. Impacts on productivity and potential avoided GP consultation were included in the model. Costs and productivity gains were derived from an evaluation of a programme delivered in one white-collar branch of a multinational UK company. This intervention looked at the costs and savings of rolling out the programme in a white-collar workplace with 500 employees. The programme cost £82.10 per employee per year, and it has been conservatively estimated that 10% of employees will make use of the intervention. The intervention was found to reduce sickness absence by more than four days per year and presenteeism by more than six hours every four weeks. Assumed that reducing absence by four days a year will also mean one GP visit can be avoided.	£2.37: £1 (one year)
Provision of a workplace cognitive behavioural therapy (CBT) service to all employees identified by occupational health	Structure of the intervention, resource use and costs averted are based on observed experience of a workplace CBT programme in a Welsh City Council with 11,000 employees. CBT was conservatively assumed to reduce risk of stress by 13%. From the Welsh Council programme, positive impacts on mental health were observed in 46% of those who received CBT. Based on a workforce of 1000, considering prevalence of workplace stress and the likelihood of being identified by occupational health services, estimated that five individuals	£2: £1 (two years)

services as being stressed.	will be offered CBT in any one year. When impacts on health services are considered, the ROI by the end of year 2 is £2 for every £1 invested.	
Protecting the mental health of people with long-term physical health problems. Trained nurses in primary care settings improve coordination between different healthcare professionals and deliver CBT.	Co-morbid depression has been shown to significantly increase the costs of eleven chronic health problems. Costs related to diabetes, coronary heart disease and congestive heart failure for people with depression were around double the costs of non-depressed individuals. The model compares usual care with collaborative care delivered in primary care for individuals with diabetes and/or coronary heart disease. A population of 100,000 was looked at, and the cost per QALY gained of under £10,000 suggests that the intervention is highly cost effective. Over two years, societal ROI is at least £1.52 for every £1 invested. This underestimates the benefits as it assume there are none after the first year and the model does not consider the long-term impacts of better physical health management.	£1.52: £1 (two years)
Signposting service for people aged 65 and older to address loneliness and protect the mental health of older people.	Signposting leading to a potential assessment to identify opportunities for participation in social activities to reduce the risk of social isolation and loneliness. Model assumes the intervention covers a population of 100,000 people aged 65 and over, some of who self-identify as being lonely. Signposting services may be in GP surgeries, shopping centres or libraries. Looks at impacts on GP and nurse contact, risk of self-harm and avoidance of psychological therapy to treat depression. Also considered benefits of people volunteering because of the signposting and navigation service. Over five years, from a societal perspective, there is a ROI of at least £1.26 for every £1 invested. This doesn't consider additional benefits such as improved physical health and the protection of cognitive health. Potential costs included restricted to those that can be linked with loneliness and poor mental health.	£1.26: £1 (five years)
Volunteer delivered debt advice in a GP surgery as a potential preventative action for mental health problems.	Substantial evidence on the association between debt and poor health. Those whose financial situation deteriorates are at higher risk of mental health problems. Debts have been associated with an increased risk of suicide. Debt advice provided to those without a diagnosable mental health problem and at risk of unmanageable debt, with the aim of alleviating financial debt and reducing the risk of mental health problems as well as reducing the impact on health services. Debt advice services are normally funded through not-for-profit organisations or the Money Advice Service. Model assumes a rate of 16.1% of problematic	£2.60: £1 (five years)

	debt in the adult population. Use of the services is compared to a no action alternative over a five-year period, considering the impact of debt related stress and depression on health and legal systems as well as productivity. For a population of 100,00 adults there is a ROI of at least £2.60 from every £1 invested in face-to-face debt advice services. Highly conservative estimate as doesn't consider additional health benefits and broader economic benefits.	
Increasing the use of psychosocial assessment when individuals present at hospital for deliberate self-harm to prevent suicide.	Previous work has estimated that the average cost of a suicide for those of working age in the UK is £1.67m, including intangible costs, lost output, police time and costs of coroner inquests. Nonfatal suicide events also have a substantial cost to health services. Model runs over a ten-year period using a hypothetical cohort of 100,000 working age adults. Most of the cost and effectiveness data are drawn English studies. Model accounts for costs including ambulatory transport, attendance at A&E, inpatient care, police/coroner activities, productivity loses, and intangible costs related to the premature loss of life. At the end of the ten-year period, there is an estimated ROI of £39.11 when productivity and intangible costs avoided are considered. From a narrower health, local authority and police perspective, the ROI is £2.93.	£39.11: £1 (ten years)

