



## The Influence of Adverse and Positive Childhood Experiences on Young People's Mental Health and Experiences of Self Harm and Suicidal Ideation

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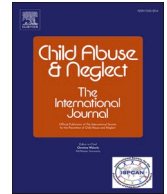
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## The influence of adverse and positive childhood experiences on young people's mental health and experiences of self-harm and suicidal ideation

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### ABSTRACT

**Background:** Few studies have examined the interaction of adverse childhood experiences (ACEs) and positive childhood experiences (PCEs) with mental health outcomes in nationally representative European populations.

**Objective:** The primary objective was to test models of resilience through investigating associations between ACEs and PCEs and young people's risk of common mood and anxiety disorders, self-harm and suicidal ideation.

**Participants and setting:** Data were from the Northern Ireland Youth Wellbeing Survey (NIYWS), a stratified random probability household survey conducted between June 2019 and March 2020. Analysis is based on data from adolescents aged 11–19 years ( $n = 1299$ ).

**Method:** Logistic regression was used to test the direct effects of ACEs and PCEs on mental health outcomes and the moderating effect of PCEs at different levels of ACE exposure.

**Results:** Prevalence rates of mental health outcomes were: common mood and anxiety disorders (16 %); self-harm (10 %); suicidal ideation (12 %). ACEs and PCEs both independently predicted common mood and anxiety disorders, self-harm and suicidal ideation. Every additional ACE increased the likelihood of a common mood and anxiety disorder (81 %), self-harm (88 %) and suicidal ideation (88 %). Every additional PCE reduced common mood and anxiety disorders (14 %), self-harm (13 %) and suicidal ideation (7 %). There was no moderating effect of PCEs on ACEs and mental health outcomes.

**Conclusion:** The findings suggest that PCEs act largely independently of ACEs and that initiatives to increase PCEs can assist in the prevention of mental health problems.

### 1. Introduction

Adverse childhood experiences (ACEs) occurring within the family household have consistently been shown to have strong associations with physical, mental and emotional problems in later life (Felitti et al., 1998; Hughes et al., 2017; Karatekin, 2018; Merrick

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et al., 2017). A meta-analysis of ACE related health outcomes in adulthood (Hughes et al., 2017) found that those with four or more ACEs 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 to have self-harmed, compared to those with no ACEs. Similarly, research in youth populations has shown the same strong association with various studies linking cumulative ACEs with mental, social, physical and behavioral problems in childhood, adolescence and early adulthood (Kerker et al., 2015, Lowthian et al., 2021; Mersky, Topitzes, & Reynolds, 2013; Bunting et al., 2020). Since Felitti et al.'s (1998) seminal work, ACEs research has profoundly changed the child maltreatment field, shifting the focus from the effect of individual types of childhood victimization to the cumulative effect of ACEs on child and adult well-being. As this body of research has expanded, it has generated considerable interest in the development of ACE informed policies and trauma informed practices in both the USA and UK, as well as other countries (Spratt, Devaney, & Frederick, 2019).

However, despite widespread influence, ACE related research has been criticised for not adequately accounting for the role of structural and socio-economic factors, and neglecting the contribution resilience and protective factors play in shaping child and adult outcomes (Edwards, Gillies, & White, 2019; Kelly-Irving & Delpierre, 2019; Narayan, Lieberman, & Masten, 2021). Narayan, Rivera, Bernstein, Harris, and Lieberman (2018) and other resilience researchers (e.g. Masten, 2015) proposed a move beyond the risk model, advocating instead for inquiry into individual, family, and community level factors that can combat ACE related outcomes. Subsequently, Narayan et al. (2018) developed the Benevolent Childhood Experiences scale (BCEs) to assess favourable childhood experiences characterised by safety and security, pleasurable and predictable quality of life, positive self-perceptions and support external to the family. The BCEs scale is a brief 10-item checklist intended for use alongside adversity measures in population research and public health screening and assessment (Merrick & Narayan, 2020). The development of the BCE scale has led to burgeoning interest in research investigating the extent to which such experiences, more collectively referred to as Positive Childhood Experiences (PCEs), can ameliorate the effects of ACEs.

