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Sources of resilience and their moderating relationships with harms from adverse childhood experiences

Report 1: Mental illness

Welsh Adverse Childhood Experience (ACE) and Resilience Study

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Foreword

Dr Tracey Cooper
Chief Executive
Public Health Wales

Understanding how Adverse Childhood Experiences or ACEs affect individuals' health and behaviour across the life course has been one of the most transformative developments in public health over recent years. A history of ACEs can underpin poor educational attainment, health-harming behaviours and anti-social and criminal behaviour in adolescence, and in later life the development of premature ill health and death. In Wales, we have recognised ACEs as a common theme preventing individuals from fulfilling their potential and impacting on health, criminal justice, education and other public services. Our early work on ACEs has allowed us to describe in detail the problem in Wales and, through Cymru Well Wales, unite Welsh Government, public services and the voluntary sector in a national agenda to prevent ACEs wherever possible as well as supporting those who continue to be affected by childhood trauma.

In Public Health Wales, we recognise that whilst eliminating ACEs is our aspiration, currently individuals continue to experience and be adversely affected by ACEs. However, not everyone who suffers ACEs experiences the same harmful outcomes. Building resilience across the life course can help people avoid and overcome many of the problems arising from childhood adversity. Support from a family member or from elsewhere in the community can prove the critical difference between ACEs pushing an individual into a harmful life course or, with a little help, finding a way to stay on one offering better health and prosperity.

This work, supported jointly by Public Health Wales and Welsh Government, is a first step towards describing how people across Wales develop resilience to the impacts of ACEs and what community, family and professional assets might help them in that process. Our first report on resilience focuses on mental ill health, given its strong associations with exposure to ACEs and the major burden it represents for people in Wales and the public services that support them. We will be using this report to better understand how our services and those of our partner organisations can help build resilience in some of our most vulnerable individuals and communities.

Adverse childhood experiences (ACEs) and resilience: risk and protective factors for mental illness throughout life

Resilience is the ability to overcome serious hardship. Factors that support resilience include personal skills, positive relationships, community support and cultural connections. The Welsh ACE and Resilience Survey asked adults about a range of such resilience resources as children and adults, their exposure to 11 ACEs and their physical and mental health.

How many adults reported each ACE in 2017?

Child maltreatment

- Verbal abuse **20%**
- Physical abuse **16%**
- Sexual abuse **7%**

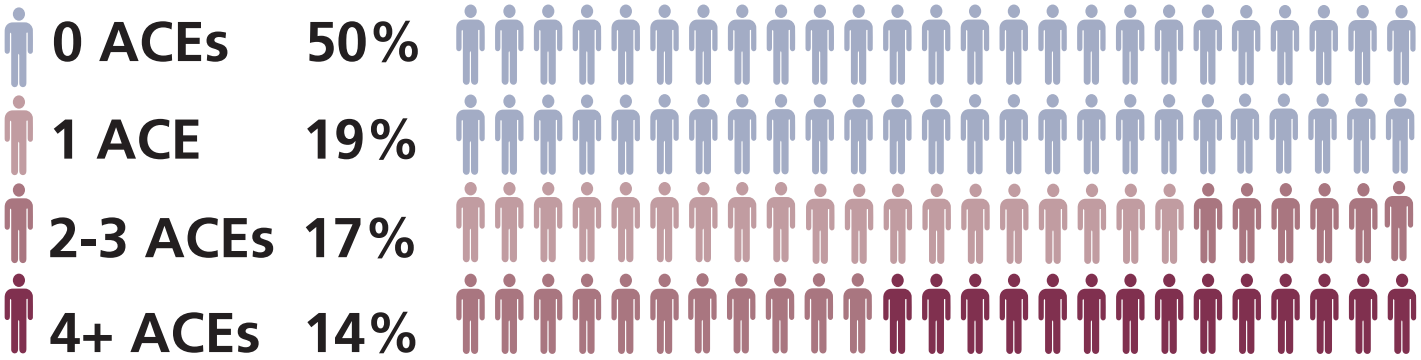
Neglect was measured for the first time in 2017. Most people who reported neglect had multiple ACEs.

- Emotional neglect **7%**
- Physical neglect **4%**

Household ACEs

- Parental separation **25%**
- Mental illness **18%**
- Domestic violence **17%**
- Alcohol abuse **13%**
- Drug abuse **6%**
- Incarceration **4%**

For every 100 adults in Wales, 50 had at least one ACE and 14 had four or more



ACEs substantially increased risks of mental illness

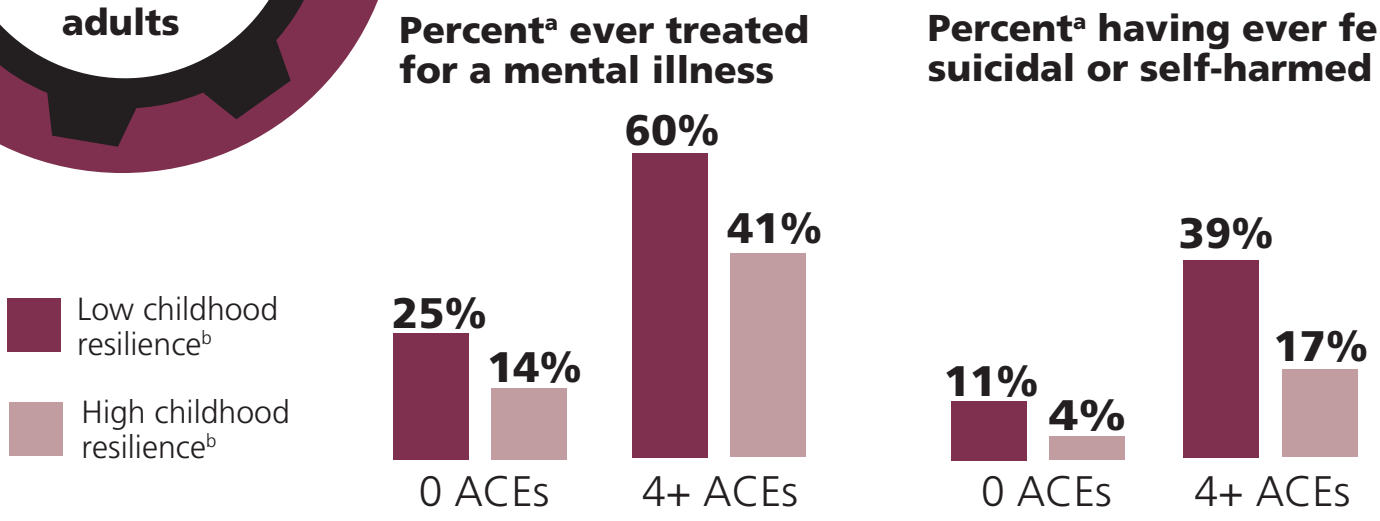
1 in 3 adults reported having ever been treated for a mental illness

Compared with people with no ACEs, those with four or more were:

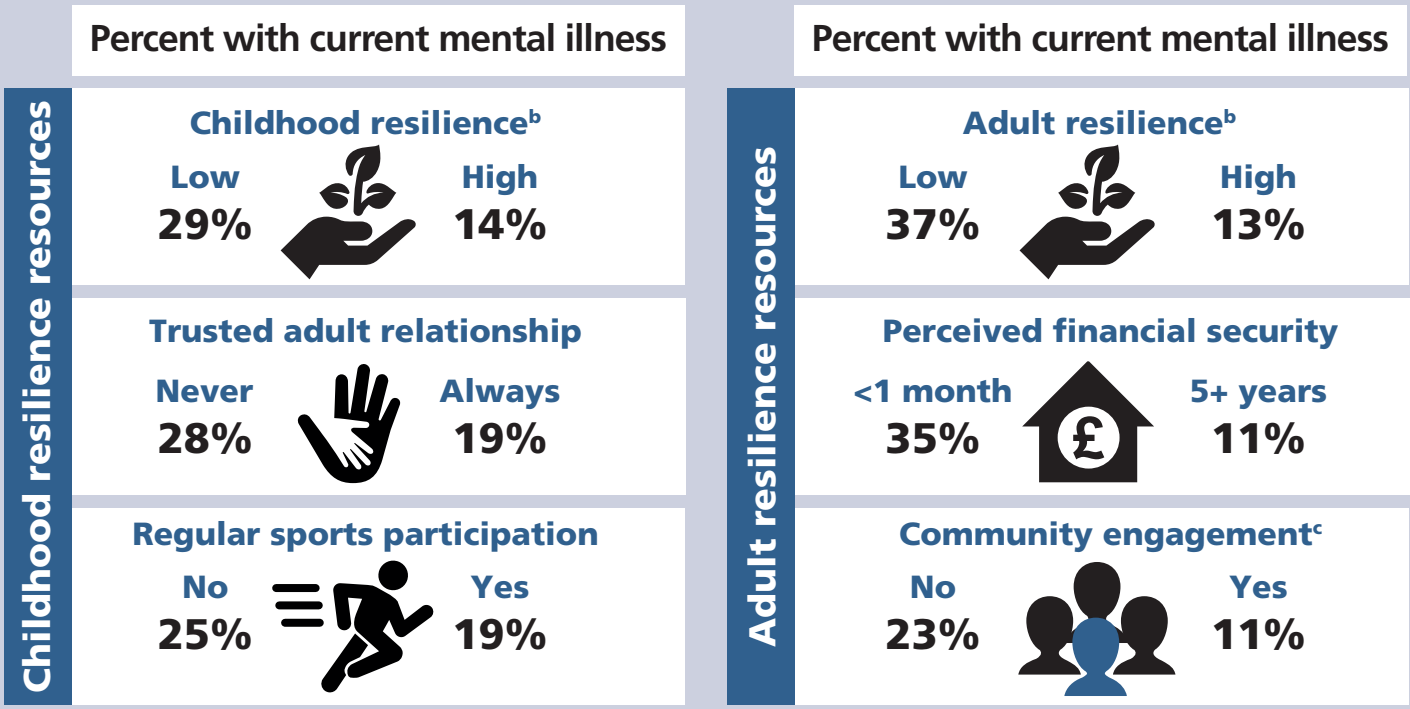
- **3.7** times more likely to **currently be receiving treatment for mental illness**
- **6.1** times more likely to **have ever received treatment for mental illness**
- **9.5** times more likely to **have ever felt suicidal or self-harmed**

Those with more ACEs had fewer resilience resources as children and adults

Childhood resilience was associated with less mental illness across the life course in those both with and without ACEs



Having some resilience resources more than halved risks of current mental illness in those with 4+ ACEs



The Welsh Adverse Childhood Experience (ACE) and Resilience Study interviewed approximately 2,500 adults (aged 18-69 years) across Wales in 2017. We are grateful to all those who voluntarily gave their time to participate.

[a]Adjusted to sample demographics; [b]Overall resilience was measured using child and adult scales including personal, relationship, community and cultural resilience factors; [c]Regular participation in community groups or social clubs.

Contents

Executive Summary

Background

- The Welsh Adverse Childhood Experience (ACE) and Resilience Survey was undertaken to examine individual and community factors that may offer protection from the harmful impacts of ACEs on health, well-being and prosperity across the life course. Resilience is described as the ability to overcome serious hardships such as those presented by ACEs.

Resilience is described as the ability to overcome serious hardships such as those presented by ACEs

- The survey measured access to various sources of resilience in both childhood *(personal, relational and community resources; social and leisure activities; relationships with adults)* and adulthood *(current personal, relationship and community resources; social and leisure activities; expectations of support from services; perceived financial security; and community culture and traditions)*.
- The survey also measured participants' exposure to eleven ACEs during childhood *(see Section 3.1; Appendix 1, Table i)* and a range of health and behavioural outcomes *(see Appendix 1, Table ii).*
- Data were collected between March and June 2017 in face-to-face interviews with a national sample of 2,005 18-69 year olds and a boost sample of 492 residents in areas with higher levels of Welsh spoken language. Around 12% of all households invited to participate by letter opted out. Of eligible households visited by an interviewer, 74% participated in the study.
- This report is the first to examine ACEs and resilience in Wales and focuses on their relationships with mental illness; the single largest area of expenditure for the NHS in Wales and a priority area for Welsh Government identified in **Prosperity for All: the national strategy.**
- Three outcomes related to mental illness are examined:
  - currently receiving treatment for a mental illness (termed *current mental illness*);
  - having ever received treatment for a mental illness (termed *lifetime mental illness*); and,
  - having ever felt suicidal or self-harmed.

Findings

- In 2017, half of all adults aged 18-69 years in Wales reported at least one ACE and more than one in seven reported four or more ACEs. **The overall prevalence of ACEs was consistent with that measured in the first Welsh ACE survey** *(see Section 3.1)*.
- The ACEs of physical and emotional neglect were measured for the first time in 2017. **Prevalence of physical neglect was 4% and of emotional neglect was 7%.** The inclusion of these ACEs made little difference to overall ACE prevalence as neglect was typically reported in childhood environments with multiple other ACEs. This suggests that neglect is an indicator of multiple other ACEs in children's lives *(see Section 3.1 and Figure 4).*

One in three adults reported having ever received treatment for a mental illness

- **One in three adults reported having ever received treatment for a mental illness** and more than one in six reported currently receiving such treatment. This is similar to other national measures of treatment for mental illness in Wales. Fourteen percent of respondents reported having ever felt suicidal and 6% having ever self-harmed *(see Section 3.2).*

- **Individuals who suffered ACEs were at significantly increased risk of mental illness**, with risks of all outcomes increasing with the number of ACEs reported. Compared with people with no ACEs, those reporting four or more were over three times more likely to report current mental illness, six times more likely to report lifetime mental illness and nine times more likely to report having ever felt suicidal or self-harmed *(see Section 3.3).*

Individuals who suffered ACEs had fewer resilience resources

- **Individuals who suffered ACEs had fewer resilience resources, with markers of both childhood and adulthood resilience reducing as ACE counts increased** *(see Sections 4 and 5).* Thus, those with four or more ACEs had the lowest exposure to individual, relationship and community factors that may build resilience.
- **Both childhood and adult resilience resources showed protective relationships with mental illness independent of ACEs.** Thus, resilience resources may lower the risks of mental illness both in those who report ACEs and those who do not. However, resilience does not provide a panacea to ACEs and primary prevention of ACEs must remain a key priority.

Childhood resilience resources

- Childhood resilience *(measured using a scale covering personal, relationship and community resilience factors; see Section 2)* was strongly associated with lower mental illness. **Across all participants, the adjusted proportion reporting lifetime mental illness fell from 60% in those with four ACEs and low childhood resilience to 14% in those with no ACEs and high childhood resilience.** This indicates the substantial mental health gains that could be made by preventing ACEs and building resilience in childhood.
- **Among adults with four or more ACEs, the adjusted proportion reporting current mental illness fell from 29% in those with low childhood resilience to less than half this level (14%) in those with high childhood resilience** *(see Section 4.1)*; similarly, the adjusted proportion having ever felt suicidal or self-harmed fell from 39% in those with low childhood resilience to 17% in those with high childhood resilience.

- **Having a trusted relationship with at least one adult during childhood was associated with lower risk of current mental illness but not lifetime mental illness or having ever felt suicidal or self-harmed** *(see Section 4.3)*. In those with four or more ACEs, the adjusted proportion reporting current mental illness was 28% in those without a trusted adult relationship in childhood but only 19% in those who always had such a relationship.
- **Individuals with higher ACE counts were less likely to report personal support from parents, other adult relatives, neighbours or friends and professionals (teachers, sport coaches, police, health professionals, religious leaders) during childhood;** although levels of support from social workers were not significantly different between those with no and four or more ACEs *(see Section 4.3).*

- **Regular participation in sports during childhood was associated with lower levels of mental illness** *(see Section 4.2).* In those with four or more ACEs, the adjusted proportion having ever felt suicidal or self-harmed was 25% in those who regularly participated in childhood sports clubs/teams compared with 34% in those who did not. This supports existing evidence showing participation in sport to be conducive to good mental health.

Adult resilience resources

- **Amongst individuals with four or more ACEs, the adjusted proportion reporting current mental illness was almost two thirds lower in those with high adult resilience (13%) than in those with low adult resilience (37%;** measured using a scale covering personal, relationship and community resilience factors, *see Section 5.1).*

- Current regular participation in sports clubs/groups or community groups/social clubs and enjoying community cultures and traditions were associated with lower levels of current mental illness *(see Sections 5.2 and 5.5).* **In those with four or more ACEs, current mental illness fell from 23% in those who did not regularly participate in community groups/social clubs to 11% in those who did.** These findings are consistent with evidence elsewhere that emphasises the importance of community connectedness in promoting mental health.

- **Financial security** *(see Section 5.4)* and perceived support from employers (for those in employment; *see Section 5.3*) were also strongly associated with lower current mental illness. **In individuals with four or more ACEs, the adjusted proportion reporting current mental illness fell from 30% in those who felt their employer was not at all supportive to 10% in those who felt their employer was supportive** *(a little or a lot; see Section 5.3).* Measures to support individuals affected by ACEs to obtain secure and quality employment are likely to be important in providing long term resilience against mental illness.

- **Individuals with ACEs tended to perceive public services as being less supportive** *(see Section 5.3).* This presents a challenge to services in how they can best engage with and support those who have suffered ACEs; and as ACE-informed services develop across Wales how confidence in public services can be built in vulnerable individuals.

Conclusions

1. **ACEs are common and represent a significantly increased risk of mental ill health across the life course.** Preventing ACEs and supporting those affected by them is vital in improving population mental health. Health and other public service staff should be educated on the impact of ACEs as an essential part of the development of ACE-informed public services.

ACEs are common and represent a significantly increased risk of mental ill health

2. **Childhood resilience moderates the increased risks to mental health from ACEs.** Personal, relationship and community resilience resources such as social and emotional skills, childhood role models, peer support, connections with school, understanding how to access community support, and a sense that your community is fair to you are strongly linked to reduced risks of mental illness across the life course. High childhood resilience is related to substantial reductions in lifetime mental illness and potentially offers protections even in those with no ACEs.
3. **Public sector support for social and emotional skills development, activities that create connectedness to schools, sign-posting children to available help, opportunities for creating friendship networks, and occasions to engage in cultural traditions should be considered investments in children's lifelong mental health.** While more information is required on the cause and effects of these resources on mental health, reductions in provision of these community facilities may have long-term repercussions for population mental health and especially affect those with high levels of childhood trauma.

There are strong relationships between sports participation in childhood and adulthood and lower mental illness

4. **There are strong relationships between sports participation in childhood and lower lifetime mental illness. There are also associations between regular adult participation in sports and current mental illness.** While much attention has been paid to the cardiovascular and weight reduction potential of sports participation, its impact of friendship opportunities, benefits to mental health, access to role models and the other aspects of resilience that engagement in sports facilitates needs to be factored into its benefits and further understood.
5. **Access to sources of resilience in adulthood continues to be associated with lower levels of current mental illness.** Along with sports, positive relationships were found with engagement in community and social groups, enjoying community culture and traditions, longer perceived financial security, and higher perceived support from public services and employers. Focus should include developing opportunities for individuals to increase their resilience resources across the life course, to offer protection from the adverse effects of ACEs as well as trauma that may occur in adulthood.
6. **Poor mental health may reduce opportunities for community engagement, while lower engagement may further impact on mental ill health.** Specific interventions may be essential to breaking this pathological cycle, especially where it is well embedded. However, developing community resilience resources and supporting those with high ACEs and low resilience at the earliest possible stages should offer a more effective mechanism to improve population well-being.
7. **Those who require the most help may be the hardest to reach. Individuals with higher ACE counts reported lower resilience resources both in childhood and as adults.** Further, individuals with higher ACE counts reported lower levels of childhood support not only from friends and relatives but also professionals (teachers, police, health professionals), and had lower perceptions of the supportiveness of services as adults. An essential part of building ACE-informed services is understanding the barriers that may be faced in engaging those who may benefit most from personal and professional support; and ensuring that those who do engage receive supportive and reliable responses that meet their needs.
8. **While resilience factors may provide some protection, they do not entirely counter the risks associated with exposure to multiple ACEs.** For all mental illness measures examined here a combination of high resilience and low ACEs provided the lowest risks of lifetime and current mental illness. Thus, primary prevention to avoid ACEs in future generations is critical in improving the mental health of the population. Focus should continue to be placed on strengthening early years, parenting and family programmes and the legislative frameworks that support them. These programmes can both reduce ACEs and support the development of resilience in children.