3.5   Smoking cessation

Smoking is responsible for 17% of deaths in people over the age of 35 and is the largest cause of health inequality and premature mortality.[9] For this reason, the evidence around smoking cessation interventions is especially relevant and needs to be properly understood in a Kent context.

Table 6

Intervention	Evidence Source	Details	Benefit-cost ratio?
Assessment, very brief advice, and ~~referral in hospitals.~~	Public Health England – Local Health and Care Planning: Menu of	Every patient who is hospitalised, regardless of diagnosis, is assessed for smoking status using CO monitoring and then offered very brief advice (VBA) about smoking cessation and immediate access to	Net savings of £119 per quitter over first 5 years to

[9] ~~Public Health England (2016). Local Health and Care Planning: Menu of preventative interventions.~~

	preventative interventions, 2016. ↓ London Health Observatory – Stop before the op: A briefing on the short term benefits of preoperative Smoking Cessation in London, 2006.	nicotine replacement therapies (NRT). Smokers should leave hospital with a clear treatment plan to address their tobacco dependence. The quit rate for patients who want to quit is 3% to 4% but increased to between 15% and 20% for those who want to quit and take up a referral. Total costs of the intervention are estimated to be around £690 per successful quitter, with the NHS incurring a one-off cost of £190 for delivery of nicotine replacement therapy and follow-up and a potential one-off cost off setting up an electronic referral system (ERS) of £11k with annual maintenance costs £3.5k. Local authorities could incur £500 of costs per successful quitter through commissioning local stop smoking services. Net savings were a cumulative minimum of £119 per quitter over the first 5 years to NHS (average savings of £24 p.a.) assuming costs are phased and excluding the ERS investment. The intervention can become net saving in year 5 after implementation, NB this is a conservative estimate. ↓ Smoking causes higher post-operative complications. If London patients admitted for planned surgery were to stop smoking prior to operation 2,500 - 5,300 fewer post-operative complications would be avoided each year, and the NHS could save 2,600 - 4,000 bed days, £0.5 - £1.1 million each year across London's PCTs, £0.9 - £2.8 million across London's hospital trusts.	NHS.
Various smoking cessation services.	York Health Economics Consortium – Cost-effectiveness of interventions for smoking cessation, 2007.	Economic model for the evaluation of smoking cessation treatments, background quite rate was assumed to be 2%. Smokers and former smokers were shown to have a chance of five co-morbidities: • Lung cancer • Coronary heart disease (CHD)	All but one intervention dominates no intervention.

- Chronic obstructive pulmonary disease (COPD)
- Myocardial infarction (MI)
- Stroke

The likelihood of developing one or more of these diseases was based on age and the probability of being a smoker / former smoker / non-smoker. Each disease has a yearly cost and utility determined by research from published data which is used to calculate the ICER. The following smoking cessation interventions were modelled:

- No intervention
- Brief advice (BA)
- BA + self-help material
- BA + self-help material + NRT
- BA + self-help material + NRT + specialist clinic
- Counsellor and bupropion
- Bupropion + less intensive counselling (LIC)
- Bupropion + more intensive counselling (MIC)
- Nicotine patch
- Nicotine patch + group counselling
- Nicotine patch + individual counselling
- Nicotine patch + pharmacist consultation
- Nicotine patch + pharmacist consultation + behavioural program

The costs for each intervention are for the average smoker included in the model and also include the costs of co-morbidities and their treatment, therefore the cost of no intervention is substantial and all but one of the interventions has a lower cost value than no intervention.

All of the interventions apart from one (BA + self-help material + NRT) are less costly and more effective (higher quit rate) than no

		intervention and therefore dominate. The intervention with the highest quit rate is MIC and bupropion which also has the lowest net cost (additional costs less cost savings from lower NHS treatment costs), meaning it dominates all the other interventions.	