## 2. Models of resilience

Based on Zimmerman's (2013) framework for resilience in adolescence, Crandall et al. (2019) highlighted three resilience models that can be used to better understand the relationship between ACEs and PCEs:

- The Compensatory Model of Resilience postulates that positive factors have a direct and independent promotive effect on an outcome that is separate from the risk factor and acts in the opposite direction. This Model suggests positive factors will show an equally beneficial effect regardless of risk exposure.
- The Protective Factors Model of Resilience postulates that individual assets and systemic resources serve to moderate the relationship between risk factors and outcomes. Such assets and resources primarily show positive benefits among those who have been exposed to the risk factor.
- Finally, the Challenge Model posits that moderate or manageable levels of adversity inoculate against subsequent adverse exposures that make people vulnerable to negative outcomes.

The compensatory and protective models, in particular, hold different implications for policy and intervention. The compensatory model indicates the positive benefits of adding new or strengthening existing assets at a universal level, while the protective model indicates differential benefits in targeting low-risk versus high-risk groups. While there is a clear moral imperative to both decrease adversity exposure and increase protective factors across the whole child population, understanding if PCEs have a compensatory or protective relationship with mental health outcomes is potentially important when deciding how best to allocate scarce public health resources and services where it may not be possible to intervene with or treat an entire population.

## 3. Research exploring the relationship between ACEs and PCEs

Although research measuring both ACEs and PCEs is still developing, there is clear evidence in support of the compensatory model of resilience with various studies in adult populations demonstrating that PCEs diminish the negative relationship between ACEs and poor health in adulthood (Bethell, Jones, Gombojav, Linkenbach, & Sege, 2019; Crandall et al., 2019; Daines, Hansen, Novilla, & Crandall, 2021; Kuhar & Zager Kocjan, 2021; Narayan et al., 2018). Crandall et al. (2019) found that PCEs were associated with improved health across a variety of mental and physical health indicators and largely neutralized the negative effects of ACEs. Similarly, Bethell et al. (2019) found that, after accounting for ACEs, PCEs were associated with lower rates of depression and poor mental health. In the area of family health, Daines et al. (2021) found that PCEs were positively associated with social and emotional health processes, resources, health lifestyles and external support.

While research with child populations is scarce, both longitudinal and cross-sectional research with young adult populations have also produced evidence for the compensatory model. Crandall et al.'s (2020) longitudinal study involving young adults aged 20–23 years of age, examined the association between cumulative ACEs and PCEs (as measured by the BCE scale) and a variety of adult health outcomes including risky sex, depression, anxiety, substance abuse and negative body image. Each additional ACE significantly increased the likelihood of all outcomes, within the exception of body image, while each additional PCE significantly decreased the likelihood of all outcomes, including negative body image. When controlling for ACEs, PCEs remained significant across all outcomes with the exception of anxiety, while ACEs were no longer predictive of any of the measured outcomes, including anxiety.

Doom, Seok, Narayan, and Fox's (2021) cross sectional study of university students in the Western United States tested whether,

during a pervasive current life stressor (the COVID-19 pandemic), higher levels of ACEs and PCEs would each independently predict current mental health when accounted for together. As with [Crandall et al. \(2020\)](#), when controlling for the presence of both, high cumulative ACE scores were associated with greater depressive symptoms, while cumulative PCE scores were associated with lower depressive symptoms. However, contrary to [Crandall et al. \(2020\)](#), neither ACEs nor PCEs were independently associated with generalized anxiety symptoms.

More recently, research with Chinese populations has also produced evidence in support for the compensatory model of resilience. Chinese undergraduate students ([Hou et al., 2022](#)) with one or more ACEs have been found to be at greater risk of uncertainty stress, depressive symptoms and suicidal ideation compared to those with no ACEs, while those with high PCEs (>8; as measured by the BCE scale) were found to be at lower risk compared to those with low PCEs. Similarly, in a sample of Chinese children and young people aged 8–18 years old, [Qu et al. \(2022\)](#) found that, compared to no ACE exposure, increasing levels of ACE exposure (1, 2, 3, 4+) were associated with higher risks of both depression and anxiety. Conversely, when compared to low levels of PCEs (0–2, as measured by seven items adapted from the Child and Youth Resilience Measure–28, [Bethell et al., 2019](#)), increasing levels of PCEs were associated with lower risk of both depression and anxiety.