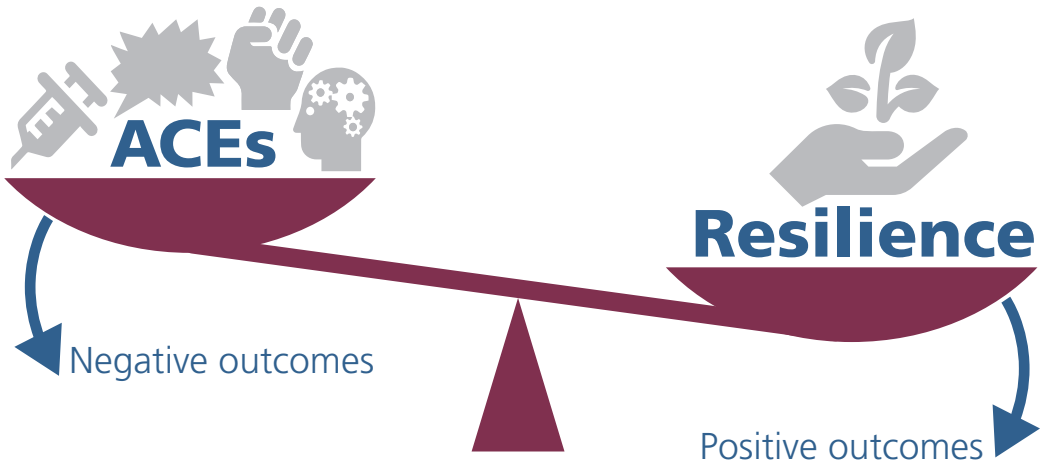
Those who require the most help may be the hardest to reach

1 Introduction

The first Welsh Adverse Childhood Experience (ACE) study identified the strong relationships between childhood trauma and poor health across the life course in Wales, including increased risk of health-harming behaviours (Bellis et al, 2015), low mental well-being (Ashton et al, 2016a) and early development of chronic disease (Ashton et al, 2016b). Its findings were consistent with a growing body of evidence from other countries (Hughes et al, 2017). The importance of all children in Wales having a safe and nurturing childhood is increasingly reflected across Welsh Government policy. **Taking Wales Forward 2016-2021** (Welsh Government, 2016a) sets out a national ambition for a Wales which is prosperous and secure, healthy and active, ambitious and learning, united and connected. To achieve these goals it recognises the importance of all children having the best start in life and the critical need to reduce ACEs through supporting families and parents. Building on Taking Wales Forward, **Prosperity for All: the national strategy** (Welsh Government, 2017) sets out the headline commitments for the future of Wales, stressing the importance of early years as the foundation of lifelong well-being and establishing the priority of creating ACE-aware public services in Wales that support the prevention of ACEs along with the development of resilience in children and young people. These policies, combined with the **Well-being of Future Generations (Wales) Act** 2015, provide a landscape for all public services to work together on an integrated approach to life course well-being and prosperity. This starts with empowering parents to nurture their children, ensuring professionals have the knowledge to support families and providing the right services for those suffering from the consequences of childhood adversity across the life course.

Whilst the prevention of all ACEs is a long-term aspiration, developing resilience in individuals and communities is an important mechanism to protect those experiencing ACEs from some of their consequences. Resilience can be thought of as the ability to overcome serious hardships such as those presented by ACEs. The development of resilience is often demonstrated visually as a seesaw, showing how protective resources such as personal skills, positive relationships and community support can counterbalance the heavy burden imposed by ACEs *(see Figure 1)*.

Figure 1: Resilience balance scale



Adapted from: Center on the Developing Child, Harvard University. See https://developingchild.harvard.edu/science/key-concepts/resilience/

Evidence suggests that the single most common contributory factor to children developing resilience is having at least one positive and stable relationship with a supportive parent, caregiver or other adult (Bellis et al, 2017; National Scientific Council on the Developing Child, 2015). Other sources of resilience can come from cultural connections, opportunities to build self-regulatory and adaptive skills and believing you have at least the opportunity and ability to influence your own life course (Rutter, 1985; National Scientific Council on the Developing Child, 2015; Zolkoski and Bullock, 2012). However, the science of resilience is still emerging, thus relatively little is known about which aspects of individuals' lives contribute most to their resilience and how much such resilience protects individuals from the pernicious effects of ACEs on health and well-being across the life course. Consequently, building on the findings from the first Welsh ACE Survey, Public Health Wales - supported by Welsh Government - undertook a national survey of ACEs and sources of resilience in the Welsh population. The survey was implemented between March and June 2017 and measured adults' exposure to 11 ACEs during their childhood; incorporating physical and emotional neglect into the range of ACEs measured in Wales *(see Section 3)*. Its principal aim was to inform work on the development of resilience to ACEs by identifying factors associated with better health, educational, economic and social outcomes in individuals who have suffered ACEs.

This first report presents the findings from the Welsh ACE and Resilience Survey with a focus on mental illness; which was not measured in the first Welsh ACE survey but has been found to be strongly related to ACEs elsewhere (Hughes et al, 2017). Mental illness has a substantive impact on the health and well-being of the Welsh population. In the 2015 Welsh Health Survey, one in eight adults in Wales reported currently being in treatment for a mental illness (Welsh Government, 2016b). Consequently, improving the nation's mental health, increasing awareness of mental health conditions and early treatment are priorities for Government (Welsh Government, 2017). Here we examine not only the relationship between ACEs and the development of mental illness but also possible sources of resilience and how effective they may be at instilling individuals who suffer ACEs with the ability to avoid the development of mental ill health. It is important to note that this study explores associations and does not imply causality. However, a growing body of international evidence suggests that resilience resources can reduce the impacts of adversity on mental health (e.g. Afifi et al, 2016; Afifi and MacMillan, 2011; Cheung et al, 2017; Eisenberg et al, 2007; Hu et al, 2015).

Early years and mental health are two of the five priority areas identified by Welsh Government in **Prosperity for All: the national strategy** (Welsh Government, 2017). A life course approach to these issues means preventing the root causes of mental ill health at the earliest possible stages. Findings in this report should help inform the potential benefits to mental health in Wales of developing resilience both in children and adults to mitigate at least some of the detrimental impacts of experiencing ACEs.

2 Methods

A random probability sampling approach was used to identify a national household sample of approximately 2,000 adults aged 18-69 years resident in Wales and a boost sample of approximately 500 adults resident in communities with higher levels of spoken Welsh language[1]. The surveys were conducted by a professional market research company between March and June 2017 at participants' places of residence. The full survey methodology and sample demographics are detailed in Appendix 1. The final sample size for analysis was 2,497 (national sample n=2,005, boost sample n=492).

2.1. Measures used in the survey

Resilience

To enable an exploration of the types of resilience resources that may help protect people who experience ACEs from suffering their harmful effects, the survey included a range of questions that aimed to measure participants' resilience resources during their childhood (in the first 18 years of life) and as adults.

Childhood resilience resources:

- The 12-item youth version of the Child and Youth Resilience Measure (CYRM; *see Box 1*) was used to measure **Childhood resilience** *(Section 4.1)*, including individual, family, peer, community and cultural factors.
- Participation in a range of **Childhood social and leisure activities** (e.g. sports clubs/teams; *Section 4.2*) was measured to explore the protective effects of engaging in community, recreational and support activities during childhood.
- **Childhood relationships with adults** *(Section 4.3)* were measured through questions on the availability of a trusted adult during childhood and which adult figures (e.g. parent, teacher) were important sources of personal support during childhood.

Box 1: The Child and Youth Resilience Measure (CYRM) and Resilience Research Centre Adult Resilience Measure (RRC-ARM)

The CYRM and RRC-ARM are companion scales that have been developed by the Resilience Research Centre at Dalhousie University in Canada.* Both scales stem from an original 58-item resilience scale which was developed through research and testing with children and young adults in 14 communities around the world. Ongoing research has resulted in a range of versions now being available targeting children, youth and adults. We used the short, 12-item youth version of the CYRM to measure childhood resilience resources, with questions applied retrospectively. We used the short, 12-item RRC-ARM to measure current adult resilience resources. Questions in the two scales are very similar with language and context adapted to be appropriate to the target age.

*See http://cyrm.resilienceresearch.org/ for further information.

Adult resilience resources:

- Current **Adult resilience** *(Section 5.1)* was measured using the 12-item Resilience Research Centre Adult Resilience Measure (RRC-ARM; *see Box 1*).
- Current participation in a range of **Social and leisure activities** (e.g. sports clubs/teams, religious group/church organisation; *Section 5.2*) was measured to explore the protective effects of engaging in community, recreational and support activities in adulthood.

[1] Defined as having 40% or more Welsh speaking residents. Data: Census 2011.

- **Perceptions of service supportiveness** *(Section 5.3*) measured how supportive participants thought selected services (e.g. health services, charities and voluntary organisations) and their employer (where applicable) would be if they required help from them.
- A single question was used to gain a measure of participants' current **Financial security** *(Section 5.4).*
- A range of items explored **Community culture and traditions** *(Section 5.5).*

Mental illness

The survey asked participants if they were currently, or if they had ever, been treated for depression, anxiety or another mental illness; and if they had ever felt suicidal or self-harmed. Overall prevalence for all outcomes is presented in Section 3.2 with further analyses focusing on three combined outcomes:

Lifetime mental illness
Ever been treated for depression, anxiety or other mental illness

Current mental illness
Currently being treated for depression, anxiety or other mental illness

Felt suicidal or self-harmed
Ever having felt suicidal or self-harmed

2.2. Presentation of findings

Findings are presented in the following format:

- Section 3 presents the prevalence of ACEs in the Welsh adult population and a comparison to findings from the 2015 survey *(Section 3.1)*; the prevalence of mental illness outcomes in the Welsh adult population *(Section 3.2);* and the relationship between mental illness and ACE count (i.e. number of ACEs; *Section 3.3).*
- Section 4 presents the relationships between childhood resilience variables, ACEs and mental illness.
- Section 5 presents the relationships between adult resilience variables, ACEs and mental illness.

2.3. Data analysis

Estimates of the prevalence of ACEs and mental illness outcomes in the Welsh adult population use data collected as part of the national sample only, with data weighted to reflect the Welsh national population (aged 18-69 years)[2]. Unless specified, the full sample (including boost group) has been used in all other analyses. In line with the first ACE survey and international literature (Bellis et al, 2015; Hughes et al, 2017), analyses explore ACEs using a count variable that categorises participants based on the number of ACEs they experienced during childhood: no ACEs, one ACE, two to three ACEs, and four or more ACEs.

To explore relationships between resilience measures, ACEs and mental illness, analyses initially tested the relationships between each resilience measure and ACE count (using chi-squared) and each resilience measure and mental illness outcomes (using logistic regression analysis controlling for socio-demographics [gender, age group, ethnicity and deprivation quintile]; *see Appendix 1*). For resilience measures that were associated with reduced risk of mental illness, multivariate analyses (generalized linear modelling) were then conducted incorporating the resilience measure, ACE count and socio-demographics. Estimated marginal means were calculated to show how the adjusted proportion of individuals affected by mental illness at each ACE count level changed with the resilience measure. For childhood resilience variables, analyses have been conducted on all three mental illness outcomes (lifetime mental illness, current mental illness, ever felt suicidal or self-harmed). For adult resilience measures, analyses were only performed for current mental illness as current adult resilience resources cannot be considered as protective factors for historical conditions.

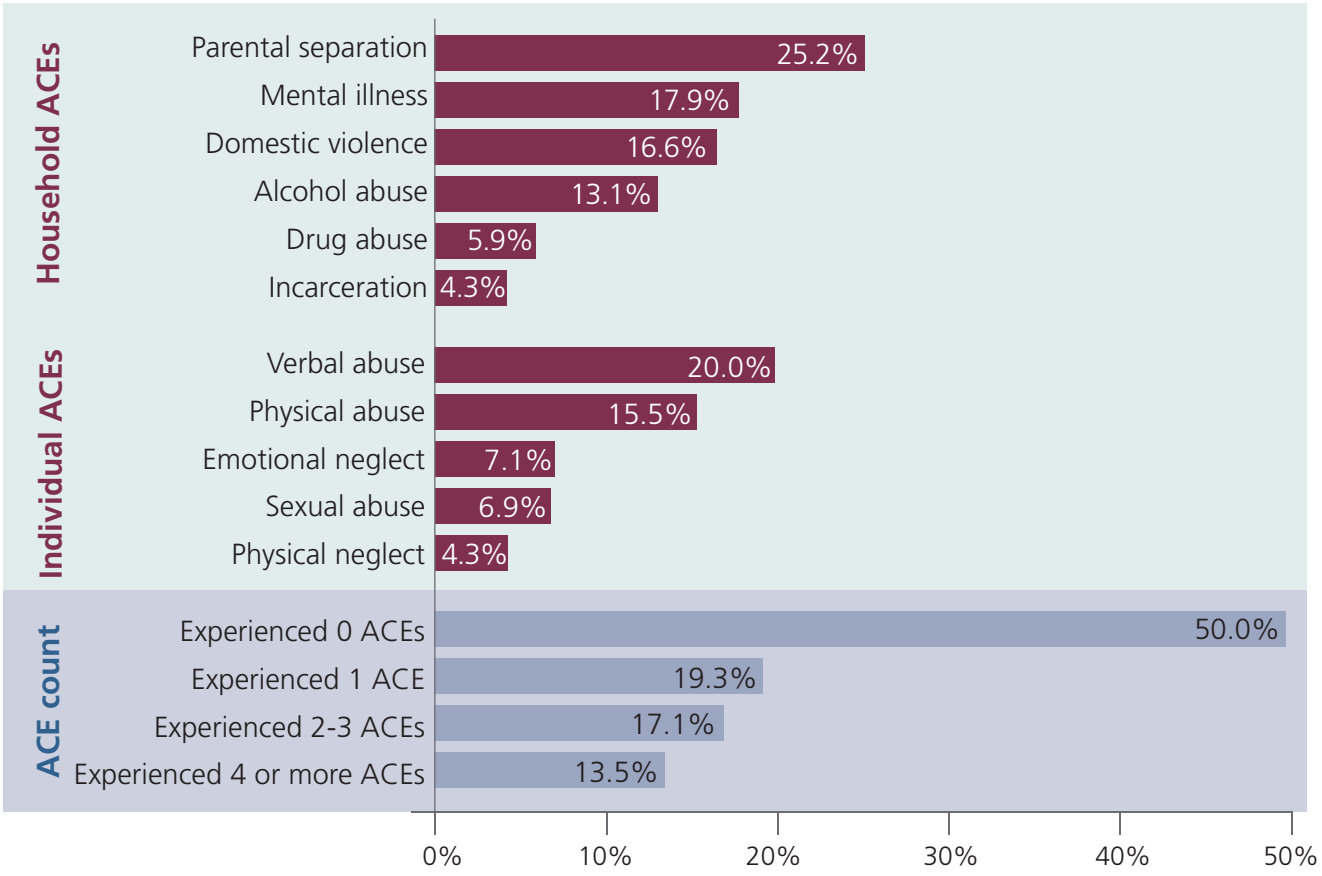
[2] Using mid-2015 population estimates for Lower Super Output Areas (LSOAs) by sex, age group (ONS, 2016) and deprivation quintile (Welsh Index of Multiple Deprivation; Welsh Government, 2015).

3 Adverse Childhood Experiences and Mental Illness

3.1. Prevalence of ACEs

The Welsh ACE and Resilience Survey measured exposure to 11 ACEs before the age of 18 *(see Appendix 1, Table i for questions)*. Half of Welsh residents aged 18-69 years reported at least one ACE and 13.5% reported four or more *(Figure 2)*. Prevalence of individual ACEs ranged from 25.2% for parental separation or divorce to 4.3% for physical neglect or living with an adult who was incarcerated. Demographic breakdowns are provided in the Appendix *(Table A1)*.

Figure 2: Adjusted prevalence of individual ACEs and ACE count in the Welsh population (aged 18-69 years), 2017*

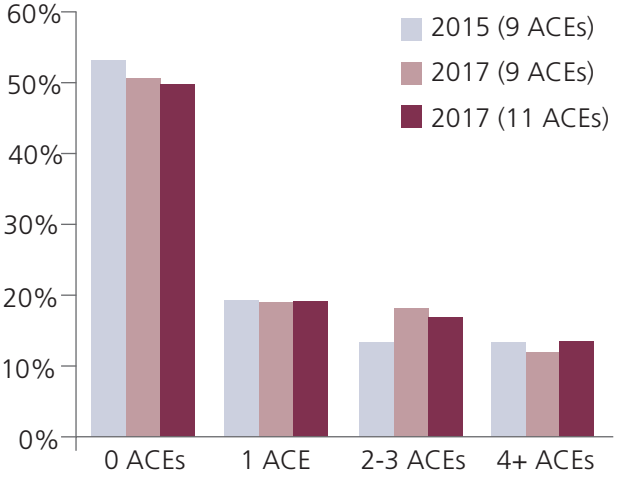


*General population survey data only (n=2,005); estimates are adjusted to mid-2015 population estimates.

Box 2: Comparison to the 1st Welsh ACE survey

The 1st Welsh ACE survey measured nine ACEs (excluding physical and emotional neglect). Figure 3 compares the ACE count prevalence from the 1st survey to an equivalent ACE count for 2017 (limited to nine ACEs; the ACE count based on all 11 ACEs is also shown). There were minor variations between years with, for instance, 12.0% of adults reporting four or more of the nine ACEs in 2017 compared with 13.5% in 2015. Comparisons for individual ACEs are presented in the Appendix *(Table A2)*.

Figure 3: Adjusted ACE count prevalence measured in 2015 and 2017



Physical and emotional neglect

Physical and emotional neglect were added to the 2017 survey and were measured using single-item questions adapted from a World Health Organization tool *(see Box 3; questions used to measure other ACEs are provided in Appendix 1, Table i*). Prevalence of these ACEs was 7.1% for emotional neglect and 4.3% for physical neglect *(see Figure 2).*

Box 3: Questions used to measure neglect

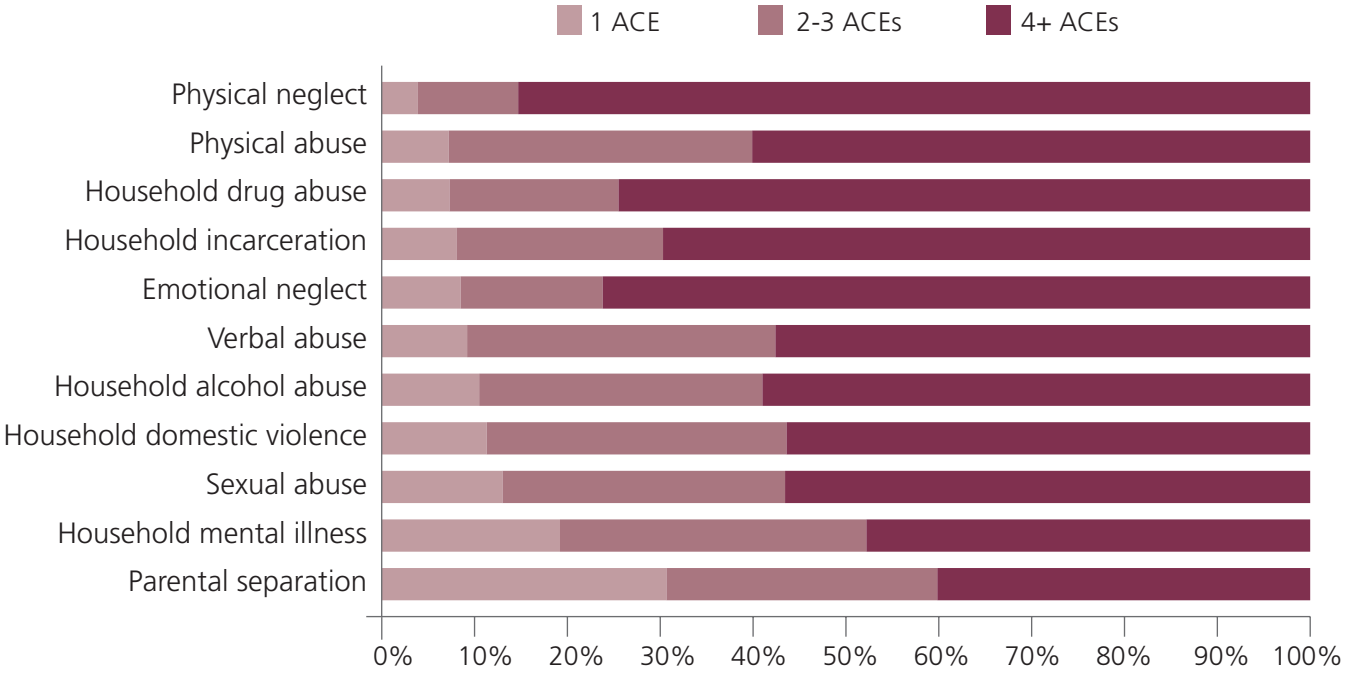
The two questions used to measure neglect were adapted from questions used in the World Health Organization's Short Child Maltreatment Questionnaire (SCMQ) (Meinck et al, 2016). The SCMQ was developed by a panel of experts to provide a brief child maltreatment measurement tool suitable for use in national surveys. For the purpose of this survey, the questions were applied retrospectively with the response options *'never'*, *'once'* and *'more than once'*, in line with other ACE questions.

