

Biological Effects of ACEs

There is a growing body of scientific understanding about how individuals are affected biologically in response to stress. It is known that ACEs can have significant negative impacts upon the body, particularly the developing brain. A number of areas of the brain are affected including the pre-frontal cortex, an area involved with planning and judgment and important in impulse control, the nucleus accumbens, the pleasure and reward centre of the brain, often associated with substance abuse and the amygdala, the fear response centre responsible for activating the stress response. When these areas of the brain are heightened in activity, an increase in risk taking behaviours is likely to be seen².

Figure 2: Diagram of the human brain highlighting main areas of the brain involved in biological response to ACEs²

Source: Adapted from Tomkins and Sellars (2001)²

When a child is experiencing high levels of stress the system that controls the stress response (the hypothalamic pituitary adrenal axis) is activated, stress hormones adrenaline and cortisol are released. This system works in two ways, one which is life saving and one that is life damaging. It becomes particularly problematic when this system is constantly activated³.

This can impact upon the following:

- Brain functioning and structure
- Hormonal system
- Immune system
- DNA Transcription

Therefore, ACEs can have a significant effect upon a child's development. When children are exposed to environments with high levels of stressors there are changes that take place at a biological level which can have a lasting impact throughout the l





their body; increasing risks of premature ill health such as cancer, heart disease and mental illness⁴ as shown in Figure 3.

Interestingly, even if an individual displays no risk taking behaviours such as smoking, drinking or taking drugs, an individual with four or more ACEs has poorer health outcomes compared to those with no ACEs³.

Figure 3: Why ACEs Matter

Source: Bellis 2016 adapted from Felitti 1998, image credit to Warren Larkin Associates Limited

Evidence Base

The CDC Kaiser Permanente Adverse Childhood Experiences Study⁵ conducted in America between 1995 and 1997 was one of the largest investigations into childhood abuse and neglect and the resulting impact upon health and well-being later in life. The major findings from the study were that Adverse Childhood Experiences (ACEs) were common.

Almost two-thirds of participants reported at least one ACE

More than one in five reported three or more ACEs

The study identified a dose-response relationship where an increase in ACEs resulted in an increase in negative health and well-being outcomes. This included risky behaviors such as smoking, alcohol and drug use or sexual risk taking, and also

⁴ Public Health Wales NHS Trust (2015) Welsh Adverse Childhood Experiences (ACE) Study: Adverse Childhood Experiences and their impact on health-harming behaviours in the Welsh adult population [Online], Available from:





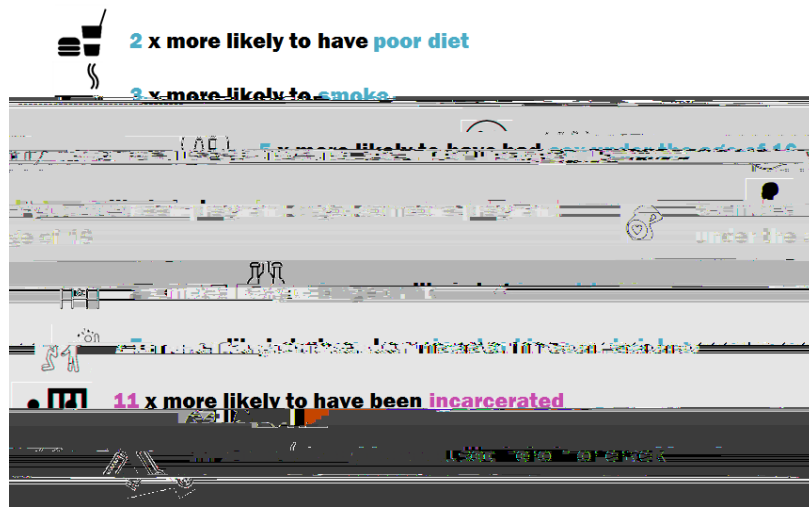
an increased risk of different types of diseases such as depression, liver disease and ischaemic heart disease.

Individuals with four or more ACEs had a risk of heart disease and lung cancer that was three times higher than those with no ACEs. Depression risk was four and a half times higher and suicidality twelve times higher.