In addition to examining the potential for PCEs to act as protective factors in reducing the risk of various mental health outcomes while controlling for ACE exposure (the Compensatory model), a number of these studies have also explored how different levels of ACE and PCE exposure combine to influence risk levels (Protective Factors Model). Various methods have been employed to do this, producing somewhat contradictory results. For example, after adding an interaction term to linear regression models, [Doom et al. \(2021\)](#) found no evidence of PCEs moderating the effect of ACEs on depressive and anxiety symptoms among university students, although they note that this might have been due to the unique context of the COVID-19 pandemic. However, after calculating a difference score by subtracting the number of ACEs from the number of PCEs, [Crandall et al. \(2020\)](#) found that, as the difference score increased relative to ACEs, participants reported reduced risk of both depression and anxiety symptoms. Given that neither cumulative ACEs nor PCEs were independently associated with anxiety symptoms, [Crandall et al. \(2020\)](#) suggest that PCEs may only have a direct, in-dependent effect on reducing anxiety among young adults only when the number of PCEs is markedly higher than the number of ACEs.

When examining the differential effect of four different ACE/PCE combinations, [Hou et al. \(2022\)](#) found that students who had experienced high ACEs and high PCEs were at significantly lower risk of uncertainty stress and depressive symptoms than those with low ACEs and PCEs. However, while the combined effect of ACEs and PCEs appeared to act as a protective factor in uncertainty stress and depressive symptoms, there was no significant difference between these groups regarding suicidal ideation, suggesting that ACEs have a stronger negative effect than the positive effect of PCEs in relation to this outcome. [Qu et al. \(2022\)](#) also employed a categorical approach, constructing 12 pairs of four categories of ACE exposure and three categories of PCE exposure to explore the combined effect of ACEs and PCEs exposure on adolescent depression and anxiety. Compared with no-ACEs and low-PCEs exposure, adolescents with low ACE (<4 counts) and high PCE (6–7 counts) exposure showed significantly lower risk of depression. They also observed a negative additive interaction between PCEs and ACEs exposure on the risk of depression, as well as in relation to the risk of depression and anxiety comorbidity. The authors conclude that PCEs can moderate the impact of ACEs on mental health of adolescents.

#### 4. The present study

In light of the conflicting evidence on the moderating effect of PCEs and the lack of research examining the relationship between ACEs, PCEs and mental health outcomes in nationally representative European youth populations, the current study aimed to:

1. Test the Compensatory Model of Resiliency by investigating whether there are direct independent associations between ACEs and PCEs in relation to young people's risk of common mood and anxiety disorders, and experiences of self-harm and suicidal ideation.
2. Test the Protective Factors Model of Resiliency by investigating whether PCEs moderate associations between different levels of ACE exposure and young people's risk of common mood and anxiety disorders, and self-harm and suicidal ideation.

The Challenge model was not tested as this typically requires longitudinal data ([Fleming & Ledogar, 2008](#)).

#### 5. Method

##### 5.1. Sampling and data collection

The data for this study were from the Northern Ireland Youth Wellbeing Survey (NIYWS), a stratified random probability household survey undertaken by a consortium comprised of researchers from Queen's University, Belfast, Ulster university and The Mental Health Foundation. The primary aims of the survey were to collect robust data to estimate the prevalence of mental health disorders among 2 to 19 year olds in Northern Ireland, and to explore the associations between demographic, social, familial, and stress-related risk factors and mental health disorders and psychological problems. Ethical approval for the survey was granted by the School of Social Sciences, Education and Social Work Research Ethics Committee, Queen's University Belfast in June 2019.

Children and young people were eligible to take part if they were aged 2 to 19 and lived in Northern Ireland. As the research teams were unable to access data registers that could have reliably indicated households with children eligible to participate in the study, it was necessary to randomly select addresses from households across Northern Ireland using the Pointer Database (a postcode register of all households in Northern Ireland). Based on a conservative estimate that one in five households in NI had a resident child aged 2–19

years, and assuming a response rate of 50 %, an initial sample of 30,000 was identified as necessary to achieve a final sample of 3000 completed interviews. Eligible households were then identified as the fieldwork stage following a visit from one of the interviewing team.

A total of 762, 264 eligible residential addresses were linked to Northern Ireland's Multiple Deprivation Measures data (NIMDM; Northern Ireland Statistics and Research Agency, 2017) and stratified by deprivation decile and county to ensure even geographical distribution and representation of both affluent and less affluent neighbourhoods. A total of 30,000 addresses were then randomly selected and divided into six installments to be issued to the data collection team at intervals from June 2019 onwards. By March 2020, just before the national UK lockdown in response to the COVID-19 pandemic, 21,730 main sample addresses had been contacted. Of these, 4621 were confirmed as eligible and 3074 interviews completed. As this met the survey objectives of obtaining a final sample of 3000 the fieldwork was stopped at this point. The response rate was 67 % and, as the final sample closely matched the NI population in terms of geographical location, deprivation and other demographic factors, no weights were applied [see Bunting et al., 2022 for further details on the study methodology and sample].