Physical neglect: While you were growing up, before the age of 18 years, did your parent/caregiver for long periods of time not provide you with enough food or drink, clean clothes, or a clean and warm place to live when they could have? (ACE = once or more than once)

Emotional neglect: While you were growing up, before the age of 18 years, were there times when there was no adult living with you who made you feel loved? (ACE = more than once)

Including the two neglect ACEs had little impact on the overall ACE count prevalence *(Figure 3)* as the majority of individuals who reported neglect also reported other ACEs. Using unadjusted data for the full sample, Figure 4 shows the number of ACEs experienced by individuals who reported each ACE. Only 3.9% of those reporting physical neglect and 8.5% of those reporting emotional neglect identified these as their only ACEs, and 85.3% and 76.2% respectively had at least three other ACEs (i.e. were in the four or more ACEs category); the highest proportions across all individual ACEs.

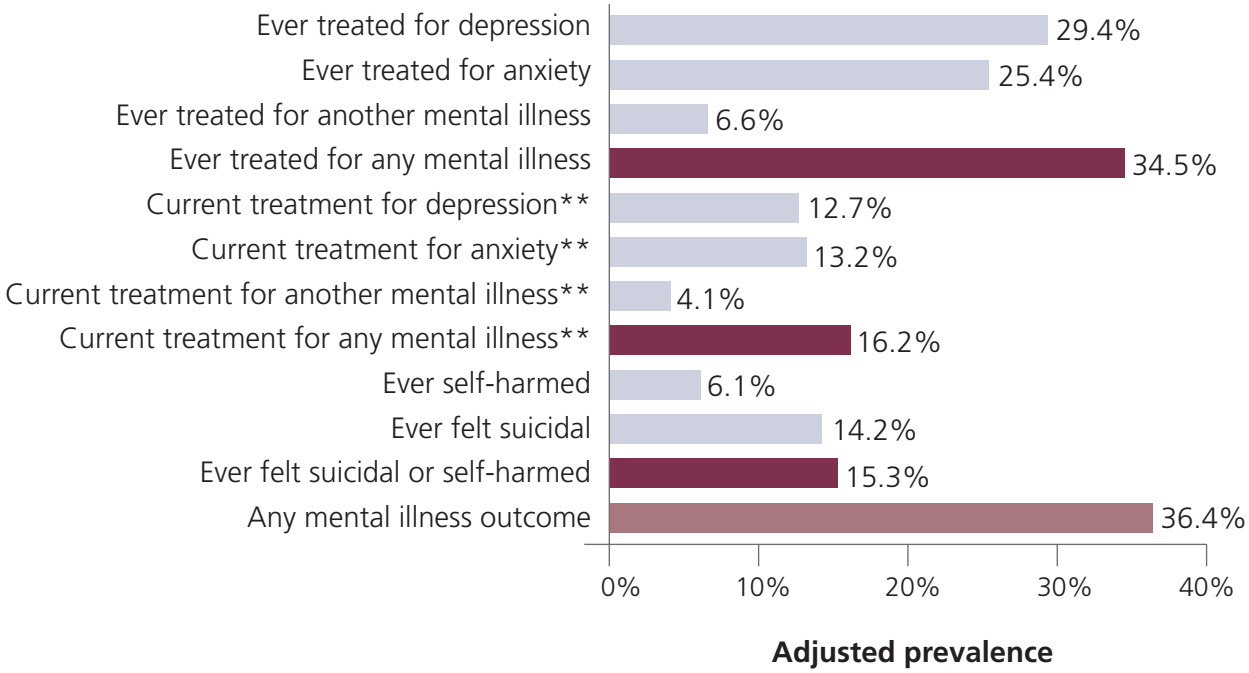
Figure 4: ACE count of individuals that reported having experienced individual ACEs



3.2. Prevalence of mental illness

The Welsh ACE and Resilience Survey asked about current and past treatment for depression, anxiety or other mental illness, and whether participants had ever felt suicidal or self-harmed. Adjusting data from the general population sample to national population demographics, over a third (36.4%) of adults aged 18-69 years reported at least one of these outcomes with 34.5% having ever received treatment for a mental illness (lifetime mental illness), 16.2% currently receiving treatment (current mental illness) and 15.3% having ever felt suicidal or self-harmed *(Figure 5).*

Figure 5: Adjusted prevalence of mental illness in the Welsh adult population (aged 18-69 years) from the Welsh ACE and Resilience Survey*



*General population survey data only (n=2,005); estimates are adjusted to mid-2015 population estimates.

**Individuals in these categories are also included in the 'ever treated' categories.

Across the full sample, two thirds (65.5%) of individuals who reported a mental illness outcome reported more than one type. The percentage reporting additional mental illness outcomes was highest (96.5%) for those who had ever self-harmed. Given the strong correlations between different mental illness outcomes, analyses focused on three grouped outcomes: lifetime mental illness (having ever received treatment for depression, anxiety or another condition); current mental illness (currently receiving treatment for depression, anxiety or another condition); and having ever felt suicidal or self-harmed (80% of individuals reporting self-harm also reported having felt suicidal).

3.3. Relationship between ACEs and mental illness

There were strong, cumulative relationships between the number of ACEs participants reported and mental illness with the proportions reporting each outcome increasing with ACE count *(Figure 6).* Two thirds of those with four or more ACEs reported lifetime mental illness; almost a third reported current mental illness; and four in ten reported having ever felt suicidal or self-harmed. Two thirds of those reporting mental illness had at least one ACE (lifetime mental illness 66.5%; current mental illness 69.5%) and a quarter reported four or more ACEs (lifetime 24.7%; current 26.2%). Four in five (79.5%) of those reporting having ever felt suicidal or self-harmed had at least one ACE and a third (35.3%) had four or more.

ACE count remained strongly predictive of all mental illness outcomes after controlling for socio-demographic factors in multivariate analysis. Compared with individuals with no ACEs, those with four or more ACEs were over three times more likely to report current mental illness, over six times more likely to report lifetime mental illness, and over nine times more likely to report having ever felt suicidal or self-harmed *(Figure 7).* Risks of all mental illness outcomes were also higher among individuals living in the two most deprived quintiles of residence (compared with the least deprived). There were no age differences but females had increased risks of lifetime and current mental illness (compared with males) and White participants had increased risks of lifetime mental illness (compared with other ethnicities; *see Appendix Table A3; and Table A4 for unadjusted relationships between mental illness outcomes and demographics).*

Figure 6: Percentage of participants reporting mental illness outcomes by ACE count

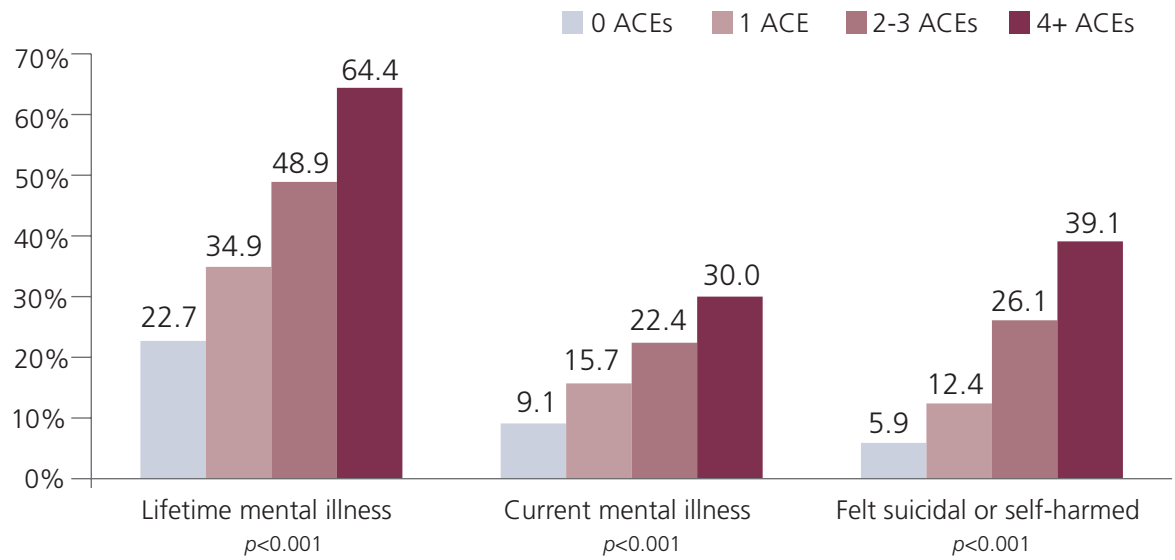
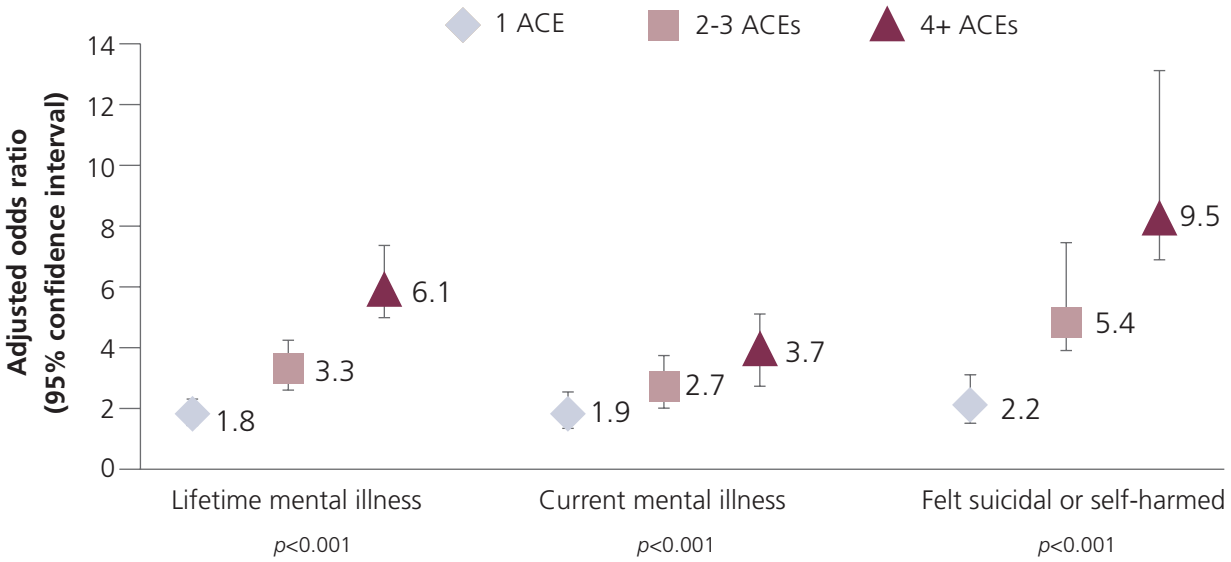


Figure 7: Adjusted odds ratios for mental illness by ACE count*



*Adjusted for age, gender, deprivation and ethnicity. Reference category = 0 ACEs.

4 Childhood Resilience Resources

4.1. Childhood resilience (Child and Youth Resilience Measure)

The 12-item youth version of the Child and Youth Resilience Measure (CYRM) was used to measure childhood resilience, with questions applied retrospectively *(Box 4)*. There were strong associations between all items and ACEs, with individuals with higher ACE counts providing less positive responses *(see Appendix Table A5).* There were also strong relationships between all individual items and mental illness *(Appendix Table A5)*, with more positive responses associated with lower levels of all mental illness outcomes after controlling for socio-demographics.

Box 4: Questions included in the 12-item Child and Youth Resilience Measure (CYRM)

When you were growing up, during the first 18 years of life, to what extent would the following sentences have described you?

Response options: *Not at all, a little, somewhat, quite a bit, a lot*

1. I had people I looked up to
2. Getting an education was important to me
3. My parents/caregivers knew a lot about me
4. I tried to finish activities that I started
5. I was able to solve problems without harming myself or others (e.g. without using drugs or being violent)
6. I knew where to go in my community to get help
7. I felt I belonged in my school
8. My family would stand by me during difficult times
9. My friends would stand by me during difficult times
10. I was treated fairly in my community
11. I had opportunities to develop skills to help me succeed in life (like job skills and skills to care for others)
12. I enjoyed my community's cultures and traditions

To provide an overall measure of childhood resilience, a variable was created showing how many of the 12 items participants responded positively to *(quite a bit* or *a lot; see Box 4 for all response options)*. Participants were then grouped into three categories:[3]

Low childhood resilience:
<6 positive items (10.9% of participants)

Moderate childhood resilience:
6-9 positive items (19.4% of participants)

High childhood resilience:
10-12 positive items (69.7% of participants)

These categories were also strongly related to ACE count and all three mental illness outcomes. Thus, the proportion reporting high childhood resilience reduced as ACE count increased *(Figure 8)* and the proportions reporting mental illness outcomes reduced as childhood resilience level increased *(Figure 9)*. In multivariate analyses (including socio-demographics, ACE count and childhood resilience category), higher ACE count remained strongly associated with increased risk of all mental illness categories, and higher childhood resilience with reduced risk ($p<0.001$). There were no significant differences in the impact of childhood resilience across ACE levels. Figure 10 shows the adjusted proportion of participants in each ACE count category reporting each outcome based on their childhood resilience level.

[3] See Appendix 1, Limitations.

Figure 8: Proportion in childhood resilience categories, by ACE count

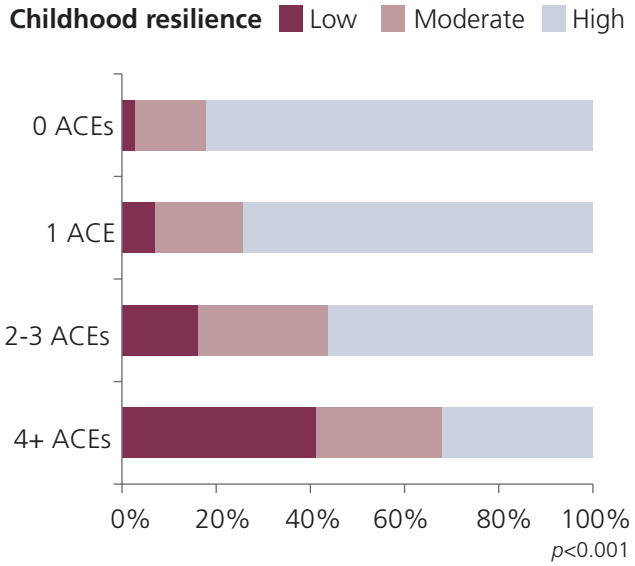


Figure 9: Proportion reporting mental illness outcomes by childhood resilience category

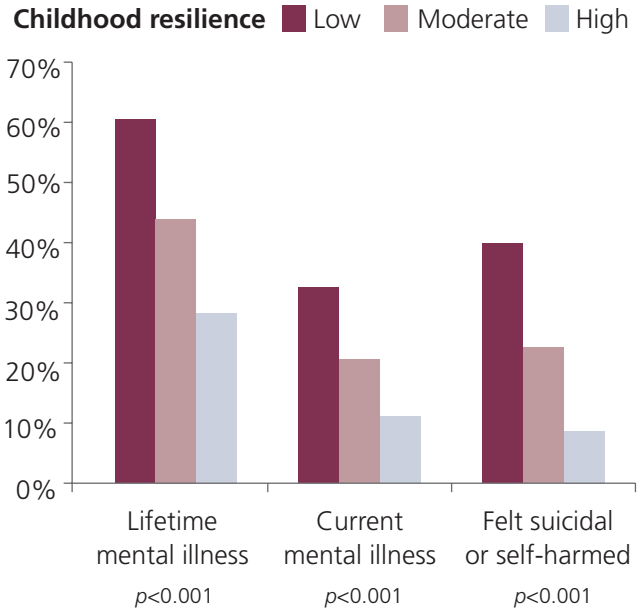
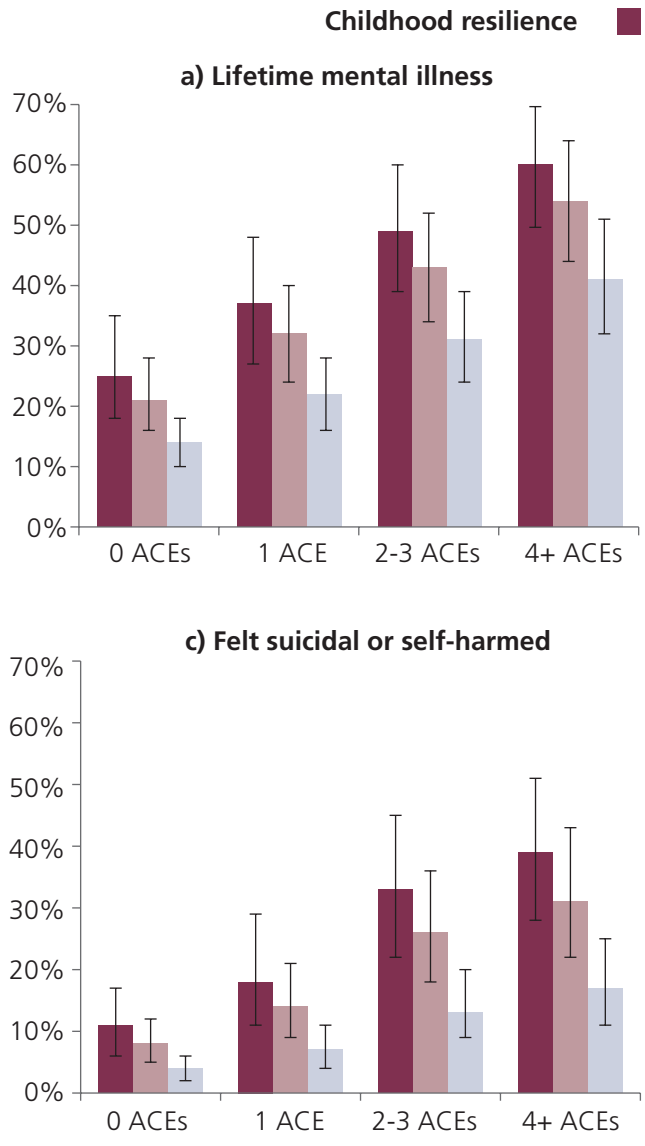


Figure 10: Adjusted proportion (95% confidence intervals) of participants reporting mental illness by ACE count and childhood resilience category



Childhood resilience was associated with lower mental illness across all ACE levels.
Among individuals with four or more ACEs and high childhood resilience, the adjusted proportion reporting:

- **Lifetime mental illness** was 41%, compared with 60% in those with low childhood resilience.
- **Current mental illness** was 14%, compared with 29% in those with low childhood resilience.
- **Having ever felt suicidal or self-harmed** was 17%, compared with 39% in those with low childhood resilience.

4.2. Childhood social and leisure activities

Respondents were asked whether they had regularly participated in a range of activities during their childhood *(Box 5).* Sports were the most commonly reported activity with 61.7% of the sample participating in sports clubs/teams in school and 44.0% out of school. Individuals with higher ACE counts were less likely to report regularly having participated in both forms of sport, and in Scout/Guide type activities, church activities and Welsh cultural events *(see Appendix Table A6).*

After controlling for socio-demographics, school and non-school sports were the only activities that showed significant associations with mental illness outcomes. Individuals who participated in either form of sport were less likely to report all mental illness outcomes[4]. Thus, further analyses focused on childhood sports participation, using a combined variable of any sports club/team participation (reported by 68.8% of all participants).

Box 5: Childhood social and leisure activities

Which of the following activities did you participate in regularly as a child?

School sports clubs/teams	Church groups/Sunday school
Sports clubs/teams outside of school	Welsh cultural events (e.g. Eisteddfodau)
School dance/arts/drama clubs	Community/social clubs (e.g. youth clubs)
Dance/arts/drama clubs outside of school	Volunteering
Cubs/Brownies/Scouts/Guides etc.	Online communities (e.g. Facebook, Twitter groups)

Figure 11 shows how regular childhood sports participation reduced as ACE count increased (from 73.6% of those with no ACEs to 56.1% of those with four or more ACEs). Figure 12 shows the lower levels of mental illness outcomes among individuals who regularly participated in sports clubs or teams during childhood.