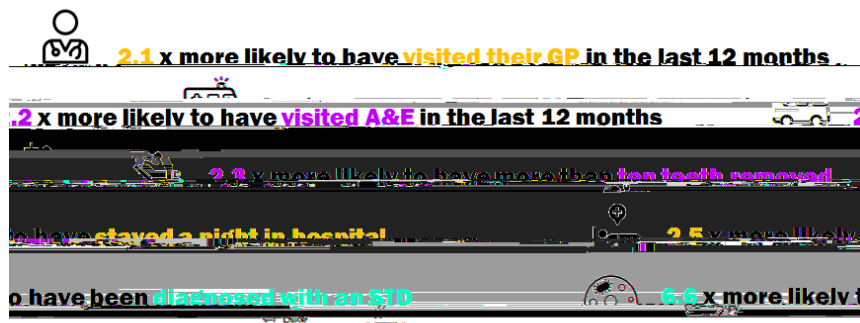
There was a 20 year difference in life expectancy for those with 4 or more ACEs compared to those with no ACEs.

A U.K based study undertaken by Bellis et al in 2013⁶ also identified that individuals with 4 or more ACEs were more likely to have a higher number of risky health behaviours and in turn have poorer health outcomes compared to those without ACEs.

Individuals with 4 or more ACEs, when compared to those with no ACEs were:



A further recent study found that ACEs also impact upon use of services. Individuals with 4 or more ACEs compared with those with no ACEs were⁸:



Source: Adapted from Presentation An introduction to Adverse Childhood Experiences, Public Health England, 2018

64% of Substance Misuse Service Users have 4 or more ACEs^{7,8}.

⁶ Bellis, M., Lowey, H., Leckenby, N., Hughes, K. and Harrison, D. (2013). Adverse childhood experiences: retrospective study to determine their impact on adult health behaviours and health outcomes in a UK population. *BMC Medicine*, 11(1), pp.81-91.

⁷ Bellis, M., Hughes, K., Leckenby, N., Perkins, C. and Lowey, H. (2014). National household survey of adverse childhood experiences and their relationship with resilience to health-harming behaviors in England. *BMC Medicine*, 12(1).



50% of Homeless people have 4 or more ACEs.

Hughes et al., 2017⁹ identified that exposure to multiple ACEs can have an impact upon a wide range of health outcomes. The strongest correlation between multiple ACEs and onward transfer of ACEs to future generations were found in those who experienced violence, mental illness and problematic substance abuse in the family environment.

Worcestershire Key Data

Estimating ACEs in Worcestershire

The study by Bellis et al (2014⁹) reported that approximately 47% of individuals reported experiencing at least one ACE and 9% of individuals reported having 4 or more ACEs.

By applying these proportions to the population living in Worcestershire it can be estimated that approximately 43% of the population have at least one ACE and 3% have 4 or more ACEs.



Parental Risk Factors

Lone Parents

Latest information from the annual population survey gives an estimate of 14,500 lone parent households within Worcestershire which accounts for 21.5% of total households with dependent children. This is a similar percentage to England.

These 14,500 lone parent households have an estimated total of 23,100 dependent children aged <16 living with them.

Teenage Mothers

The Worcestershire rate for teenage pregnancy is now similar to England but we know there is some disparity around the County with higher rate of teenage pregnancies leading to a birth in Worcester City than in some of the less deprived areas of the County.

Mental Health

In Worcestershire 70,000 adults and nearly 7,000 children are living with common mental ill-health at any time and around 50 people take their own life each year.

There is a higher prevalence of depression in Worcestershire than nationally, with nearly 53,000 people aged over 18 on the GP Register (nearly 11% of the total adult population).

Despite the general prosperity in Worcestershire County there are pockets of high deprivation presenting a number of risks to mental health and well-being.

Substance Misuse in Worcestershire

There are an estimated 1,157 adults with an alcohol dependency who live with children.

There are an estimated 643 adults with an opiate dependency who live with children.

In 2016-17, 17.2% of cases identified alcohol as a risk factor in children in need assessments, drug misuse episodes were identified in 14.9% of children in need assessments in Worcestershire.