## 5.2. Participants

Participants were a representative sample of the 2–19 year old population of NI. As ACEs and PCEs data were not collected for those aged 2–10 years old, this analysis is based young people aged 11–19 years ( $N = 1299$ ).

## 5.3. Mental health outcomes

### 5.3.1. Mood and anxiety disorders

Mood and anxiety disorders were measured using the Revised Children's Anxiety and Depression Scale (RCADS; Chorpita, Yim, Moffitt, Umemoto, & Francis, 2000). The RCADS is a 47-item questionnaire that produces indications of clinically relevant levels of severity of six disorders derived from the diagnostic criteria of the DSM-IV (American Psychiatric Association, 2000): major depressive disorder (MDD), separation anxiety (SAD) disorder, social phobia (SP), generalized anxiety disorder (GAD), panic disorder (PD), and obsessive compulsive disorder (OCD). One of the more widely used brief screening instruments for symptoms of anxiety and depression, RCADS has shown robust internal consistency reliability in different assessment settings, countries, and languages (Piqueras, Martín-Vivar, Sandin, San Luis, & Pineda, 2017), good test-retest reliability (Chorpita et al., 2000), and good convergent validity (Bouvard, Denis, & Roulin, 2015). Importantly, it has shown good reliability and validity within a population of Irish youth aged 12–18 years (Donnelly, Fitzgerald, Shevlin, & Dooley, 2018). The scale is available in formats that can be self-completed or completed by a parent/carer; the parent version has been validated for use with children aged 3–17 years (Ebesutani, Tottenham, & Chorpita, 2015). In this study, 11–19 year olds completed the self-report version. Each item is scored on a 4-point Likert response scale (0 = never to 3 = almost always) and raw subscale scores are converted into t-scores which are normed based on school year and gender. This process is facilitated using syntax available from the developer that identifies cut-off scores above the clinical threshold (<https://www.childfirst.ucla.edu/resources>). The dichotomized rate for a young person meeting 'clinical' threshold for any of these common mood and anxiety disorders is used in this analysis.

### 5.3.2. Self-harm and suicidal ideation

Self-injury and suicidal thoughts or attempts among 11–19 year olds were assessed using selected questions from the Deliberate Self Harm Inventory (DSHI; Gratz, 2001) and the Suicide Behaviours Questionnaire-Revised (SBQR; Osman et al., 2001). The items are (1) "Have you ever intentionally (i.e. on purpose) cut your wrist, arms, or other area(s) of your body (without intending to kill yourself)? (or burned yourself with a cigarette, lighter or match; carved words, pictures, designs or other marks into your skin)" and (2) "Have you ever thought about or attempted to kill yourself?". Participants screened positive for self-injury and suicidal thoughts or attempts by answering 'Yes' to both questions.

## 5.4. Adverse childhood experiences and positive childhood experiences measures

### 5.4.1. Adverse childhood experiences

Childhood adversities were assessed using the same ten items used in the original Adverse Childhood Experiences Scale (ACE, Felitti et al., 1998). The ACE questions were asked alongside questions from the Child and Adolescent Trauma Screener (CATS; Sachser et al., 2017) which was adapted to include additional questions in relation to adverse childhood experiences. These questions were prefaced with "Stressful or scary experiences happen to many people. Below is a list of stressful or scary situations that sometimes happen to young people. Tick the box if the event happened to you." The CATS questions in relation to "being hit or hurt badly in your family", and "being pressured or forced into sexual acts" were used as the measures for exposure to physical and sexual abuse. Other ACE questions representing emotional neglect, physical neglect, domestic violence, parental incarceration and parent substance abuse were included within the CATS questionnaire.