In multivariate analyses (including socio-demographics, ACE count and childhood sports participation), higher ACE count remained independently associated with greater risk of all three mental illness outcomes ($p<0.001$) and childhood sports participation with lower risk (lifetime mental illness, current mental illness $p<0.05$; ever felt suicidal or self-harmed $p<0.005$). There were no significant differences in the impact of childhood resilience resources across ACE levels. Figure 13 shows the adjusted proportion of participants in each ACE count category reporting mental illness outcomes by childhood sports participation.

[4] School sports: lifetime mental illness, felt suicidal/self-harmed, $p<0.001$; current mental illness, $p<0.005$; Out of school sports: felt suicidal/self-harmed $p<0.001$; lifetime mental illness, current mental illness, $p<0.005$

Figure 11: Proportion regularly participating in sports clubs/teams in childhood, by ACE count

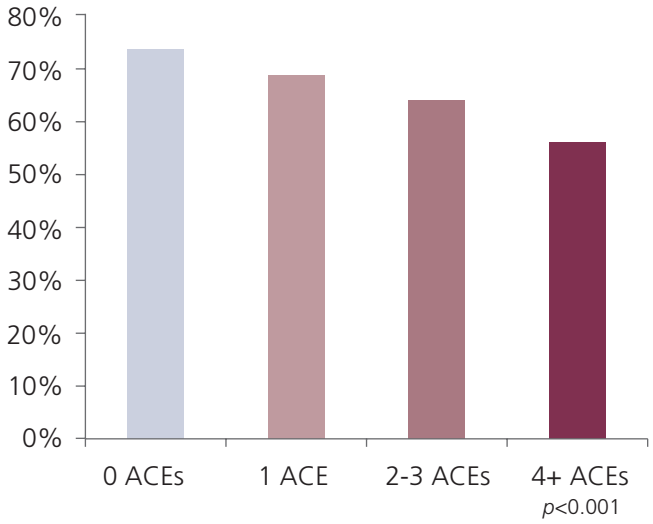


Figure 12: Proportion reporting mental illness outcomes by regular childhood sports participation

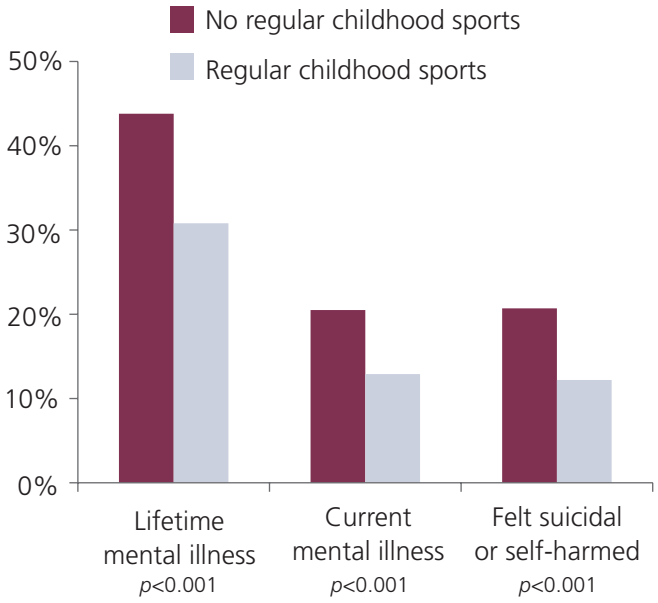
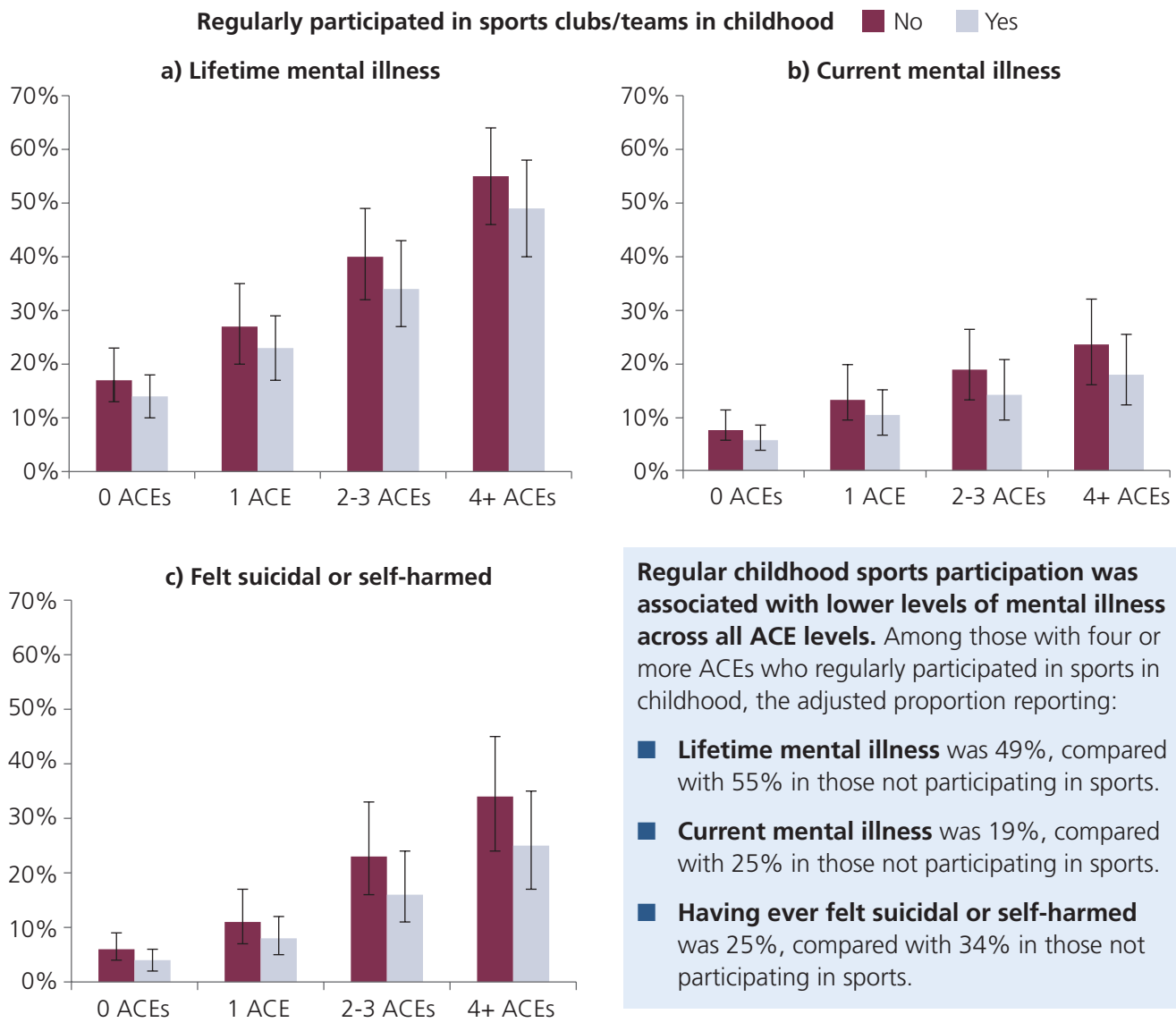


Figure 13: Adjusted proportion (95% confidence intervals) of participants reporting mental illness by ACE count and childhood sports participation



Regular childhood sports participation was associated with lower levels of mental illness across all ACE levels. Among those with four or more ACEs who regularly participated in sports in childhood, the adjusted proportion reporting:

- **Lifetime mental illness** was 49%, compared with 55% in those not participating in sports.
- **Current mental illness** was 19%, compared with 25% in those not participating in sports.
- **Having ever felt suicidal or self-harmed** was 25%, compared with 34% in those not participating in sports.

4.3. Childhood relationships with adults

Participants were asked: *While you were growing up, before the age of 18, was there an adult in your life who you could trust and talk to about any personal problems?* Response options were *never*, *sometimes* and *always*. The proportion who answered *always* reduced from 86.6% of those with no ACEs to 44.4% of those with four or more ACEs *(Figure 14; Appendix Table A7)*. There were strong relationships between the presence of trusted adult relationships and mental illness outcomes *(Figure 15)*. For example, 55.2% of those who *never* had a trusted adult relationship reported lifetime mental illness compared with 31.5% of those who *always* had such a relationship. In multivariate analyses (including socio-demographics, ACE count and trusted adult relationship status) ACE count remained independently associated with greater risk of all mental illness outcomes ($p<0.001$). However, trusted adult relationship status only showed an independent relationship with current mental illness, with risks of current mental illness being lower in those who *always* or *sometimes* had a trusted adult relationship than in those who *never* had such a relationship ($p<0.05$; *Figure 16*). There was no significant difference in impact across ACE categories.

Figure 14: Proportion with trusted adult relationships in childhood, by ACE count

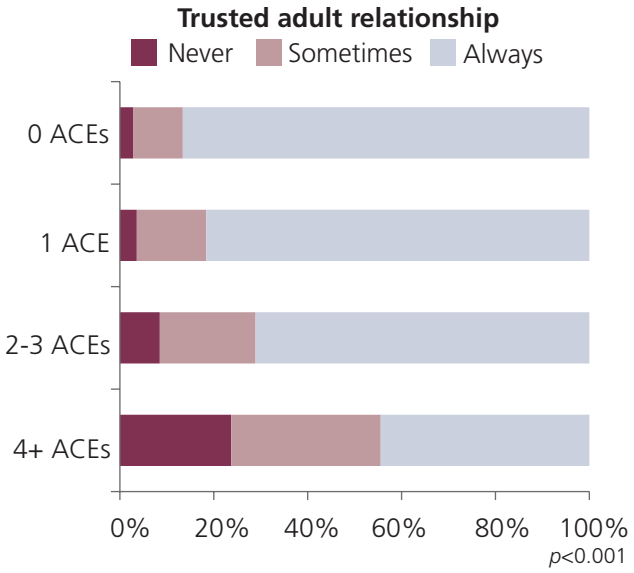


Figure 15: Proportion with mental illness outcomes by availability of trusted adult relationships in childhood

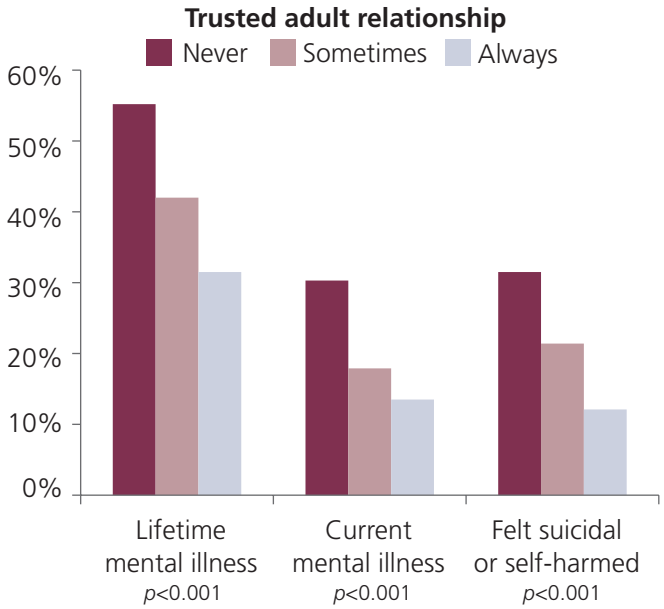
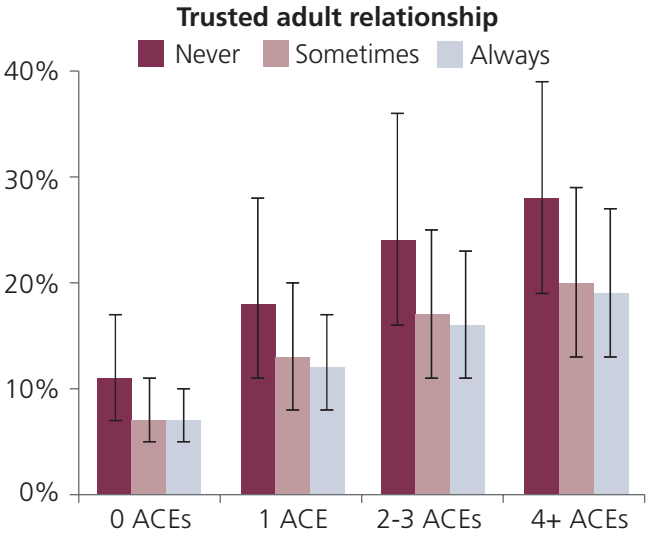


Figure 16: Adjusted proportion (95% confidence intervals) of participants reporting current mental illness by ACE count and availability of trusted adult relationships in childhood



Trusted adult relationships in childhood were associated with lower current mental illness across all ACE levels. Among those with four or more ACEs, the adjusted proportion reporting current mental illness was 28% in those who never had a trusted adult relationship compared with 19% and 20% in those who always and sometimes had a trusted adult relationship respectively.

Participants were also asked which of a list of adult figures were important sources of personal support in their childhood *(Table 1)*. Response options were *never, sometimes* and *always*. Those with higher ACE counts were significantly less likely to identify all except social workers as important sources of support

(p<0.001; *Table 1; Appendix Table A8*). Individuals were categorised into four groups indicating constant (always) personal support from:

Both parents (with or without other adults; 61.6% of participants)

One parent (with or without other adults; 24.4% of participants)

No parents but other adults (4.3% of participants)

None of those listed (9.6% of participants)

These categories were strongly related to ACEs *(Figure 17)* and mental illness *(Figure 18)*. However, in multivariate analysis, while higher ACE count remained associated with increased risk of all mental illness outcomes (p<0.001), personal support category only showed an independent relationship with current mental illness (p<0.05; *Figure 19*).

Table 1: Proportion of participants with 0 and 4+ ACEs reporting adult figures as constant (always) sources of personal support in childhood

	0 ACEs	4+ ACEs
Mother	94.1%	42.4%
Father	83.1%	22.1%
Other adult relative	53.6%	34.6%
Teacher	27.3%	6.9%
Sports coach	15.2%	4.8%
Doctor/nurse*	21.9%	9.0%
Religious leader	13.9%	4.8%
Adult neighbour/friend	27.9%	14.6%
Policeman	12.8%	5.1%
Social worker	3.7%	2.7%

*Or other health professional

Figure 17: Constant adult sources of personal support during childhood, by ACE count

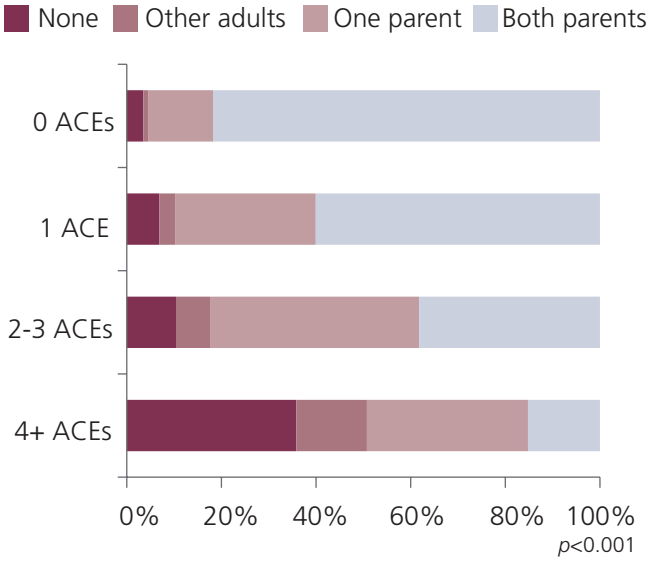


Figure 18: Proportion with mental illness outcomes by constant sources of personal support in childhood

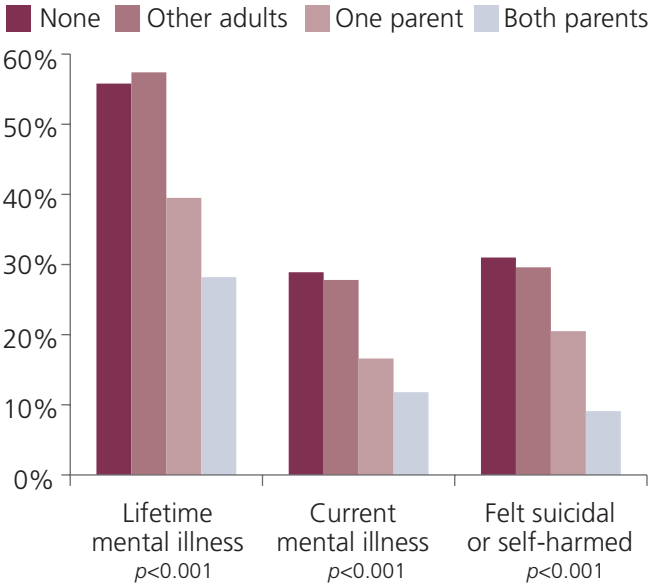
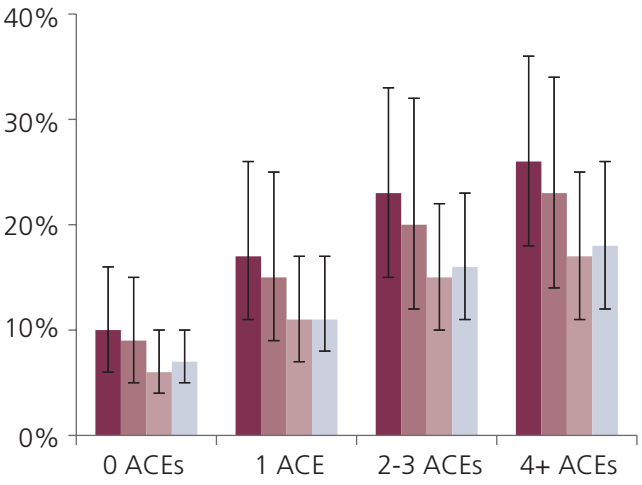


Figure 19: Adjusted proportion (95% confidence intervals) of participants reporting current mental illness by ACE count and constant adult sources of personal support in childhood



Individuals reporting constant personal support from at least one parent during childhood had lower levels of current mental illness than those without such parental support across all ACE levels.

5 Adult Resilience Resources

5.1. Adult resilience (Resilience Research Centre Adult Resilience Measure)

The 12-item Resilience Research Centre Adult Resilience Measure (RRC-ARM) was used to measure current adult resilience. This tool largely mirrors the CYRM tool used to measure childhood resilience, but is designed for application with adults *(Box 6)*. There were strong relationships between ACE count and all individual items except item 2 (qualifications and skills) with higher ACE counts associated with less positive responses ($p<0.001$; *Appendix Table A9*).

Exploration of the impact of adult resilience on mental illness focused on current mental illness. There were strong relationships between all individual adult resilience items and current mental illness *(Appendix Table A9)* which remained after controlling for socio-demographics ($p<0.001$).

Box 6: Questions in the 12-item Resilience Research Centre Adult Resilience Measure (RRC-ARM)

To what extent do the statements below describe you?

Response options: *Not at all, a little, somewhat, quite a bit, a lot*

1. I have people I can respect in my life
2. Getting and improving qualifications or skills is important to me
3. My family know a lot about me
4. I try to finish what I start
5. I can solve problems without harming myself or others (e.g. without using drugs or being violent)
6. I know where to get help in my community
7. I feel I belong in my community
8. My family stand by me during difficult times
9. My friends stand by me during difficult times
10. I am treated fairly in my community
11. I have opportunities to apply my abilities in life (like skills, a job, caring for others)
12. I enjoy my community's cultures and traditions

To provide an overall measure of adult resilience resources, a variable was created showing how many of the 12 items participants responded positively to (*quite a bit* or *a lot*; *see Box 6* for all response options). Participants were then grouped into three categories:[5]

Low resilience resources:
<7 positive items (7.7% of participants)

Moderate resilience resources:
7-9 positive items (19.6% of participants)

High resilience resources:
10-12 positive items (72.7% of participants)

These categories were also strongly related to both ACE count and current mental illness. One in five individuals with four or more ACEs had low adult resilience resources *(Figure 20)* while 36.5% of all those with low adult resilience resources reported current treatment for a mental illness *(Figure 21)*. In multivariate analysis (including adult resilience category, ACE count and socio-demographics), ACE count remained strongly associated with increased risk of current mental illness ($p<0.001$) and higher adult resilience with lower risk ($p<0.001$). There was no significant difference in the impact of adult resilience across ACE categories. Figure 22 shows the adjusted proportion of participants at each ACE level reporting current mental illness based on adult resilience category.

[5] Categorisation differs from that for childhood resilience to provide sufficient data for analysis.