Brief intervention by GPs with additional services.	[Centre for Health Economics – Cost-effectiveness of brief intervention and referral for smoking cessation](), 2006.	Background quit rate assumed to be 1%. Brief intervention by GPs is defined as five minutes of a GPs time, assessing current and past smoking behaviour, providing information on consequences of smoking, providing options for support and providing advice on stop smoking medications. This advice on its own cost £10 per person for the GPs time and had an effectiveness rate of 1.7% over and above control. Using estimates for QALY gains and the quit rate, the average cost per QALY was £732. Brief intervention as above plus self-help material cost £12 per person (£10 GP time, £2 self-help material) and had an effectiveness rate of 2.7% over and above control. Using estimates for QALY gains and the quit rate, the average cost per QALY was £370. Brief intervention plus nicotine replacement therapy cost £82.56 (for 5 mins GP time, plus NRT, assuming 50% use full NRT course and 50% use one month's supply) and had an effectiveness rate of 3% over and above control. Using estimates for QALY gains and the quit rate, the average cost per QALY was £2110. In this case, brief GP intervention plus self-help had the smallest cost per QALY gained.	ICER of £370-£2110
Brief interventions delivered in GP practices and nicotine replacement therapy.	[Matrix Insight. Prioritising investments in preventative health. Health England.]() 2009.	This report looked at various interventions and prioritised them using multi criteria decision analysis (MCDA). For each intervention, the benefits accrue as a result of reduced probability of five diseases associated with smoking – Lung cancer, stroke, coronary heart disease, heart attack and obstructive pulmonary disease. QALY gains and cost-savings estimated to occur in the long-run and costs associated with increased life expectancy (pensions, health care costs) are not included in the analysis. Net cost per QALY gained takes into account the cost savings as well as cost of intervention. The preventative health interventions are ranked using a variety of criteria, e.g. cost-effectiveness, benefits distribution and proportion	ICER of £1,151 and £2,388 respectively

		benefitting. The relevant smoking interventions looked were brief interventions delivered in GP practices and Nicotine replacement therapy and they ranked 4th and 8th respectively out of 14 interventions. Brief interventions cost £11 per person and the net cost per QALY gained was –£2,169. There was a 0.727% increase in quit rate producing 0.009 QALYs per person and £31.10 cost savings per person. NRT cost £57.30 per person and the net cost per QALY gained was -£933. There was a 1.86% increase in quit rate producing 0.024 QALYs per person and £79.70 cost savings per person.	
Various interventions to improve the uptake of smoking cessation among the general public.	National Institute for Health and Clinical Excellence. Cardiovascular disease: identifying and supporting people most at risk of dying early (PH15). Supplementary economic analysis on interventions to reduce health inequalities. 2008.	The cost per quality-adjusted life year (QALY) of smoking cessation interventions for disadvantaged groups is low or very low. It is rarely likely to exceed £6000. Smoking cessation interventions are generally cost effective, irrespective of the target audience, the methods used to identify and recruit adults or the type of service offered.	Wide range of ICER. From £50 for client centred smoking cessation. Up to £1593 for disadvantaged pregnant women.
Various interventions to promote smoking cessation in pregnant women.	Taylor M. Economic analysis of interventions for smoking cessation aimed at pregnant women. Supplementary report York Health Economics Consortium. 2009.	Various smoking cessation interventions were considered such as cognitive behaviour strategies, stages of change, feedback, rewards and pharmacotherapies. Cost implications were calculated by looking at the lifetime healthcare costs associated with a woman smoking in addition to the costs associated with the infant. Health benefits were estimated by adding the health benefits of the intervention of the mother and the child. Smoking in pregnancy can result in higher rates of sudden unexpected death in infancy, higher rates of mortality, breathing difficulties, prematurity, smaller birth weight, smaller stature when older, slower growth and head	Rewards intervention shown to be dominant. ICER of £1992 - £4005 for others.

		circumference, learning difficulties hyperactivity and behavioural problems and lower IQ. Smoking whilst pregnant can increase the probability of neonatal death. QALY gains are derived from the number of deaths averted as a result of each intervention.	