For young people aged 11–15 years, and those aged 16–19 years living with parents, indication of the parental mental health ACE was based on parent report. The mental health of parents was first assessed using the question "Have you ever experienced any form of mental health problem?" with response options currently, in the past or neither. The first two options were coded as Yes (1) and the last as No (0) to represent an 'any parental mental health diagnosis' variable. Parents were also asked "On a scale of 0–5 how much did (or does) your mental health condition impact on your parenting?" with 0 being not at all and 5 being extremely". If a parent indicated the

presence of both a past or present mental health diagnosis, and a score of 3 or more when reporting the impact on their parenting, then their child was coded as yes in relation to exposure to a 'Parental Mental Health ACE' and included as part of their ACE score. Young people aged 16–19 years living independently, or living with parents who chose not to participate in the survey, were asked "While growing up, did a parent or another household member... Have a serious mental health problem, suffer from depression or attempt suicide?" Those who answered yes were recorded as Parental Mental Health ACE = 1. There were no significant differences in the Parental Mental Health ACE rates between the parent report and youth report groups ( $\chi^2(1, N = 1299) = 0.087, p = 0.822$ ).

Similarly, for young people aged 11–15 years, and those aged 16–19 years living with parents, parental separation was based on parent report. The questions "What is your relationship to nominated child", "Are you living in this household with a partner", and "What is your partner's relationship to nominated child", were used to identify young people living with both parents (Parental Separation ACE = 0) and those living with one or no parents (Parental Separation ACE = 1). For young people aged 16–19 years living independently, or living with parents who chose not to participate in the survey, the parental separation ACE was based on the question "Are your parents ... *married (1), living together as if married (2), separated (3), divorced (4), widowed (5), never lived together (6)*". Responses options 3–6 we recoded as Parental Separation ACE = 1 and response options 1–2 were recoded as Parental Separation ACE = 0.

#### 5.4.2. Positive childhood experiences

The Benevolent Childhood Experiences Scale (BCE) (Narayan et al., 2018) was used to measure positive childhood experiences. The BCE is a 10-item self-report measure which assesses favourable childhood experiences characterised by safety and security (e.g., 'at least one caregiver with whom you felt safe', 'beliefs that gave you comfort'), pleasurable and predictable quality of life (e.g., 'opportunities to have a good time', 'predictable home routine'), positive self-perceptions (e.g., 'like yourself or feel comfortable with yourself'), and support external to the family (e.g., 'good neighbours', 'at least one teacher that cared', 'adult who could provide support or advice'). Responses are coded *yes* = 1, and *no* = 0, and can be summed to produce a cumulative score, similar to the ACE measure. The present study is based on the cumulative score with composite reliability (CR) estimates indicating that the BCE scale had high levels of internal reliability in the current sample (CR = 0.94). More detailed analysis of the prevalence and predictors of individual and cumulative BCEs in this sample is reported in Redican, McBride, Bunting, Murphy, and Shevlin (2023).

### 5.5. Covariates

#### 5.5.1. Child age and gender

For 11–15 year olds age and gender (*male, female, other*) was reported by parents or carers. For 16–19 year olds age and gender (*male, female, other*) was self-reported. *Female* was coded as 1 and *male* was coded as 0, with the *other* category excluded due to extremely small numbers.

#### 5.5.2. Child health

Parents of 11–15 year olds were asked "How is your child's health in general? Would you say it is..." and young people aged 16–19 years were asked the same question in relation to themselves. Possible responses ranged from *Very Good* = 1 to *Very Bad* = 5. These scores were recoded to be dichotomized and represent poor/good physical health (1 = Bad or Very Bad, 0 = Very Good, Good, or Fair).

#### 5.5.3. Special education needs of young person

Parents of 11–15 year olds were asked if their child had a diagnosed or suspected special educational need (SEN). In Northern Ireland, this is a legal definition and refers to children with learning problems or disabilities that make it harder for them to learn compared to most children of the same age. Parents could select one or more of four options: difficulties with speech, language and/or communication; learning difficulties; social, emotional or mental health difficulties; and sensory difficulties and/or physical health problems. Young people aged 16–19 years were asked the same questions in relation to themselves. Each item was scored (*Yes* = 1, *No* = 0) and the categories aggregated to identify those children with any diagnosed or suspected educational need (*Yes* = 1, *No* = 0).