Figure 20: Proportion in adult resilience categories, by ACE count

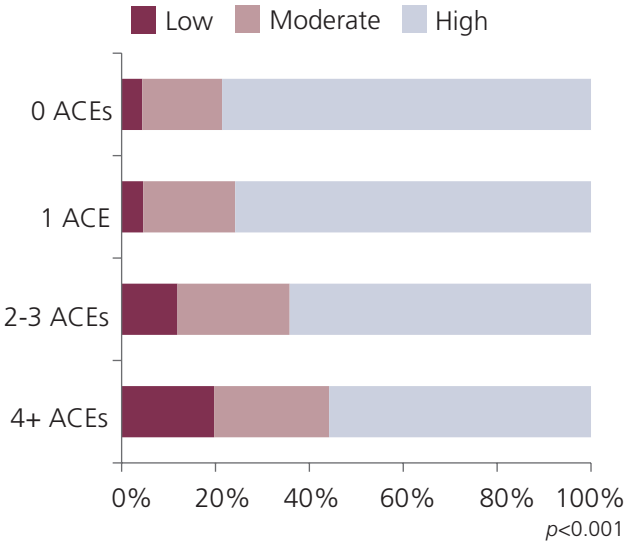


Figure 21: Proportion reporting current mental illness by adult resilience category

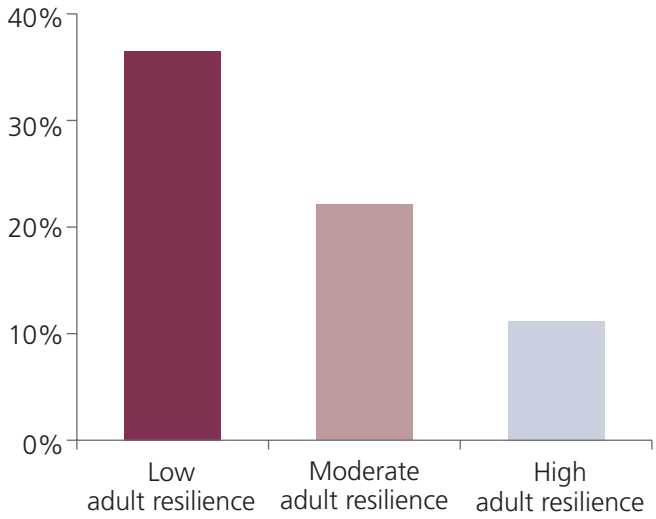
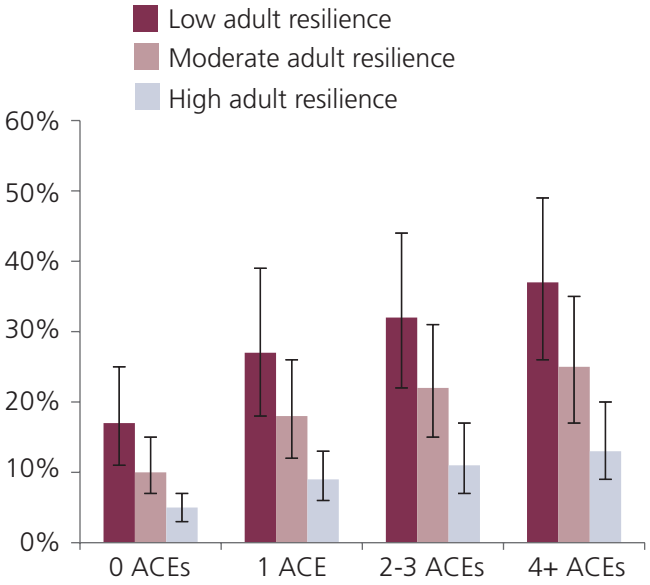


Figure 22: Adjusted proportion (95% confidence intervals) of participants reporting current mental illness by ACE count and adult resilience



Adult resilience was strongly associated with lower current mental illness across all ACE levels. Among individuals with four or more ACEs and high adult resilience, the adjusted proportion reporting current mental illness was almost two thirds lower (13%) than that in those with low adult resilience (37%).

5.2. Current social and leisure activities

Respondents were asked if they currently participated in a range of activities on a regular basis *(Box 7)*. Over one in three (36.1%) stated that they did not participate in any of the listed activities. The most commonly reported activity was participation in online communities (39.6%), followed by participation in sports clubs/groups (25.0%). Individuals with higher ACE counts were less likely to report participating in religious groups/church organisations and sports clubs/groups and more likely to report participating in support/self-help groups and online communities *(see Appendix Table A10)*.

After controlling for socio-demographics, only regular participation in sports clubs/groups ($p<0.001$) and community/social groups ($p<0.005$) were associated with lower risk of current mental illness.

Box 7: Current social and leisure activities

Do you join in the activities of any of the following organisations on a regular basis?

Political parties, trade unions, interest groups (e.g. Environment)
Parents'/school associations/parenting groups/mums and toddlers groups
Tenants/residents groups
Education, arts or music group/evening class
Welsh cultural events (e.g. Eisteddfodau)
Religious group/church organisation
Support/self-help group
Youth group (e.g. Scouts, guides, youth clubs)
Sport clubs/groups (e.g. Rugby, swimming, keep fit)
Community groups, social clubs
Online communities (e.g. Facebook, Twitter groups)

Figure 23 shows the relationship between ACE count and regular participation in sports clubs/groups and community groups/social clubs. For sports, participation reduced as ACE count rose (from 27.4% in those with no ACEs to 21.5% in those with four or more ACEs). This pattern was not seen for community/social group participation where levels were equivalent for those with both no ACEs (10.6%) and four or more ACEs (10.7%). Figure 24 shows the levels of current mental illness in those who did and did not participate regularly in each activity.

Multivariate analysis was undertaken for each activity including ACE count and socio-demographics. For both activities, ACE count remained independently associated with increased risk of current mental illness ($p<0.001$) and activity participation with lower current mental illness (sports, $p<0.001$; community/social groups, $p=0.001$). Figures 25 and 26 show the adjusted proportion of participants at each ACE level reporting current mental illness based on activity participation. There were no significant differences in the impacts of activity participation across ACE groups.

Figure 23: Proportion regularly participating in sports or community/social groups, by ACE count

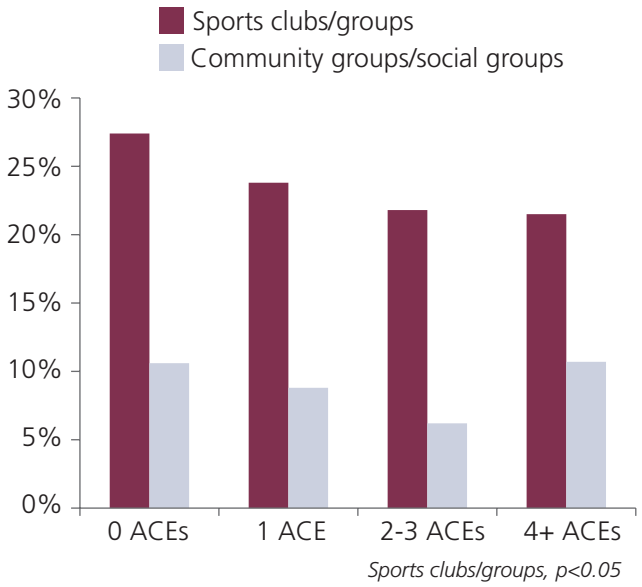


Figure 24: Proportion with current mental illness by sports and community/social group participation

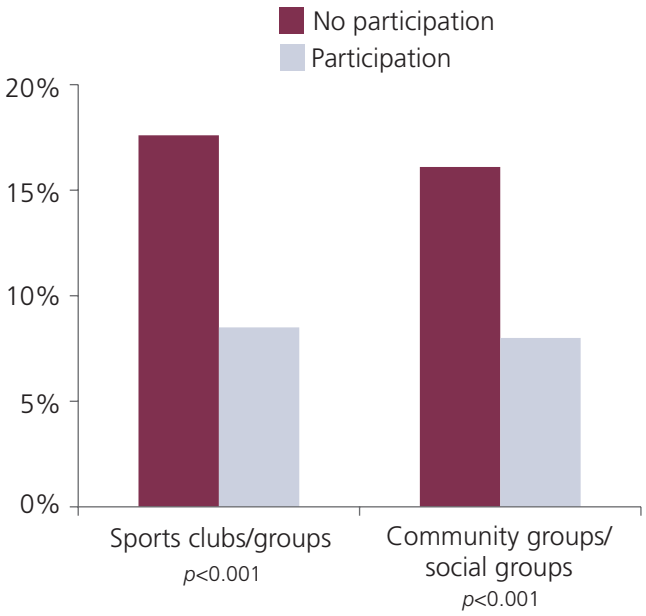
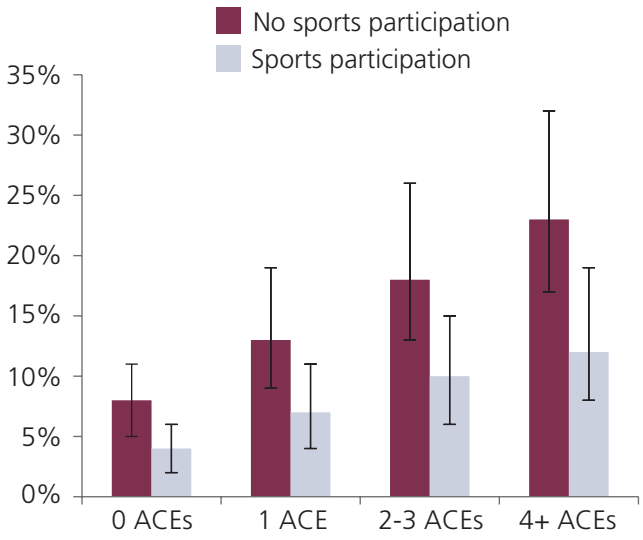


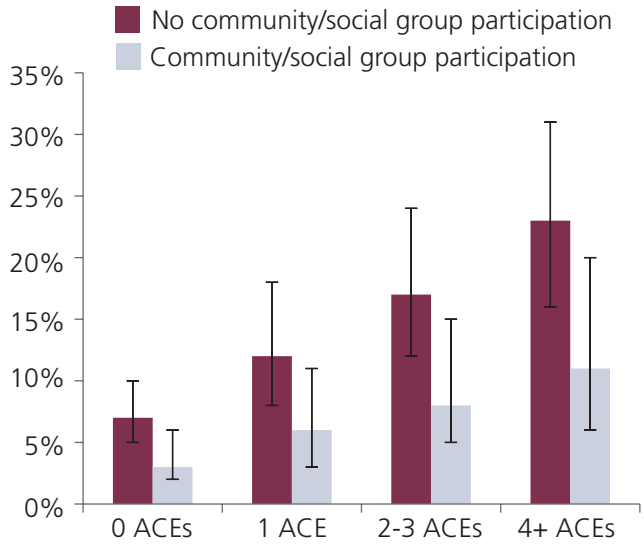
Figure 25: Adjusted proportion (95% confidence intervals) of participants reporting current mental illness by ACE count and current regular sports participation



Current regular sports participation was associated with lower levels of current mental illness across all ACE levels.

Among respondents with four or more ACEs, the adjusted proportion reporting current treatment for a mental illness was almost halved (12%) in those who regularly engaged in sports compared with those who did not (23%).

Figure 26: Adjusted proportion (95% confidence intervals) of participants reporting current mental illness by ACE count and current regular community group/social club participation



Current regular community group/social club participation was associated with lower levels of current mental illness across all ACE levels.

Among respondents with four or more ACEs, the adjusted proportion reporting current treatment for a mental illness was halved (11%) in those who regularly engaged in community group/social clubs compared with those who did not (23%).

5.3. Perceptions of service supportiveness

Participants were asked how supportive they thought selected public services and their employer (where applicable) would be if they required help from them *(see Box 8)*. Response options were *not at all*, *a little supportive* and *very supportive*. Across all respondents, the proportions perceiving services as being very supportive were: 71.4% for health services; 60.0% for police; 59.5% for charities and voluntary organisations; 53.9% for mental health services; and 48.8% for social services *(see Appendix Table A11)*. Employers were highly endorsed as being *very supportive* by those for whom this option was applicable (73.7%).

Individuals with higher ACE counts had lower expectations of services and employers being supportive *(*$p<0.001$; *Appendix Table A11)*. For example, the proportion perceiving that health services would be *very supportive* fell from 76.0% in those with no ACEs to 60.6% in those with four or more ACEs. Figure 27 compares responses for individuals with no ACEs and four or more ACEs across all services and employers.

There were no relationships between current mental illness and expectations of health or mental health services being supportive. For other services (including employers), those who expected they would be either *very* or *a little supportive* had lower risk of mental illness than those who expected they would be *not at all supportive*.

Box 8: Perceptions of service supportiveness

In general, if you needed help from the following, how supportive do you think they would be?

Response options: *not at all; a little supportive; very supportive*

Health services

Social services

Police

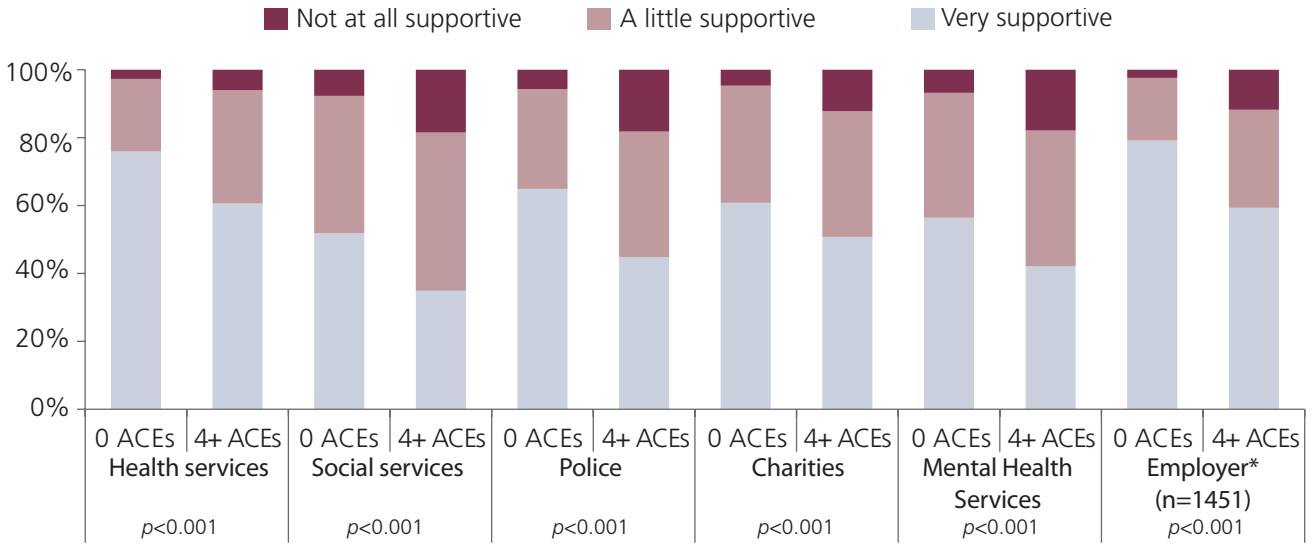
Charities/voluntary organisations

Your employer^

^Limited to those for whom this question was applicable.

Separate multivariate analyses (controlling for socio-demographics) were run for social services, police, charities and voluntary organisations and employers to explore the relationships between expected supportiveness (*not at all supportive* versus *very* or *a little supportive*), ACEs and current mental illness. In all analyses, higher ACE count remained significantly associated with increased levels of current mental illness ($p<0.001$) and perceiving services and employers to be supportive with lower levels of current mental illness (police, employers, $p<0.001$; Social services, charities/voluntary organisations, $p<0.01$; *See Figures 28 and 29)*. There were no significant differences in the impact of expected service supportiveness across ACE categories.

Figure 27: Perceived supportiveness of services and employers in those with 0 and 4+ ACEs



*Limited to those for whom this question was applicable.

Figure 28: Adjusted proportion (95% confidence intervals) of participants reporting current mental illness by ACE count and perceived service supportiveness

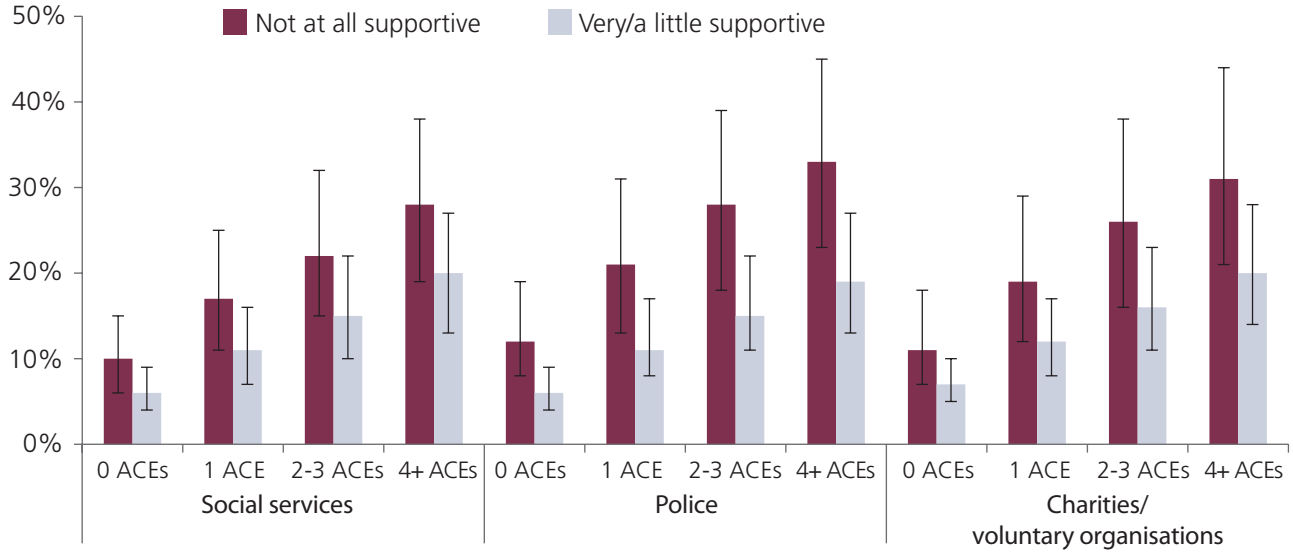
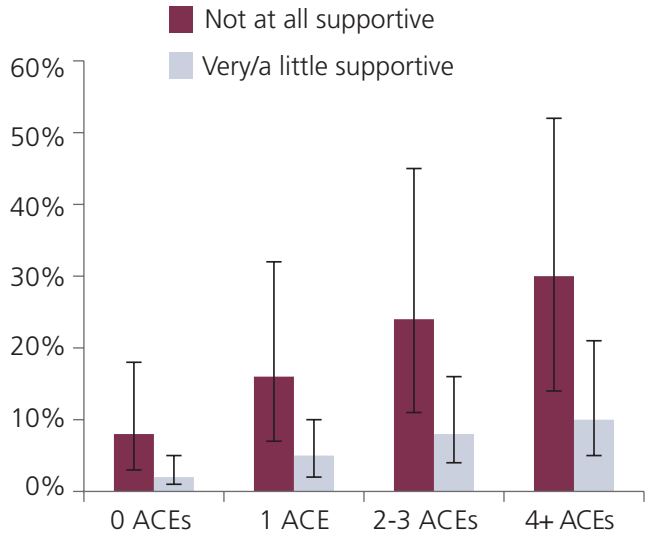


Figure 29: Adjusted proportion (95% confidence intervals) of participants reporting current mental illness by ACE count and perceived employer supportiveness (where applicable)



Perceiving social services, police, charities/ voluntary organisations and employers as supportive was associated with lower levels of current mental illness across all ACE levels.

Among those with four or more ACEs who reported on employers, the adjusted proportion reporting current treatment for a mental health condition fell from 30% in those perceiving their employer as not at all supportive to 10% in those perceiving them as very or a little supportive.

5.4. Financial security

A single question was used to gain a measure of participants' current financial security: *All things considered, how long would you say you feel financially secure for? (i.e. confident you will have enough money to pay for the essential things in life).* Financial security was strongly related to both ACE count *(Figure 30; Appendix Table A12)* and current mental illness *(Figure 31).* For example, 32.9% of individuals with four or more ACEs stated they felt financially secure for no more than one month, compared with 11.3% of those with no ACEs. The proportion reporting current mental illness increased from 8.0% of those who felt financially secure for at least five years to 31.6% of those feeling financially secure for no more than a month.