Domestic Abuse¹¹.

9,200 domestic abuse incidents were reported to police in Worcestershire in 2014-15, representing 2,485 victims.

The reporting of domestic abuse in the most deprived areas is almost 25 times that in the least deprived areas.

Police recorded data shows that during the financial year 2014-15 162 of victims of domestic abuse in Worcestershire were aged under 18. This equates to around 6.5% of the total number of domestic abuse victims in Worcestershire during 2014-15.

Where domestic abuse occurs in a household 90% of incidents are likely to be witnessed by children that live within that household.

¹¹ Worcestershire County Council (2016) Worcestershire Health and Wellbeing Board Joint Strategic Needs Assessment (JSNA), [Online], Available from:

http://www.worcestershire.gov.uk/info/20122/joint_strategic_needs_assessment/1514/jsna_health_needs_assessments

Accessed: 29/06/2018



Estimating Children at Risk

The following indicators identify the needs of children who may be at higher risk of developing mental and physical health problems.

Worcestershire has lower levels of child poverty and a lower number of 16-17 year olds not in education, employment or training and a lower level of spending on children and young people's services in comparison to the England average.

Worcestershire has a higher proportion of children who are in need due to abuse, neglect or family dysfunction, higher proportion of children who had behavioural, emotional and social support needs and higher rate of first time entrants to the youth justice system when compared to the England average.

Figure 5: Primary prevention and early intervention indicators¹²

Risk Factors	Child Poverty	15.7	22.5	19.9	Lower
	Children in need due to abuse, neglect or family dysfunction: % of children in need	74.3	69.1	67.3	Higher
	Looked after children: rate per 10,000 <18 population	60.3	73.2	60.3	Same
	Pupils with behavioural, emotional and social support needs: % of school pupils	2.17	1.56	1.66	Higher
	First time entrants to the youth justice system	407.4	398.5	327.1	Higher
	16-17 year olds not in education, employment or training (NEET) or whose activity is not known - current method	4.7	7.3	6.0	Lower
Protective	GCSEs achieved (5A*-C including English & Maths)	60.9	54.8	57.8	Higher
Finance	Spend (£000s) on Local Authority children and young people's services (excluding education): rate (£) per 10,000 aged 0-17	6,260	7,945	7,789	Lower

¹² Public Health England (2017) Better Mental Health: JSNA toolkit - Guidance: Children and Young People, [Online], Available from: <https://www.gov.uk/government/publications/better-mental-health-jsna-toolkit/5-children-and-young-people> , Accessed: 15/06/2018



Best Practice

To tackle the issue of ACEs there needs to be an integrated approach across a variety of different sectors including police, health, housing, education and probation services. The three key areas of work are:

Prevention

Ensuring children have the best start in life and foundation for good mental health and well-being. Early years are a crucial stage in the life course.

Early Intervention

Introduction of services to allow people to get help and support quickly. For example mental health support in Schools and Colleges.

Mitigation

Offering support where issues already exist. Such as programmes for workless families and workstreams to tackle issues such as Child Sexual Exploitation (CSE).

Individuals



Associated Documents

National Guidance

[NICE Guideline \[NG76\] - Child Abuse and Neglect](#)

[Better Mental Health JSNA Toolkit: Children and Young People](#)

Key Studies and Research

[Original Study: The Adverse Childhood Experiences \(ACE\) Study, CDC Kaiser Permanente
Welsh Adverse Childhood Experiences Study](#)

[Liverpool John Moores: Public Health Institute - Adverse Childhood Experiences \(ACEs\)](#)

[Young Minds Report \(2016\) Beyond Adversity](#)

Worcestershire County Council JSNA Briefings

[JSNA Briefing on Substance Misuse](#)

[JSNA Briefing on Alcohol](#)

[JSNA Briefing on Early Help](#)

[JSNA Briefing on Mental Health](#)

Data Notes

Organisations who carried out the original collection and analysis of the data bear no responsibility for its further analysis or interpretation.

Further Information and Feedback

This briefing has been written by Worcestershire County Council's Public Health Team. We welcome your comments on these briefings and how they could better suit your requirements, please do contact us with your ideas.

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