#### 5.5.4. Family benefits

Socio-economic factors such as social class, benefit receipt and income are commonly associated with ACEs (Walsh et al., 2019). Although the NIYWS included questions on both income and benefit receipt, the income question had significant missing data. As such, only household receipt of benefits was used in this analysis. Parents or carers were asked the question, "Is your household receiving any of these state benefits?", provided with a list of benefits, and directed to tick the benefits they were in receipt of. The list of benefits included: Universal Credit/Housing Benefit/Working Tax Credit/Child Tax Credit/Income support/Jobseeker's Allowance/Employment and Support Allowance/Carer's Allowance/Disability Living Allowance/Personal Independence Payment or No benefits. If any benefits were selected then the family was considered to be in receipt of benefits (1 = Yes, 0 = No). Young people aged 16–19 years whose parents did not participate in the survey or who were living independently were asked the same question in relation to their family household.

#### 5.5.5. Area level deprivation

Studies have shown area-level deprivation can increase the risk for ACEs in adult populations over and above individual-level circumstances, such as education and social class (Bellis et al., 2015). Level of deprivation was assessed using the NI Multiple Deprivation Measure (Northern Ireland Statistics and Research Agency, 2017). This is an area-based measure that assesses seven

different domains of deprivation: health; income; employment; education skills and training; proximity to services; living environment; and crime and disorder. Weighted scores are derived by calculating the number of people experiencing each type of deprivation in a specific geographical area. The key geography for the NIMDM is Super Output Area (SOA) - Northern Ireland is divided into 890 SOAs with an average population size of around 2100 people. NIMDM scores are ranked from 1 to 890, with 1 being the most deprived and 890 the least deprived. The SOA for each residence was recorded and then used to identify deprivation level using Northern Ireland's 2017 NIMDM data.

## 5.6. Analysis

The data were analysed using SPSS V27. Descriptive statistics were produced for all study variables. Simple logistic regressions were used to test associations between each of the three mental health outcomes and ACEs, PCEs and all covariates. ACE and PCE measures and all covariates were then entered simultaneously into a logistic regression model for each of the outcomes (Model 1) to investigate the direct effects of ACEs and PCEs while controlling for a range of demographic and socio-economic factors.

ACE and PCE measures and all covariates were then entered into a logistic regression model together with an interaction term for ACEs and PCE (Model 2) to examine the moderating effect. ACE and PCE variables were mean centred for the moderation analysis, which was conducted in SPSS. Model fit and comparative statistics (Omnibus Test of Model Coefficients and Nagelkerke R Square) were calculated for all models. The PROCESS macro was then used to generate code for visualizing the variable interactions using the  $-1SD$ , Mean and  $+1SD$  conditioning values. These results are presented in Figs. 1–3 as above average, average and below average values of ACEs and PCEs. For ACEs, below average equates to a score of 2 or more, average to a score of 1 and below average to a score of 0. For PCEs, below average equates to a score of 5 or less, average to a score between 6 and 9 and above average to a score of 10.

## 6. Results

### 6.1. Descriptive statistics

Table 1 presents descriptive statistics for each of the study variables. Just over half of the young people were male (51.4 %) and aged 11–15 years (51.6 %) with a mean age of 14.2 years ( $SD = 2.58$ ). Child health was reported as 'Good' or 'Very good' in the majority of cases (86.8 %) and in 13.9 % of cases the young person reported having been assessed or suspected of having a special educational need. A third of family households were in receipt of benefits (36.0 %) and 18.6 % lived in the 20 % of most deprived areas in Northern Ireland.

Sixteen per cent met the clinical criteria for any common mood or anxiety disorder, while one in ten reported having self-harmed and 12.1 % having thought about or attempted suicide. Although cumulative ACE scores (Mean = 0.73, Median = 0.00,  $SD = 1.06$ , Range = 9) and PCE scores (Mean = 7.64, Median = 8,  $SD = 2.62$ , Range = 10) were used in further analysis, Table 1 also presents ACE and PCE scores as ordinal variables to give a sense of their spread across the sample. Just over half (52.5 %) indicated that they had experienced no ACEs during childhood while 5.7 % had experienced three or more. The majority of young people (63.3 %) reported eight or more PCEs.