In multivariate analysis, higher ACE count remained strongly associated with increased risk of current mental illness and greater financial security with reduced risk, with no significant difference in the impact of financial security between ACE categories *(Figure 32)*.

Figure 30: Length of perceived financial security, by ACE count

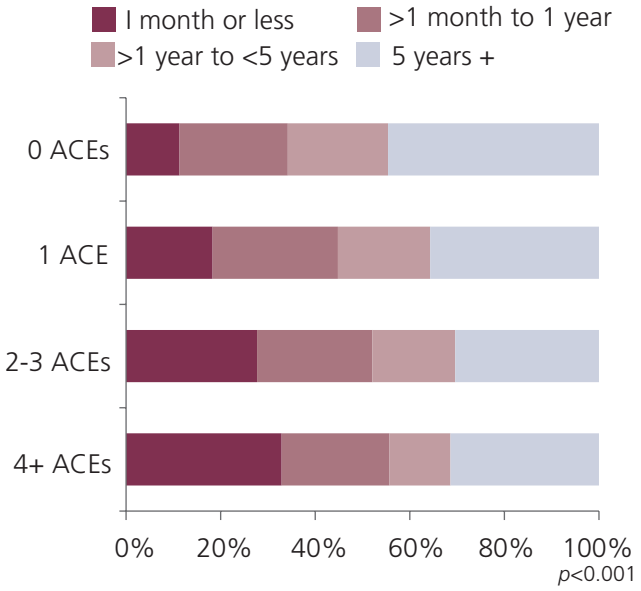


Figure 31: Proportion with current mental illness by perceived length of financial security

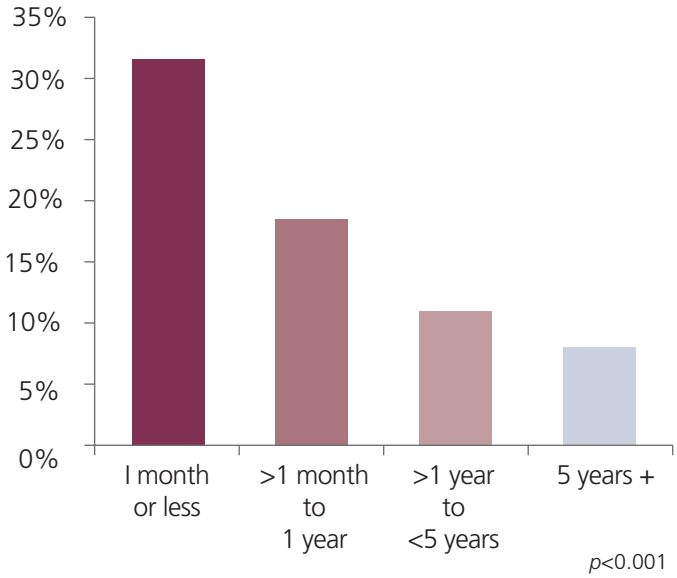
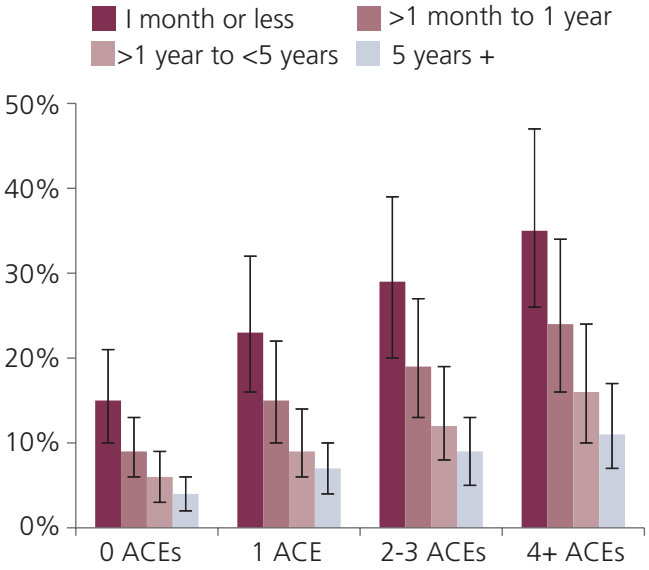


Figure 32: Adjusted proportion (95% confidence intervals) of participants reporting current mental illness by ACE count and perceived length of financial security



Longer perceived financial security was associated with lower levels of current mental illness across all ACE levels.

Among respondents with four or more ACEs, the adjusted proportion reporting current treatment for a mental illness was two thirds lower (11%) in those who felt financially secure for five or more years than in those who only felt financially secure for a month or less (35%).

5.5. Community culture and traditions

A number of questions measured aspects of community culture and traditions, including Welsh language *(see Appendix Table A13)*. While those with stronger cultural connectedness tended to report fewer ACEs *(Appendix Table A13)*, there were no associations between most questions and current mental illness. However, a question drawn from the RRC-ARM *(see Section 5.1)* showed a strong relationship with both ACEs and mental illness ($p<0.001$): ***To what extent do the statements below describe you? I enjoy my community's culture and traditions.*** Thus, further analyses focus on this question.

Figure 33 shows the relationship between enjoyment of community culture and traditions and ACE count. The proportion of participants reporting current mental illness increased as enjoyment of community culture and traditions decreased *(Figure 34)*. For multivariate analysis, the two most negative responses *(not at all* and *a little)* were combined. Enjoying community culture and traditions was associated with lower levels of current mental illness, with no significant difference in impact across ACE categories *(Figure 35)*.

Figure 33: Responses to the statement I enjoy my community's cultures and traditions, by ACE count

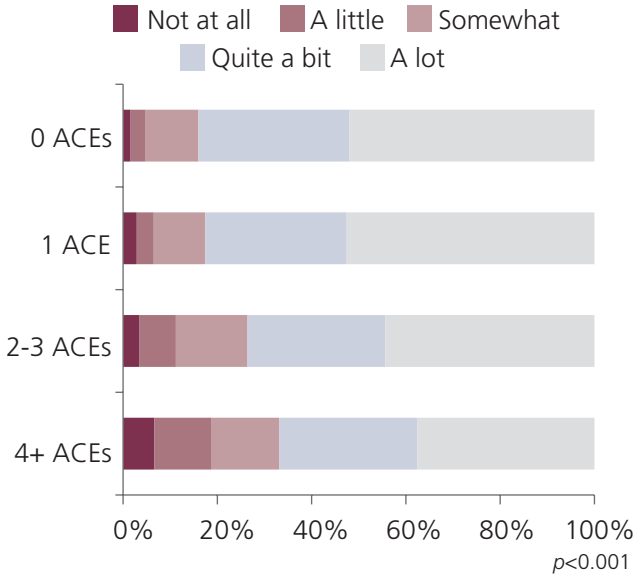


Figure 34: Proportion with current mental illness by response to the statement I enjoy my community's cultures and traditions

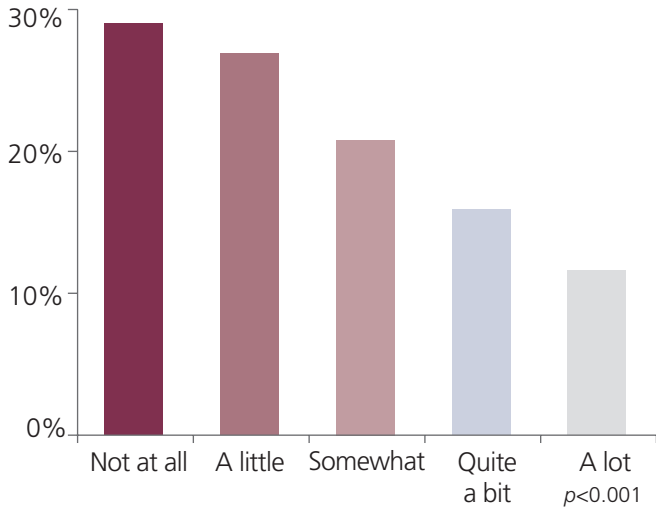
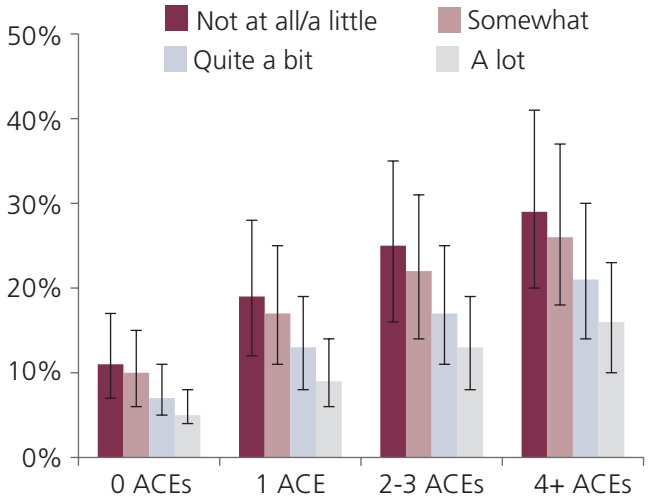


Figure 35: Adjusted proportion (95% confidence intervals) of participants reporting current mental illness by ACE count and response to the statement I enjoy my community's cultures and traditions



Enjoyment of community culture and traditions was associated with lower levels of current mental illness across all ACE levels.

Among those with four or more ACEs, the adjusted proportion with current mental illness reduced from 29% in those with the lowest levels of enjoyment to 16% among those who enjoyed their community's cultures and traditions a lot.

6 Discussion

Prevalence of ACEs

The Welsh ACE and Resilience Survey provides reassurance for the measurement of childhood adversity among adults in Wales. While some variation in reports of individual ACEs between surveys is expected, findings are generally consistent between survey waves. In the first ACE survey, 46.7% of all adults in Wales reported at least one of the nine ACEs measured and 13.5% reported four or more (Bellis et al, 2015; *see Box 2).* In this second survey, based on the same nine ACEs, 49.2% of all adults reported at least one ACE and 12.0% four or more. Including the two additional neglect ACEs in 2017 made little difference to the overall ACE prevalence, with 50.0% of all adults reporting at least one ACE and 13.5% reporting four or more.

Neglect

Population level ACE surveys both in Wales and elsewhere have often not included neglect due to difficulties in measuring this complex issue using brief retrospective questions. However, the exclusion of neglect has led to concerns that it is being overlooked in national work to address ACEs. Therefore, in the Welsh ACE and Resilience Survey we adapted two questions measuring physical and emotional neglect which have recently been developed by the World Health Organization (*see Box 3*; Meinck et al, 2016). Reported prevalence was 4.3% for physical neglect and 7.1% for emotional neglect. However, approximately three quarters of those who reported either form of childhood neglect reported multiple (i.e. four or more) ACEs *(see Section 3.1 and Figure 4)*. This suggests that neglect is indicative of highly complex childhood environments and that children who are (or adults who were) neglected are likely to face a multitude of adversity and therefore be at particularly increased risk of poor outcomes.

Mental illness

The Welsh ACE and Resilience Survey estimates that 16% of 18-69 year olds in Wales are currently receiving treatment for depression, anxiety or another mental illness *(see Section 3.3)*. This is in line with findings from the Welsh Health Survey (2015), which found that 13% of all individuals aged 16 and over were receiving treatment for a mental illness (Welsh Government, 2016b). The Welsh ACE and Resilience Survey also estimates that one in three adults have received treatment for a mental illness at some point in their lives, that 14% have ever felt suicidal and that 6% have self-harmed. Mental illness has devastating effects on individuals, families and society and places an enormous burden on health services (Friedli and Parsonage, 2009; World Health Organization, 2016). Good mental health is a fundamental requirement for prosperity and in recognition of this, improving mental health is one of the five key priorities of the national strategy for Wales (Welsh Government, 2017).

Mental illness and ACEs

While the first ACE survey demonstrated how ACEs affected general mental well-being (Ashton et al, 2016a), this survey has identified the strong relationships between ACEs and mental illness in Wales *(see Section 3.3)*. The more ACEs people suffered in childhood, the greater their risks of all mental illness outcomes. Compared with individuals with no ACEs, those reporting four or more were more than three times more likely to be currently receiving treatment for a mental illness, six times more likely to have ever received such treatment, and nine times more likely to have ever felt-suicidal or self-harmed. These findings are consistent with a large body of international research that identifies childhood adversity as being among the strongest predictors of poor mental health across the life course (Hughes et al, 2016; Hughes et al, 2017; Kessler et al, 2010). The key theory underlying the ACE framework is that childhood trauma has negative impacts on childhood brain and physiological development (Anda et al, 2010; Broyles

et al, 2012; Danese and McEwen, 2012; Teicher and Samson, 2016). Thus, chronic stress in childhood can lead to over-development of the life preserving parts of the brain, affecting people's ability to cope with stress, relax, manage their own emotions and read emotions in others. Abusive and inconsistent care-giving environments can also lead to under-development of critical social and emotional functions such as trust, empathy, co-operation and self-esteem. All of these factors can affect individuals' ability to form relationships, engage in communities and feel good about themselves.

The strong relationships between ACEs and mental illness indicate how important preventing ACEs and supporting those affected by them is in improving population mental health. Seven in ten survey participants who were currently receiving treatment for a mental illness reported having suffered at least one ACE and over one in four reported four or more ACEs. This is consistent with studies elsewhere which show high levels of childhood adversity among individuals receiving treatment for mental illness (e.g. Read et al, 2008). Despite this, studies also suggest that most people who access mental health services are never asked about child abuse or neglect (Read et al, 2017). Understanding the childhood history of individuals in mental health services is likely to be an important part of identifying appropriate treatment options.

Resilience

While a range of definitions exist, resilience can be thought of simply as the ability to cope, adapt positively to and recover from adversity (Rutter, 1985). While ACEs can damage individuals' life potential, a substantive subset of people who suffer ACEs avoid in part or entirely the negative health and social outcomes associated with them (Khanlou and Wray, 2014). Emerging evidence suggests a range of factors can help individuals develop resilience during childhood, including: the availability of at least one stable, caring and supportive relationship between a child and an important adult in their life; strong links with cultural traditions; better developed self-regulation skills; and a sense of having control over personal circumstances (National Scientific Council on the Developing Child, 2015; Zolkoski and Bullock, 2012). These types of personal, relationship, community and cultural resilience resources can be important across the life course in promoting mental health. Understanding which resiliency resources protect against the harmful effects of ACEs in Wales has been the focus of this second ACE survey. The survey found strong relationships between many of the childhood and adult resilience resources measured and both ACEs and mental illness. Individuals with more ACEs had lower resilience resources in both childhood and adulthood; and individuals with lower childhood and adult resilience resources had higher levels of mental illness. Resilience resources were associated with lower levels of mental health both in those with ACEs and those without them. This suggests that strategies to build individual and community resilience would support mental health across all sectors of the population.

Childhood resilience resources

Using the CYRM to measure childhood resilience across multiple domains[6], the survey found that childhood resilience had a strong protective effect against mental illness in both those with ACEs and those without them. Among individuals with four or more ACEs, for example, modelled levels of current mental illness fell from 29% in those with low childhood resilience to less than half this level (14%) in those with high childhood resilience. Similar effects were seen for lifetime measures of mental illness. Overall, the adjusted prevalence of lifetime mental illness fell from 60% in those with four or more ACEs and low childhood resilience to 14% in those with no ACEs and high childhood resilience. This indicates the substantial mental health gains that could be made by preventing ACEs and building resilience in future generations. Measures to build resilience in childhood can be implemented universally, such as through school-based social and emotional development curricula. However, the more ACEs individuals had, the less likely they were to report all forms of childhood resilience, suggesting that children who suffer ACEs are less well

[6] Personal, relational and contextual; Child and Youth Resilience Measure.

placed to access or develop resilience resources. Thus, children affected by ACEs are likely to require more focused resilience building interventions tailored to their particular needs and offering essential support that may not be available from within the family environment (Ungar, 2013). Further, over 40% of those with four or more ACEs and high childhood resilience had required treatment for a mental illness at some point in their lives. While building resilience may help protect those who suffer ACEs from their harmful effects it cannot be expected to completely counteract them, and preventing ACEs must remain the key priority.

Having at least one trusted, stable and supportive relationship with an adult is emerging in international literature as one of the most important aspects of childhood resilience (Affifi and Macmillian, 2011; Bellis et al, 2017; Marriott et al, 2014). In this survey, having a trusted adult relationship in childhood was associated with lower levels of current mental illness but not lifetime mental illness or having ever felt suicidal or self-harmed. A possible explanation for this could be that trusting adult relationships in childhood provide a level of protection against ongoing mental illness – i.e. support recovery from mental illness. However, the inclusion of neglect as an ACE in analyses may also have obscured associations between trusted relationships, ACEs and mental illness. Similar effects were seen for constant parental support during childhood, which lowered current but not lifetime levels of mental illness. Also, these initial analyses identified little benefit to those without parental support from the continued support of other adults. Further analysis will be required to explore the links between childhood relationships and the harmful impacts of ACEs. However, findings suggest that those with good relationships within the family can be best placed to take advantage of other support outside it. ACEs can affect children's trust, communication skills and self-esteem and such effects may hamper their ability to form positive relationships with both adults and peers. Schools and communities have essential roles in creating opportunities for children affected by ACEs to develop personal and relationship skills as well as positive friendships.

Of childhood activities measured, only regular participation in sports showed a protective effect against mental illness. Among those with four or more ACEs, the adjusted proportion reporting current mental illness fell from 25% of those who did not regularly participate in childhood sports to 19% in those who did. It is not possible from this survey to explore whether participation in sports builds resilience in children or whether children with greater resilience are more attracted to sports. However, there is a wealth of research identifying the benefits of sports participation to mental health both in childhood and adulthood (Eime et al, 2013) and examples of how sports participation can provide psychological focus and support for children growing up in difficult environments (Massey and Whitley, 2016). The relationships found here for the Welsh population suggest increased sports participation should be further explored as a means of developing resilience and protecting mental health. The joining of remits for Sports Wales and Public Health Wales in delivering Wales' physical activity agenda creates opportunities for this work.

Adult resilience resources

As with childhood resilience, individuals with higher ACE counts had lower overall adult resilience (measured by the RRC-ARM, *see Section 5.1*) and higher adult resilience was protective against current mental illness (analyses were not conducted for lifetime mental illness outcomes). In individuals with four or more ACEs, the adjusted proportion reporting current mental illness was almost two thirds lower in those with high adult resilience (13%) than in those with low adult resilience (37%). In addition to overall adult resilience, lower levels of current mental illness were associated with regular sports participation; regular participation in social clubs/community groups; enjoying community culture and traditions; longer perceived financial security; and higher perceived support from some public services and employers. Being connected and active are among the activities promoted by the five ways to well-being as actions that individuals can take to improve their personal mental health (Aked et al, 2008). However, with ACEs affecting aspects such as self-motivation, confidence, mental well-being and physical health, adults affected by ACEs may be less well placed to implement such actions. Ensuring opportunities for social connectivity and activity are inclusive and accessible; understanding that disproportionate efforts may

need to be made to engage those with a history of ACEs; and supporting the development of other adult resilience resources may be particularly important for individuals with a history of childhood adversity.

Feeling financially secure had a strong protective effect against mental illness in those with (and without) ACEs, as did the perceived supportiveness of employers (where applicable). Among respondents with four or more ACEs, for example, the adjusted proportion reporting current treatment for a mental illness was two thirds lower (11%) in those who felt financially secure for five or more years than in those who only felt financially secure for a month or less (35%). Thus, for individuals who suffer complex childhood experiences, providing opportunities to obtain secure, quality employment is likely to proffer substantial mental health benefits. Research has highlighted the detrimental impact that unemployment and experiencing redundancy can have on an individual's mental health and well-being, which extends to children within the family unit (Davies et al, 2017).

In addition to employers, individuals with higher ACE counts were less likely to believe that public services would be supportive if they needed help from them. This may reflect previous negative experiences with services, or lower expectations and trust among those who grew up in unsupportive or abusive childhood environments (Farley et al, 2002). The perceived supportiveness of police, social services and voluntary or charitable organisations was also related to mental illness, although the perceived supportiveness of health or mental health services was not; possibly indicating higher levels of contact with health and mental health services among individuals with mental illness. Rather than perceptions of service support being seen solely as a protective factor, this finding identifies a challenge in how services can best engage with and support those who have suffered ACEs. Building confidence and demonstrating service supportiveness is likely to be an important aspect of delivering ACE-aware public services.