3.6   Health checks

The NHS health checks programme invites adults aged 40 to 74 for a check up to spot early sign of vascular diseases such as stroke, kidney disease, heart disease, type 2 diabetes, and dementia. Earlier research into health checks has indicated that they are likely to be cost effective. [10] For this reason, it is important to look specifically at the evidence surrounding NHS health checks and adapt this within a Kent context.

Table 7

Intervention	Evidence Source	Details	Benefit-cost ratio?
NHS health check – for adults aged 40-74 to spot early signs of stroke, kidney disease, heart disease, type 2 diabetes, or dementia.	Kerr, M – NHS Health Check costs, benefits, and savings, 2011	The 15-year average costs are £351m which includes the costs of risk assessment and risk management (monitoring, medications, lifestyle interventions). There will be an estimated 119000 QALYs gained a year in the first four years, leading to a cost per QALY of £2142. This comes from an estimated 1800 strokes and 1500 heart attacks prevented per year through statins, anti-hypertensives, and smoking cessation. Up to 9700 cases of diabetes prevention through non-diabetic hyperglycaemia detection and lifestyle interventions. Also 19000 cases of diabetes and 24000 cases of chronic kidney disease detected early, reducing the risk of disease progression and complications. Assumptions used around uptake, compliance, attribution, and relative risk reduction. Costs level off over time	ICER of £2142, using no intervention as a comparator. Therefore, cost per QALY of £2142.

[10] Schuetz, C., Alperin, P., Guda, S., et al. (2013). A Standardized Vascular Disease Health Check in Europe: A Cost-Effectiveness Analysis

		whilst savings increase. Estimated 70% of costs are recouped by year 15. There are very few health interventions where improvement in quality of life and survival can be achieved so cost effectively. Much lower cost per QALY than many other NICE recommended therapies.	
NHS health check – for adults aged 40-74 to spot early signs of stroke, kidney disease, heart disease, type 2 diabetes, or dementia.	PLOS ONE - A Standardized Vascular Disease Health Check in Europe: A Cost-Effectiveness Analysis, 2013	A model generated simulated population of individuals aged 40-75 eligible for health checks in the UK. The impact of health checks on incidence of major adverse cardiovascular events (MACE) can then be forecasted. The results showed that significant numbers of events, e.g. MACEs are averted, resulting in cost savings. An assumption was made that 50% of patients would comply to treatments triggered by a health check. Other scenarios were considered, with different methods of selecting the cohort to receive health checks. The health check programme remained cost effective in the UK.	Cost per QALY of £2426 when offering health checks to all 40-74-year olds.
NHS health check – for adults aged 40-74 to spot early signs of stroke, kidney disease, heart disease, type 2 diabetes, or dementia.	Department of Health – Economic Modelling for Vascular Checks, 2008.	A simulation model is used that is based on population equivalent to 50 GP lists. Scenario modelling carried out followed by sensitivity analysis. A take up rate of 75% was assumed for the model, however the average is currently 50% with variation between local authorities. Intervention offered included; brief exercise intervention, multi-component weight loss programmes, IGR intensive lifestyle management, stop smoking services, anti-hypertensives, and statins. The average cost of a health check was shown to be £23.70 and this was combined with the additional costs of any subsequent tests, e.g. for high blood pressure. The cost of the programmes is estimated between £180m and £243m per year. This equates to a cost per QALY gained of £3000, well under the threshold of £20,000.	Cost per QALY gained of around £3000.