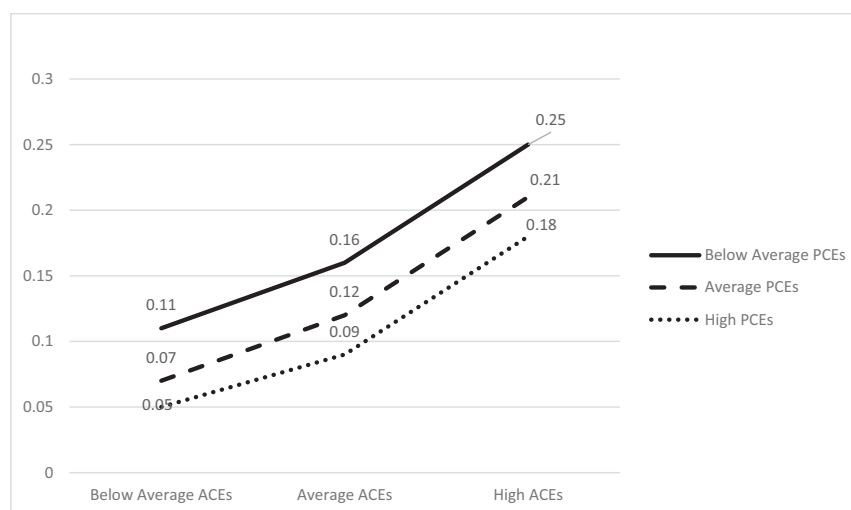


Fig. 1. Probability of any common mood/anxiety disorder by ACEs and PCEs.

Note: Generated from PROCESS macro code for visualizing the variable interactions using the  $-1SD$ , mean and  $+1SD$  conditioning values.

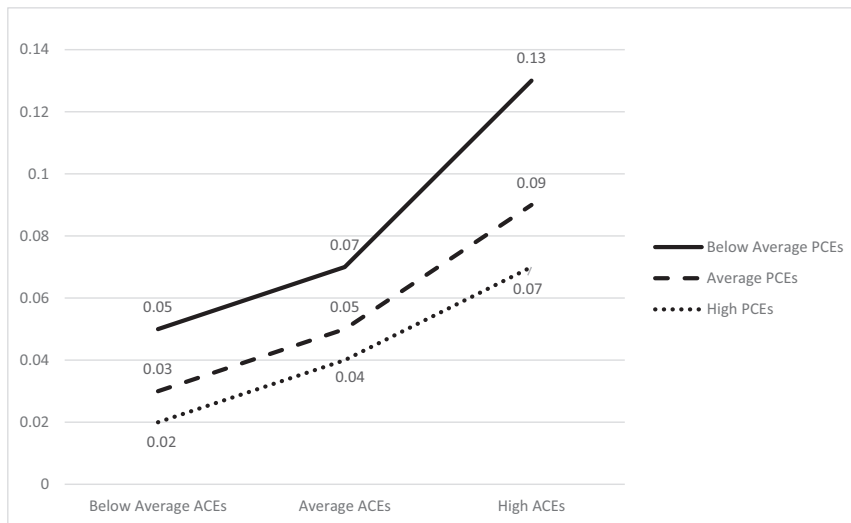


Fig. 2. Probability of self-harm by ACEs and PCEs.

Note: Generated from PROCESS macro code for visualizing the variable interactions using the -1SD, mean and +1SD conditioning values.

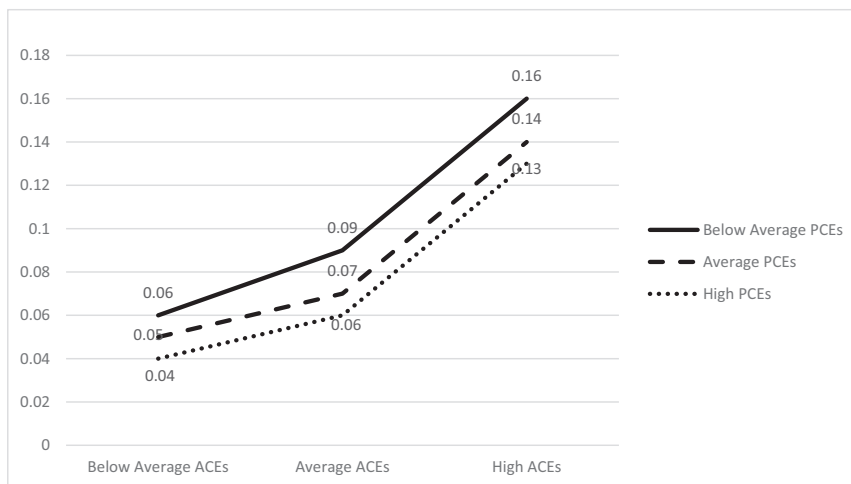


Fig. 3. Probability of suicidal ideation by ACEs and PCEs.