Conclusion

In this report we have sought to explore the associations between ACEs, resilience and the development of mental illness over the life course. Findings identify the strong relationships between ACEs and mental illness in Wales and the potential benefits of building resilience to protect those who suffer ACEs from developing mental illness; as well as improving mental health more broadly across the population. It should be noted that results from this survey alone cannot establish cause and effect between resilience resources and mental health. We recognise that causality is likely to run in both directions and are interested in exploring the opportunities for resilience to prevent mental illness. Work needs to be undertaken to identify which interventions can work to build resilience in Wales and to ensure that effective programmes are implemented alongside primary prevention approaches such as those to promote positive parenting and change social norms that support violence. Further, if individuals who have experienced multiple ACEs have poorer mental health, less social support and lower expectations of support from services they may be the hardest to engage in resilience-building activities. This is an essential challenge that must be recognised as ACE-informed services develop across Wales. Finally, despite reductions in mental illness associated with both childhood and adult resilience, such resilience resources do not completely counteract the effects of ACEs. Consequently, preventing ACEs is critical along with appropriate support for those who develop problems relating to childhood adversity.

6.1. Conclusions

1. **ACEs are common and represent a significantly increased risk of mental ill health across the life course.** Preventing ACEs and supporting those affected by them is vital in improving population mental health. Health and other public service staff should be educated on the impact of ACEs as an essential part of the development of ACE-informed public services.

2. **Childhood resilience moderates the increased risks to mental health from ACEs.** Personal, relationship and community resilience resources such as social and emotional skills, childhood role models, peer support, connections with school, understanding how to access community support, and a sense that your community is fair to you are strongly linked to reduced risks of mental illness across the life course. High childhood resilience is related to substantial reductions in lifetime mental illness and potentially offers protections even in those with no ACEs.

3. **Public sector support for social and emotional skills development, activities that create connectedness to schools, sign-posting children to available help, opportunities for creating friendship networks, and occasions to engage in cultural traditions should be considered investments in children's lifelong mental health.** While more information is required on the cause and effects of these resources on mental health, reductions in provision of these community facilities may have long-term repercussions for population mental health and especially affect those with high levels of childhood trauma.

4. **There are strong relationships between sports participation in childhood and lower lifetime mental illness. There are also associations between regular adult participation in sports and current mental illness.** While much attention has been paid to the cardiovascular and weight reduction potential of sports participation, its impact of friendship opportunities, benefits to mental health, access to role models and the other aspects of resilience that engagement in sports facilitates needs to be factored into its benefits and further understood.

5. **Access to sources of resilience in adulthood continues to be associated with lower levels of current mental illness.** Along with sports, positive relationships were found with engagement in community and social groups, enjoying community culture and traditions, longer perceived financial security, and higher perceived support from public services and employers. Focus should include developing opportunities for individuals to increase their resilience resources across the life course, to offer protection from the adverse effects of ACEs as well as trauma that may occur in adulthood.

6. **Poor mental health may reduce opportunities for community engagement, while lower engagement may further impact on mental ill health.** Specific interventions may be essential to breaking this pathological cycle, especially where it is well embedded. However, developing community resilience resources and supporting those with high ACEs and low resilience at the earliest possible stages should offer a more effective mechanism to improve population well-being.

7. **Those who require the most help may be the hardest to reach. Individuals with higher ACE counts reported lower resilience resources both in childhood and as adults.** Further, individuals with higher ACE counts reported lower levels of childhood support not only from friends and relatives but also professionals (teachers, police, health professionals), and had lower perceptions of the supportiveness of services as adults. An essential part of building ACE-informed services is understanding the barriers that may be faced in engaging those who may benefit most from personal and professional support; and ensuring that those who do engage receive supportive and reliable responses that meet their needs.

8. **While resilience factors may provide some protection, they do not entirely counter the risks associated with exposure to multiple ACEs**. For all mental illness measures examined here a combination of high resilience and low ACEs provided the lowest risks of lifetime and current mental illness. Thus, primary prevention to avoid ACEs in future generations is critical in improving the mental health of the population. Focus should continue to be placed on strengthening early years, parenting and family programmes and the legislative frameworks that support them. These programmes can both reduce ACEs and support the development of resilience in children.

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Appendix 1. Methodology

The Welsh ACE and Resilience Survey – the second national ACE survey in Wales – was undertaken between March and June 2017 by Public Health Wales NHS Trust. A private market research company, BMG Research,[7] was commissioned to undertake data collection for the study. All interviewers followed the Market Research Society Code of Conduct.[8] Ethical approval was obtained from Bangor University's Healthcare and Medical Sciences Ethics Committee and research and development approval was granted by the Public Health Wales Research and Development Office.

Sample selection

A random probability sampling method was used to recruit Welsh residents aged 18-69 years to the study. To allow adequate representation of residents of Wales, a target sample size of 2,505 individuals was set, comprising a nationally representative sample of 2,010 and a Welsh language boost[9] sample of 495. The achieved sample size was 2,506 (2,012 nationally representative sample, 494 Welsh boost sample). Cases were excluded if demographic data were missing or they could not be assigned an ACE count due to missing data. Thus, the final sample for analysis was 2,497 (nationally representative sample n=2,005, Welsh boost sample n=492).

Sample selection was stratified based on Health Board area, deprivation quintile[10] and Lower Super Output Area (LSOA).[11] In order to get an equal range of deprivation areas, the study randomly selected a proportionate number of LSOAs across each deprivation quintile within each health board (134 nationally representative and 33 Welsh boost LSOAs were sampled). This approach ensured that selected LSOAs were broadly representative of the geo-demographic diversity of each area. Addresses were sampled using the postcode address file,[12] with 45 households randomly selected for inclusion across each LSOA.

Recruitment

Letters were sent to the randomly selected households, providing information on the study and instructions if the household wished to opt out of the research (i.e. not participate). Households which had not opted-out of the study were then visited by trained and eligible residents were invited to participate in the study via a face-to-face interview. Recruitment continued until the target sample had been achieved. For quality assurance, a sub set of interviews were accompanied by researchers from Public Health Wales. Household visits were made on all days of the week between the hours of 9:00 am and 8:00 pm. Only one individual from each household was eligible to participate in the study. The study inclusion criteria were:

- Welsh resident
- Aged 18-69 years
- Cognitively able to participate.

To ensure informed consent for participation, household members were presented with an information sheet on contact, which outlined the purpose of the study, what the results would be used for and the confidentiality and anonymity of the research. It was outlined to all potential participants that participation was voluntary and that they were able to withdraw at any point during the interview. If the participant

[7] More information on BMG Research can be found on their web pages: www.bmgresearch.co.uk.

[8] https://www.mrs.org.uk/standards/code_of_conduct.

[9] Resident in areas with higher spoken Welsh language, defined as having 40% or more Welsh speaking residents. Data: Census 2011.

[10] Using the Welsh Index of Multiple Deprivation (WIMD, Welsh Government, 2015).

[11] An LSOA is a geographic area with approximately 1500 residents (between 400-1,200 households).

[12] For more information on the PAF see: http://www.royalmail.com/business/services/marketing/data-optimisation/paf.

was ineligible to take part, the household member with the next birthday was asked to participate, thus ensuring the random selection of an individual within the home. Potential participants were also given the option for the interviewers to call back at a date or time more suitable to them. Addresses were visited up to five times before being removed from the sample and a record of contact was retained. No personal identifiable details were collected from the individual at any stage during the recruitment process or interview.

All materials were available in Welsh and English and a bilingual helpline was provided for residents to call if they had any queries or wished to opt out of the survey. All individuals were given the option to complete the interview in Welsh, and where possible translators for other languages were arranged.

Participation rate

7,515 letters were mailed out to households and 887 households (11.8%) opted-out of taking part in the research at this stage. Contact was made with 4,042 households, of which 645 were ineligible. Of the 3,397 eligible households, 888 declined to take part in the research (26.1%) and three interviews could not be completed,[13] with the remaining 2,506 households completing a study questionnaire. Thus, of known occupied eligible households visited, the completion rate was 73.8% and 58.5% when including those opting out at the letter stage.

Questionnaire

The study used a revised version of the questionnaire from the first Welsh ACE survey. It included an established tool to measure the prevalence of ACEs developed by the United States Centers for Disease Control and Prevention. Two additional questions measuring physical and emotional neglect were included, adapted from the World Health Organization's Short Child Maltreatment Questionnaire (Meinck et al, 2016). Questions used to identify all 11 ACEs measured by the study are provided in Table i. Data on resilience resources was obtained from various questions described in the methodology and findings sections of this report. Data were also collected on the issues outlined in Table ii. In addition, basic demographics, including: gender, age, length of residency in Wales, ethnicity, and education, employment and marital status were enquired about.

The interview was completed using Computer Assisted Personal Interviewing, with Computer Assisted Self Interviewing used for the more sensitive sections of the questionnaire. Respondents were also given the option to complete the survey on paper. On completion, individuals were provided with a thank you leaflet which contained contact details for relevant help-lines in Wales and for the research team for further information regarding the study. On average, interviews took 17 minutes to complete.

[13] Efforts were made to ensure that language was not a barrier to individuals completing the questionnaire. However, in three instances, the language of the household member was uncommon or interviewers were unable to return to the household before the quota for that LSOA was completed, thus an interview was not completed within a household due to language.

Table i: ACEs enquired about in the study

ACE	Question All ACE questions were preceded by the statement "While you were growing up, before the age of 18…"	Response indicating ACE
Parental separation	Were your parents ever separated or divorced?	Yes
Domestic violence	How often did your parents or adults in your home ever slap, hit, kick, punch or beat each other up?	Once or more than once
Physical abuse	How often did a parent or adult in your home ever hit, beat, kick or physically hurt you in any way? This does not include gentle smacking for punishment	Once or more than once
Verbal abuse	How often did a parent or adult in your home ever swear at you, insult you, or put you down?	More than once
Sexual abuse	How often did anyone at least 5 years older than you (including adults) ever touch you sexually?	Once or more than once to any of the three questions
	How often did anyone at least 5 years older than you (including adults) try to make you touch them sexually?	
	How often did anyone at least 5 years older than you (including adults) force you to have any type of sexual intercourse (oral, anal or vaginal)?	
Physical neglect	Did your parent/caregiver for long periods of time not provide you with enough food or drink, clean clothes or a clean and warm place to live when they could have?	Once or more than once
Emotional neglect	Were there times when there was no adult living with you who made you feel loved?	More than once
Mental illness	Did you live with anyone who was depressed, mentally ill or suicidal?	Yes
Alcohol abuse	Did you live with anyone who was a problem drinker or alcoholic?	Yes
Drug abuse	Did you live with anyone who used illegal street drugs or who abused prescription medications?	Yes
Incarceration	Did you live with anyone who served time or was sentenced to serve time in a prison or young offenders' institution?	Yes

Sample characteristics

Table iii shows the demographics of participants in the national sample in comparison to the Welsh population. The sample varied from national population demographics by gender and age, with more females participating, more residents from the oldest age group and fewer residents from the youngest age group. There were no significant differences by residential deprivation or ethnicity. Table iv shows the demographics for all samples with comparison between the national and Welsh boost samples.

Table ii: Topics included in the questionnaire

Health and lifestyle	Current and childhood self-rated health status
	Childhood health conditions/symptoms
	Smoking and e-cigarette use
	Problem alcohol use
	Illicit drug use
	Current and lifetime mental health
	Lifetime self-harm or suicide
	Violence perpetration and victimisation
	Lifetime incarceration
	Experience of homelessness
	Childhood school attendance
Healthcare utilisation	How often visited GP and A&E
	Number of hospital stays in last 12 months
Living in Wales	National identity
	Welsh attachment/belonging
	Welsh language
	Financial security
	Perceptions of services
Resilience	Resiliency resources in childhood and adulthood
	Social and recreational activities in childhood and adulthood
	Supportive adult relationships
ACE enquiry	ACE enquiry by professionals

Calculation of ACE count

Thirteen questions covering 11 ACEs experienced by the individual when they were under the age of 18 years were included in the questionnaire *(see Table i)*. From this score, a person's ACE count was calculated outlining the number of different types of adverse events they experienced (range 0 to 11). The count does not account for the duration of events or reoccurring events. Consistent with other surveys ACE counts were classified into four cohorts:

- No ACEs (n = 1281)
- One ACE (n = 478)
- Two or three ACEs (n = 403)
- Four or more ACEs (n = 335).

Table iii: Demographics of the national sample and comparison with the Welsh national population* (aged 18-69 years)

		National sample		General population			
		n	%	n	%	X^2	p
Sex	Male	924	46.1	1,014,003	50.3		
	Female	1081	53.9	1,028,108	49.7	5.180	0.023
Age group	18-29	374	18.7	488,050	23.9		
	30-39	375	18.7	352,640	17.3		
	40-49	416	20.7	403,981	19.8		
	50-59	409	20.4	416,832	20.4		
	60-69	431	21.5	380,608	18.6	18.639	0.001
Deprivation quintile	1 (least deprived)	421	21.0	401,819	19.7		
	2	387	19.3	416,323	20.4		
	3	410	20.4	424,490	20.8		
	4	403	20.1	406,247	19.9		
	5 (most deprived)	384	19.2	393,232	19.3	1.526	0.822
Ethnicity	White	1925	96.0	1,943,973	95.6		
	Other	80	4.0	89,539	4.4	0.398	0.528

*LSOA population estimates mid-2015 (ONS, 2016) and the 2011 Census for Ethnicity.

Table iv: Full sample demographics and comparison between national sample and boost sample

		Full sample		National sample		Boost sample			
		n	%	n	%	n	%	X^2	p
Sex	Male	1132	45.3	924	46.1	208	42.3		
	Female	1365	54.7	1081	53.9	284	57.7	2.312	0.128
Age group	18-29	447	17.9	374	18.7	73	14.8		
	30-39	459	18.4	375	18.7	84	17.1		
	40-49	501	20.1	416	20.7	85	17.3		
	50-59	514	20.6	409	20.4	105	21.3		
	60-69	576	23.1	431	21.5	145	29.5	17.221	0.002
Deprivation quintile	1 (least deprived)	468	18.7	421	21	47	9.6		
	2	523	20.9	387	19.3	136	27.6		
	3	627	25.1	410	20.4	217	44.1		
	4	481	19.3	403	20.1	78	15.9		
	5 (most deprived)	398	15.9	384	19.2	14	2.8	198.381	<0.001
Ethnicity	White	2407	96.4	1925	96.0	482	98.0		
	Other	90	3.6	80	4.0	10	2.0	4.357	0.037

Data analysis

Data analysis was undertaken using IBM SPSS Statistics v23. Analyses used chi-squared to measure unadjusted relationships between ACEs, demographics, resilience measures and mental illness, and logistic regression to identify associations between resilience variables and mental illness outcomes after controlling for participants' gender, age group, ethnicity and quintile of residential deprivation (termed socio-demographics). The protective effects of resilience factors on mental illness in different ACE categories were explored using generalized linear modelling (controlling for socio-demographics), with estimated marginal means providing adjusted proportions of individuals in the sample that reported mental illness based on their resilience at each ACE level. It should be noted that this is an association and does not imply causation.

Final estimates of the prevalence of ACEs in Wales (using the national sample) have been modelled using mid-2015 population estimates for LSOAs by sex, age group (Office for National Statistics, 2016) and WIMD (Welsh Government, 2015). Ethnicity was excluded as no data for current national estimates are available in Wales.

Limitations

The findings from this study should be considered in light of several limitations. As participation in the survey was voluntary, it is not possible to identify or exclude any bias created by refusal to participate. Data were self-reported and in the case of childhood resilience and ACEs retrospective, and therefore are vulnerable to recall capacity, subjectivity and accurate reporting. However, answers to sensitive questions were provided by participants privately (using computer assisted self-interviewing) and ACE prevalence reported in this study was similar to that recorded through other national studies (Bellis et al, 2015; Hughes et al, 2016). There were some differences between the national sample and demographics of the Welsh population *(see Sample characteristics)*; although these were adjusted for in calculating national prevalence rates. By categorising resilience scale measures (CYRM and RRC-ARM scales) we may have missed some relationships that could have been present within categories or within individual elements combined in the composite resilience measure. Finally, while the data suggest resilience moderates the increased risks to mental health from ACEs, causality between outcomes cannot be established.

Table A1: Demographic breakdowns for individual ACEs and ACE count (full sample, unadjusted)

		Child abuse				Neglect		Household dysfunction					ACE count			
		Parental separation	Verbal abuse	Physical abuse	Sexual abuse	Emotional	Physical	Mental illness	Domestic violence	Alcohol abuse	Incarceration	Drug abuse	0	1	2-3	4+
All	%	23.6	19.7	15.7	7.4	7.6	4.1	17.1	16.6	12.6	4.0	5.5	51.3	19.1	16.1	13.4
	n (total sample size)	2496	2497	2497	2496	2497	2497	2497	2497	2497	2497	2497				
Sex	Male	21.2	19.9	17.0	3.8	6.7	3.2	14.2	15.6	10.6	3.9	5.7	53.7	18.9	15.5	11.9
	Female	25.7	19.5	14.6	10.3	8.3	4.8	19.5	17.4	14.3	4.0	5.3	49.3	19.3	16.7	14.7
	X^2	6.812	0.059	2.659	38.733	2.165	4.326	12.098	1.447	7.623	0.033	0.261				6.425
	p	0.009	0.808	0.103	<0.001	0.141	0.038	0.001	0.229	0.006	0.856	0.610				0.093
Age group	18-29	41.4	23.0	14.3	5.8	6.5	4.9	25.5	13.2	17.4	5.4	8.9	40.9	22.1	19.7	17.2
	30-39	31.2	19.8	14.2	5.9	7.2	3.9	19.2	15.9	12.6	4.8	8.5	47.7	19.4	18.3	14.6
	40-49	23.4	24.8	20.8	9.2	10.0	5.8	16.4	21.2	15.2	4.4	7.0	48.9	18.0	16.8	16.4
	50-59	17.3	20.6	18.1	8.2	7.4	3.7	15.0	20.6	12.1	3.7	2.7	53.5	16.7	16.3	13.4
	60-69	9.7	11.6	11.3	7.5	6.8	2.4	11.5	12.3	7.1	2.1	1.6	62.3	19.8	10.9	6.9
	X^2	165.439	35.265	21.905	5.985	5.552	8.762	38.407	24.994	28.375	8.834	45.194				70.530
	p	<0.001	<0.001	<0.001	0.200	0.235	0.067	<0.001	<0.001	<0.001	0.065	<0.001				<0.001
Deprivation quintile	1 (least deprived)	17.8	15.6	11.3	6.4	6.0	2.8	13.2	10.7	10.0	1.5	3.0	57.5	20.9	12.2	9.4
	2	16.1	18.2	15.1	6.1	6.5	4.0	16.4	15.9	10.7	2.1	3.8	56.8	15.7	16.6	10.9
	3	25.0	19.6	16.3	7.5	8.5	3.3	17.2	17.1	13.4	4.1	4.8	50.4	19.9	16.4	13.2
	4	27.7	21.2	18.3	8.1	9.4	6.2	17.7	18.9	12.1	6.2	7.5	46.2	20.4	17.9	15.6
	5 (most deprived)	33.4	24.6	17.3	9.0	7.3	4.3	21.6	21.1	17.6	6.3	9.3	44.5	18.8	17.6	19.1
	X^2	51.593	12.562	10.334	3.882	5.476	8.635	10.881	19.816	13.947	24.440	23.845				42.878
	p	<0.001	0.014	0.035	0.422	0.242	0.071	0.028	0.001	0.007	<0.001	<0.001				<0.001
Ethnicity	White	24.1	19.7	15.5	7.4	7.6	4.2	17.3	16.5	12.7	4.1	5.6	51.0	19.3	16.2	13.5
	Other	11.1	18.9	20.0	6.7	7.8	1.1	11.1	21.1	10.0	1.1	2.2	58.9	14.4	14.4	12.2
	X^2	8.117	0.035	1.332	0.068	0.006	2.107	2.363	1.359	0.579	1.997	1.919				2.390
	p	0.004	0.851	0.248	0.794	0.939	0.147	0.124	0.244	0.447	0.158	0.166				0.496
Sample	National sample	24.2	19.5	15.3	7.0	7.2	4.4	17.3	16.5	12.7	4.2	5.7	51.2	19.0	16.5	13.4
	Boost group	21.3	20.5	17.3	8.7	9.1	2.8	16.3	17.3	12.2	2.8	4.7	51.8	19.9	14.8	13.4
	X^2	1.790	0.290	1.214	1.680	2.179	2.402	0.305	0.191	0.098	2.016	0.779				0.869
	p	0.181	0.590	0.271	0.195	0.140	0.121	0.581	0.662	0.754	0.156	0.378				0.833
Prevalence adjusted to the general population		25.2	20.0	15.5	6.9	7.1	4.3	17.9	16.6	13.1	4.3	5.9	50.0	19.3	17.1	13.5

Table A2: Adjusted ACE prevalence for the nine ACEs measured in both 2015 and 2017*

	Individual ACEs									ACE count (9 ACEs)			
	Parental separation	Verbal abuse	Physical abuse	Sexual abuse	Mental illness	Domestic violence	Alcohol abuse	Incarceration	Drug abuse	0	1	2-3	4+
2015	19.7	22.8	17.5	10.4	14.1	15.7	13.6	4.9	4.6	53.4	19.6	13.5	13.5
2017	25.2	20.0	15.5	6.9	17.9	16.6	13.1	4.3	5.9	50.8	19.0	18.2	12.0

*excludes physical and emotional neglect.