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| 4. PHE and NICE Cost-Effectiveness Tools

4.1   The use of ROI tools

A return on investment tool models the effects of a public health intervention on a chosen population group. The model estimates the costs and benefits of an intervention and translates this into a return on investment figure that can be used in conjunction with other evidence to make commissioning decisions. PHE have produced ROI tools based around the following:

- Colorectal cancer
- NHS Diabetes Prevention Programme
- End of life care
- Weight management
- Oral health in pre-school children
- Mental health service
- Musculoskeletal conditions
- Movement into employment
- Falls prevention
- Best Start in Life
- Air pollution
- Contraceptive services

In addition to this, NICE have produced the following ROI tools:

- Tobacco
- Physical activity
- Alcohol
- Social and emotional wellbeing
- Children, young people and pregnant women

4.2   Kent application of the PHE ROI tool for falls prevention programmes

In the UK, 30% of people older than 65 and 50% of people older than 85 will have at least one fall within a year. This translates to over 3 million falls annually, with serious consequences such as injury, loss of confidence or independence and even death. Hip fracture is one outcome of a fall and has a high mortality risk of 9.4% at 30 days and 31.2% at 1 year. The total cost to the NHS of falls is estimated to be £2.3 billion per year, the largest part of this cost resulting in people being unbale to return home after a fall and needing social care support or admission to a nursing home.

Kent is facing an aging population, so it is therefore important to look at the evidence related to the ROI commissioning falls prevention initiatives. For this reason, it would be beneficial to populate PHEs ROI tool for falls prevention programmes.

Figure 1 shows the population inputs of the ROI tool in a Kent context, using the population estimates for over 65s for Kent in 2017. Previous studies have found that 34% of this population is deemed at risk of future falls, with an assumption made that 20% of these people would be willing to take part in a falls management exercise (FaME) programme. This means that a sample population of 21,080 of 65s were included in the analysis.

Figure 1

The intervention costs were assumed to be £220.76 per person which can be broken down into various categories as seen in figure 2. As it is recommended that these figures should not be altered, they have been left as intended in the model.

Figure 2

Selected intervention:	Falls Management exercise (FaME)	

Include a cost for evaluation interventions? ☑

Cost for implementation of the intervention:

Resource	Cost per person	Total cost
Staff time	£121.50	£2,561,220
Staff training	£4.07	£85,800
Equipment/Facilities	£47.18	£994,586
Transport	£37.50	£790,500
Evaluation cost	£10.51	£221,605
Total	£220.76	£4,653,711

Figure 3 shows the

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primary and secondary care costs for all possible events related to a fall. It also shows the social care costs relating to a fall, specifically the cost of a new admission to a care home following a fall. These inputs will be used to work out any cost savings from falls averted due to the intervention.

When data around the rate of falls with and without the intervention as well as the severity of falls and the destination after discharge from hospital is considered, the mean cost per serious fall is estimated to be a total of £4,174. The model estimates that over two years, 4,371 falls could be in the chosen population.

Figure 4 shows the overall results produced by the tool. When a purely financial view is taken, the intervention appears to show a new loss, as shown in the financial ROI field. However, when the intervention is viewed from a societal perspective, for every £1 invested, it can be expected that there is a return of £2.28. This means that when the improvement in quality of life (QALYs) is included, the FaME intervention generates benefits of £2.80 for every £1 spent.

Figure 4

Impact on costs (by total population):

	FaME	Usual care	Difference
Intervention costs	£4,653,711	£0	£4,653,711
Primary/secondary care costs	£16,096,575	£19,746,231	-£3,649,657
Social care costs	£4,235,327	£5,195,624	-£960,297
Total	£24,985,613	£24,941,855	£43,758

Impact on costs (per person):

	FaME	Usual care	Difference
Intervention costs	£221	£0	£221
Primary/secondary care costs	£764	£937	-£173
Social care costs	£201	£246	-£46
Total	£1,185	£1,183	£2

Financial benefits of FaME	£219

Financial ROI - Benefits to cost ratio	£0.99 : £1.00

Impact on quality of life:

	FaME	Usual care	Difference
Total QALYs	59760	59660	100.25
QALYs per person	2.8349	2.8301	0.005
Value of QALYs per person	£170,094	£169,809	£285

Societal benefits of FaME	£504

Societal ROI - Benefits to cost ratio	£2.28 : £1.00

In a Kent context, KCC currently commission a postural stability service which is very similar to the FaME programme modelled in the ROI tool. There are some differences between the two programmes, for example cost and the number of people targeted in each class. However broadly speaking, if the results from the ROI tool are translated onto the Kent spend of £412,00 on the classes, we can expect a social return on investment of £939,360 with the money invested.

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5.Conclusions

6. Recommendations

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