Table A3: Adjusted odds ratios for mental illness in demographic and ACE count groups

		Lifetime mental illness			Current mental illness			Felt suicidal or self-harmed		
		AOR	95% CIs	p	AOR	95% CIs	p	AOR	95% CIs	p
Sex	Male	Ref								
	Female	2.139	1.782-2.567	<0.001	1.646	1.299-2.086	<0.001			ns
Age group	18-29	Ref								
	30-39	1.247	0.921-1.688	0.153	1.047	0.713-1.536	0.815			
	40-49	1.709	1.272-2.294	<0.001	1.617	1.127-2.320	0.009			
	50-59	1.681	1.254-2.255	0.001	1.759	1.229-2.519	0.002			
	60-69	1.470	1.096-1.971	0.010	0.816	0.545-1.223	0.325			ns
Deprivation quintile	1 (least deprived)	Ref								
	2	0.869	0.647-1.168	0.353	0.890	0.588-1.349	0.584	1.095	0.713-1.680	0.679
	3	1.233	0.935-1.625	0.138	1.232	0.844-1.799	0.280	1.416	0.952-2.107	0.086
	4	1.448	1.083-1.935	0.012	1.553	1.056-2.283	0.025	1.666	1.110-2.499	0.014
	5 (most deprived)	1.786	1.321-2.415	<0.001	2.690	1.842-3.928	<0.001	2.159	1.433-3.253	<0.001
Ethnicity	White	Ref								
	Other	0.371	0.206-0.668	0.001			ns			ns
ACE count	0	Ref					<0.001			
	1	1.824	1.440-2.309	<0.001	1.850	1.345-2.543	<0.001	2.169	1.514-3.107	<0.001
	2-3	3.325	2.604-4.245	<0.001	2.742	2.010-3.741	<0.001	5.397	3.906-7.456	<0.001
	4+	6.135	4.677-8.049	<0.001	3.735	2.731-5.108	<0.001	9.508	6.892-13.118	<0.001

AOR= Adjusted Odds Ratio; 95% CIs = 95% confidence intervals; Ref = Reference category; ns= Not significant.

Table A4: Bivariate relationships between mental illness and age, gender, deprivation and ethnicity (entire sample, unadjusted)

			% reporting mental illness outcome		
			Lifetime mental illness	Current mental illness	Felt suicidal or self-harmed
All	%		34.9	15.3	14.9
	n (total sample size)		2495	2492	2494
Sex	Male		25.9	11.7	14.0
	Female		42.3	18.3	15.6
		X^2	73.188	20.775	1.127
		p	<0.001	<0.001	0.288
Age group	18-29		30.9	14.5	19.5
	30-39		34.6	14.9	16.4
	40-49		39.1	19.2	15.6
	50-59		38.3	19.5	14.8
	60-69		31.4	9.0	9.5
		X^2	12.780	30.707	21.379
		p	0.012	<0.001	<0.001
Deprivation quintile	1 (least deprived)		29.7	11.1	9.6
	2		27.3	10.1	11.3
	3		34.8	13.8	14.7
	4		39.7	17.3	17.9
	5 (most deprived)		45.1	27.0	22.4
		X^2	41.767	61.732	36.920
		p	<0.001	<0.001	<0.001
Ethnicity	White		35.5	15.5	15.1
	Other		17.8	10.0	7.8
		X^2	12.010	2.017	3.715
		p	0.001	0.156	0.054
Sample	National sample		35.3	16.3	15.1
	Boost group		33.0	11.0	14.0
		X^2	0.947	8.693	0.351
		p	0.330	0.003	0.554
Prevalence adjusted to general population demographics			34.5	16.2	15.3

Table A5: Proportions of individuals with 0 ACEs and 4+ ACEs responding positively and negatively* to child CYRM** questions, and proportion reporting mental illness by CYRM response

When you were growing up, during the first 18 years of life, to what extent would the following sentences have described you? Response options: *not at all, a little, somewhat, quite a bit, a lot*		All	% within ACE category reporting CYRM response		% reporting mental illness outcome		
			0 ACEs	4+ ACEs	Lifetime mental illness	Current mental illness	Felt suicidal or self-harmed
I had people I looked up to	Negative	12.9	4.6	43.0	52.5	28.1	34.7
	Positive	87.1	95.4	57.0	32.3	13.4	12.0
Getting an education was important to me	Negative	26.9	19.7	49.2	43.6	20.7	22.3
	Positive	73.1	80.3	50.8	31.7	13.3	12.1
My parents/caregivers knew a lot about me	Negative	16.2	6.6	49.6	54.2	28.3	33.5
	Positive	83.8	93.4	50.4	31.1	12.8	11.3
I tried to finish activities that I started	Negative	15.8	10.0	32.0	50.5	24.2	26.6
	Positive	84.2	90.0	68.0	31.9	13.6	12.6
I was able to solve problems without harming myself or others	Negative	7.5	3.7	22.4	62.7	37.8	41.9
	Positive	92.5	96.3	77.6	32.6	13.4	12.6
I knew where to go in my community to get help	Negative	34.1	25.7	57.0	42.5	20.9	22.6
	Positive	65.9	74.3	43.0	31.0	12.4	10.9
I felt I belonged in my school	Negative	27.0	17.0	58.2	50.1	26.2	28.9
	Positive	73.0	83.0	41.8	29.2	11.3	9.7
My family would stand by me during difficult times	Negative	9.5	1.9	40.0	62.3	34.9	39.6
	Positive	90.5	98.1	60.0	31.9	13.2	12.3
My friends would stand by me during difficult times	Negative	12.9	7.2	34.6	55.3	29.2	33.5
	Positive	87.1	92.8	65.4	31.8	13.2	12.0
I was treated fairly in my community	Negative	14.1	6.0	43.6	59.3	30.2	34.8
	Positive	85.9	94.0	56.4	30.9	12.9	11.6
I had opportunities to develop skills to help me succeed in life	Negative	20.7	11.7	50.3	52.2	26.7	29.1
	Positive	79.3	88.3	49.7	30.3	12.3	11.2
I enjoyed my community's cultures and traditions	Negative	20.4	11.9	48.6	46.6	25.2	27.5
	Positive	79.6	88.1	51.4	31.8	12.7	11.6

*Negative=somewhat, a little, not at all; Positive=quite a bit, a lot; all differences $p<0.001$; **Child and Youth Resilience Measure.

Table A6: Proportion reporting childhood activities by ACE count

		ACE count					
	All	0	1	2-3	4+	X^2	p
School sports clubs/teams	61.7	66.7	61.3	56.1	49.6	40.125	<0.001
Sports clubs/teams outside of school	44.0	46.7	45.2	42.2	34.3	17.270	0.001
School dance/arts/drama clubs	18.9	18.3	18.8	21.6	17.6	2.523	0.471
Dance/arts/drama clubs outside of school	14.1	13.6	14.9	14.6	14.3	0.618	0.892
Cubs/Brownies/Scouts/Guides etc.	35.0	37.9	34.5	30.8	29.6	12.453	0.006
Church groups/Sunday school	31.8	35.4	30.8	25.8	26.6	18.978	<0.001
Welsh cultural events (e.g.Eisteddfodau)	13.2	14.2	15.1	10.7	9.9	8.105	0.044
Community/social clubs (e.g. youth clubs)	33.8	34.1	36.0	33.7	29.3	4.170	0.244
Volunteering	18.7	18.5	20.5	18.4	17.6	1.340	0.720
Online communities (e.g. Facebook, Twitter groups)	8.2	6.9	10.5	9.7	8.1	7.455	0.059

Table A7: Availability of trusted adult relationships in childhood by ACE count (percentage)

While you were growing up, before the age of 18, was there an adult in your life who you could trust and talk to about any personal problems? An adult is defined as someone aged 18 years and over.		ACE count					
	All	0	1	2-3	4+	X^2	p
Always	77.5	86.6	81.6	71.1	44.4		
Sometimes	15.9	10.6	14.8	20.4	31.8		
Never	6.7	2.8	3.6	8.5	23.7	328.420	<0.001

Table A8: Whether selected adult figures were important sources of personal support in childhood, by ACE count (percentage)

			ACE count					
		All	0	1	2-3	4+	X^2	p
Mother	Always	82.2	94.1	84.3	74.9	42.4		
	Sometimes	11.7	4.6	11.3	17.9	31.6		
	Never	6.2	1.3	4.4	7.2	26.0	537.053	<0.001
Father	Always	65.5	83.1	65.5	45.7	22.1		
	Sometimes	19.6	13.6	20.7	30.3	28.4		
	Never	14.9	3.3	13.8	24.1	49.6	652.185	<0.001
Other adult relative	Always	50.9	53.6	56.7	49.4	34.6		
	Sometimes	29.4	30.2	26.6	29.0	30.4		
	Never	19.7	16.2	16.7	21.6	34.9	74.317	<0.001
Teacher	Always	22.4	27.3	25.1	16.6	6.9		
	Sometimes	40.4	42.3	41.8	39.7	31.9		
	Never	37.2	30.4	33.1	43.7	61.2	139.562	<0.001
Sports coach	Always	14.0	15.2	17.4	13.6	4.8		
	Sometimes	21.7	23.8	24.3	18.4	14.0		
	Never	64.3	61.0	58.4	68.0	81.2	61.438	<0.001
Doctor/nurse*	Always	20.2	21.9	24.7	18.9	9.0		
	Sometimes	27.9	27.3	30.1	29.3	25.1		
	Never	51.9	50.7	45.2	51.9	66.0	47.463	<0.001
Religious leader	Always	11.6	13.9	12.8	8.4	4.8		
	Sometimes	16.1	18.3	15.7	13.2	11.6		
	Never	72.4	67.8	71.5	78.4	83.6	45.004	<0.001
Adult neighbour/friend	Always	24.9	27.9	28.0	20.3	14.6		
	Sometimes	34.0	35.7	32.4	35.5	28.1		
	Never	41.0	36.4	39.5	44.2	57.3	58.924	<0.001
Policeman	Always	12.0	12.8	15.7	10.9	5.1		
	Sometimes	15.2	15.7	16.5	16.6	9.6		
	Never	72.8	71.5	67.8	72.5	85.4	37.434	<0.001
Social worker	Always	3.6	3.7	4.2	3.7	2.7		
	Sometimes	5.2	4.3	5.4	5.7	8.1		
	Never	91.1	92.0	90.4	90.6	89.3	8.991	0.174

*Or other health professional.

Table A9: Proportions of individuals with 0 ACEs and 4+ ACEs responding positively and negatively* to adult RRC-ARM** questions, and proportion reporting mental illness by RRC-ARM response

To what extent do the statements below describe you? Response options: *not at all, a little, somewhat, quite a bit, a lot*		% within ACE category reporting CYRM response			% reporting current mental illness
		All	0 ACEs	4+ ACEs	
I have people I can respect in my life	Negative	7.9	5.3	15.5	28.1
	Positive	92.1	94.7	84.5	14.2
Getting and improving qualifications or skills is important to me*	Negative	35.9	38.0	35.0	17.2
	Positive	64.1	62.0	65.0[c]	14.3
My family know a lot about me	Negative	9.5	5.4	20.9	27.5
	Positive	90.5	94.6	79.1	14.0
I try to finish what I start	Negative	10.1	6.8	17.3	31.5
	Positive	89.9	93.2	82.7	13.5
I can solve problems without harming myself or others[a]	Negative	5.4	3.2	13.4	51.1
	Positive	94.6	96.8	86.6	13.2
I know where to get help in my community	Negative	23.9	21.1	34.0	21.1
	Positive	76.1	78.9	66.0	13.5
I feel I belong in my community	Negative	22.0	18.3	33.7	22.6
	Positive	78.0	81.7	66.3	13.2
My family stand by me during difficult times	Negative	6.5	2.9	19.7	34.2
	Positive	93.5	97.1	80.3	14.0
My friends stand by me during difficult times	Negative	10.0	6.3	23.9	31.2
	Positive	90.0	93.7	76.1	13.5
I am treated fairly in my community	Negative	11.9	8.4	24.1	29.3
	Positive	88.1	91.6	75.9	13.4
I have opportunities to apply my abilities in life[b]	Negative	19.2	15.5	31.9	29.8
	Positive	80.8	84.5	68.1	11.9
I enjoy my community's cultures and traditions	Negative	20.2	15.9	33.1	23.5
	Positive	79.8	84.1	66.9	13.2

*Negative=somewhat, a little, not at all; positive=quite a bit, a lot; ** Resilience Research Centre Adult Resilience Measure; [a](e.g. without using drugs or being violent); [b](like skills, a job, caring for others); [c]Relationship not significant; for all other analyses $p<0.001$.

Table A10: Proportion reporting current adult activities by ACE count

		ACE count					
	All	0	1	2-3	4+	X^2	p
Political parties, trade unions, interest groups (e.g. Environment)	5.0	5.0	3.8	5.2	6.3	2.717	0.437
Parents'/school associations/parenting groups/mums and toddlers groups	9.5	8.5	9.6	11.4	10.4	3.549	0.314
Tenants/residents groups	2.0	2.0	1.0	2.5	3.0	4.365	0.225
Education, arts or music group/evening class	9.5	9.8	8.6	8.4	11.0	2.034	0.565
Welsh cultural events (e.g. Eisteddfodau)	5.2	5.9	5.2	4.7	3.3	3.799	0.284
Religious group/church organisation	8.1	9.7	7.1	7.2	4.8	10.298	0.016
Support/self-help group	2.6	1.9	2.9	3.2	4.2	6.788	0.079
Youth group (e.g. Scouts, guides, youth clubs, etc.)	3.0	2.7	3.1	4.0	2.7	1.761	0.623
Sport clubs/groups (e.g. Rugby, swimming, keep fit)	25.0	27.4	23.8	21.8	21.5	8.616	0.035
Community groups, social clubs	9.6	10.6	8.8	6.2	10.7	7.773	0.051
Online communities	39.6	37.2	41.0	42.9	42.7	6.586	0.086

Table A11: Perceptions of service and employer supportiveness by ACE count (percentage)

In general, if you needed help from the following, how supportive do you think they would be?		All	ACE count 0	1	2-3	4+	X^2	p
Health services	Very supportive	71.4	76.0	71.8	65.8	60.6		
	A little supportive	25.1	21.4	26.2	28.5	33.4		
	Not at all supportive	3.5	2.7	2.1	5.7	6.0	46.269	<0.001
Social services	Very supportive	48.8	51.9	53.8	44.4	34.9		
	A little supportive	40.6	40.4	37.7	40.0	46.6		
	Not at all supportive	10.6	7.7	8.6	15.6	18.5	65.627	<0.001
Police	Very supportive	60.0	64.9	61.1	56.1	44.8		
	A little supportive	32.0	29.4	33.9	34.0	37.0		
	Not at all supportive	7.9	5.7	5.0	9.9	18.2	85.231	<0.001
Charities/voluntary organisations	Very supportive	59.5	60.8	61.7	60.0	50.7		
	A little supportive	34.5	34.5	33.3	34.0	37.0		
	Not at all supportive	6.0	4.7	5.0	6.0	12.2	32.288	<0.001
Mental health services	Very supportive	53.9	56.4	57.5	51.1	42.1		
	A little supportive	36.6	36.8	34.3	35.7	40.0		
	Not at all supportive	9.6	6.8	8.2	13.2	17.9	54.869	<0.001
Your employer[a]	Very supportive	73.7	79.2	72.2	70.1	59.4		
	A little supportive	21.2	18.4	21.4	23.9	28.9		
	Not at all supportive	5.0	2.4	6.4	6.0	11.8	45.693	<0.001

[a]n=1451.

Table A12: Perceived financial security by ACE count (percentage)

		ACE count					
	All	0	1	2-3	4+	X^2	p
1 month or less	18.2	11.3	18.3	27.7	32.9		
>1 month to 1 year	23.8	22.9	26.5	24.4	22.8		
>1 year to <5 years	19.1	21.2	19.5	17.5	12.9		
5 years +	38.8	44.6	35.7	30.4	31.4	128.678	<0.001

Table A13a: Welsh culture variables by ACE count

			ACE count of participants providing each response (percentage)			
		All %	0	1	2-3	4+
How long have you lived in Wales?	Less than 5 years	7.2	48.3	17.8	18.9	15.0
	5-10 years	4.9	49.6	19.0	14.9	16.5
	Over 10 years	21.4	49.4	18.7	17.4	14.4
	Most of my life since birth	66.5	52.3	19.5	15.6	12.7
	X^2					5.571
	p					0.782
Self-defined nationality Welsh	Welsh	56.8	52.9	20.1	15.5	11.5
	Other	43.2	49.2	17.9	17.0	16.0
	X^2					13.150
	p					<0.05
Which of these best describes your ability in spoken Welsh?	I'm fluent in Welsh	14.5	57.2	21.8	13.0	8.0
	I can speak a fair amount of Welsh	7.6	47.6	19.0	17.5	15.9
	I can only speak a little Welsh	16.6	49.4	19.3	16.6	14.7
	I can say just a few words	25.6	49.0	20.2	16.3	14.6
	I don't speak Welsh at all	35.7	52.3	17.3	16.7	13.7
	X^2					20.013
	p					0.067

Table A13b: Welsh culture variables by ACE count

Question responses by participant ACE count (percentage)			ACE count			
		All	0	1	2-3	4+
I have a strong attachment to Wales	Strongly agree	49.3	49.3	54.4	45.9	46.0
	Agree	36.8	36.8	34.3	36.7	40.0
	Neither agree or disagree	7.9	8.2	6.7	8.2	8.4
	Disagree	5.2	4.9	3.8	7.9	5.4
	Strongly disagree	0.8	0.8	0.8	1.2	0.3
	X^2					16.989
	p					0.150
I have a strong national (Welsh) identity	Strongly agree	35.1	36.3	37.4	33.3	29.6
	Agree	31.3	32.1	31.8	28.8	30.4
	Neither agree or disagree	11.0	10.5	9.6	13.6	11.9
	Disagree	17.9	16.6	17.2	20.1	20.9
	Strongly disagree	4.7	4.5	4.0	4.2	7.2
	X^2					18.973
	p					0.089
I live in Wales but I don't particularly feel Welsh	Strongly agree	3.6	3.6	3.4	3.0	4.5
	Agree	18.4	17.2	15.5	22.8	21.9
	Neither agree or disagree	10.2	10.4	8.6	10.4	11.7
	Disagree	32.8	31.8	35.0	32.8	33.5
	Strongly disagree	35.0	37.0	37.5	31.0	28.4
	X^2					22.341
	p					0.034
Adult participation in Welsh cultural events	Yes	5.2	5.9	5.2	4.7	3.3
	X^2					3.799
	p					0.284
I enjoy my community's culture and traditions	A lot	48.9	52.0	52.5	44.4	37.6
	Quite a bit	30.9	32.1	30.0	29.2	29.3
	Somewhat	12.2	11.2	10.9	15.2	14.3
	A little	5.2	3.2	3.6	7.7	12.2
	Not at all	2.8	1.6	2.9	3.5	6.6
	X^2					95.038
	p					<0.001


Health Improvement
Providing information, advice and taking action, across sectors, to promote health, prevent disease and reduce health inequalities
Health Protection
Providing information, advice and taking action to protect people from communicable disease and environmental hazards
Microbiology
Providing a network of microbiology services which support diagnosis and management of infectious diseases
Health intelligence
Providing public health data analysis, evidence finding and knowledge management
Public Health Wales
what we do
We exist to protect and improve health and wellbeing and reduce health inequalities for people in Wales. We work locally, nationally and internationally, with our partners and communities, in the following areas:
Screening
Providing screening programmes which assist the early detection, prevention and treatment of disease
Safeguarding
Providing expertise and strategic advice to help safeguard children and vulnerable adults
NHS quality improvement and patient safety
Providing the NHS with information, advice and support to improve patient outcomes
Primary, community and integrated care
Strengthening public health impact through policy, commissioning, planning and service delivery

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