Note: Generated from PROCESS macro code for visualizing the variable interactions using the -1SD, mean and +1SD conditioning values.

## 6.2. Logistic regression

### 6.2.1. Common mood and anxiety disorders

In bivariate logistic regression, cumulative ACE scores, cumulative PCE scores, age, gender, health, special educational need status and household receipt of benefits were all individually associated with common and mood and anxiety disorders (Table 1). In adjusted analysis (Model 1), ACEs and PCEs retained significant associations with RCAD scores after controlling for a range of covariates. ACEs were significantly associated with an increase in the likelihood of meeting the criteria for a common mood or anxiety disorder (OR = 1.81), while PCEs were associated with a significant decrease (OR = 0.86). Moderation analysis (Model 2) showed no significant interaction between ACEs, PCEs and the likelihood of having a common mood or anxiety disorder (OR = 1.05). As Fig. 1 illustrates, having above average PCEs decreased the risk of a common mood and anxiety disorder compared to those with below average PCEs by 6–7% across all levels of ACE exposure (below average, average, above average). The Omnibus Test of Coefficients showed that Model 2 was a significantly better fit than Model 1 ( $\chi^2(9, N = 1132) = 175.24, p < 0.001$ ). Examination of variable correlations showed no problems with multicollinearity and all values were  $< 0.4$  (Table 2).

### 6.2.2. Self-harm

In simple logistic regression, ACE scores, PCE scores, age, gender, health and household receipt of benefits were all individually



**Table 1**  
Frequencies of study variables.

Child characteristics		%
Gender	N = 1299	
Male	688	51.4
Female	631	48.6
Age group	N = 1299	
11–15 years	670	51.6
16–19 years	629	48.4
Child health	N = 1224	
Good	1062	86.8
Fair/poor	162	12.5
Special education needs	N = 1254	
Yes	180	13.9
No	1074	85.6
Family/area socio-economic status	N	%
Household in receipt of benefits	N = 1299	
Yes	468	36.0
No	831	64.0
Area level deprivation quintile	N = 1299	
1 most deprived	242	18.6
2	238	18.3
3	253	19.5
4	277	21.3
5 least deprived	289	22.2
Child mental health outcomes	N	%
Any common mood or anxiety disorder	N = 1171	
Yes	189	16.1
No	982	83.9
Self-harm	N = 1181	
Yes	111	9.4
No	1070	90.6
Suicide ideation	N = 1181	
Yes	143	12.1
No	1034	87.9
Adverse childhood experiences	N = 1291	%
0	678	52.5
1	428	33.2
2	111	8.6
3	40	3.1
4+	34	2.6
Positive childhood experiences	N = 1179	%
10	361	30.6
9	217	18.4
8	169	14.4
7	146	12.4
6	72	6.1
5 or less	214	18.2

**Table 2**  
Common mood and anxiety disorder unadjusted and adjusted estimates from logistic regression.

Independent variables	Unadjusted OR	Model 1	Model 2
		Adjusted OR	Adjusted OR
ACE score	1.95*** (1.69–2.24)	1.81*** (1.55–2.11)	1.88*** (1.60–2.20)
PCE score	0.85*** (0.80–0.89)	0.86*** (0.81–0.92)	0.85*** (0.80–0.91)
Controls			
Child age	1.15*** (1.08–1.22)	1.10* (1.02–1.18)	1.10* (1.02–1.20)
Child gender (male = 1)	0.64** (0.47–0.88)	0.67* (0.47–0.96)	0.67* (0.46–0.94)
Child health (good health = 1)	0.20*** (0.14–0.30)	0.39*** (0.25–0.60)	0.38*** (0.25–0.60)
Child SEN (no SEN = 1)	0.47*** (0.30–0.72)	0.51** (0.30–0.84)	0.50** (0.30–0.84)
Household receiving benefits (no benefits = 1)	0.68* (0.49–0.94)	1.10 (0.74–1.63)	1.08 (0.72–1.60)
Deprivation decile	0.99 (0.94–1.05)	1.06 (0.99–1.13)	1.06 (0.99–1.13)
Interaction			
ACE score * PCE score	–	–	1.05 (0.99–1.11)
Model statistics		1	
Omnibus test of model coefficients	–	$\chi^2(8, N = 1132) = 172.650, p < 0.001$	$\chi^2(9, N = 1132) = 175.24, p < 0.001$
Nagelkerke R square	–	0.241	0.244

Note. Significant at 0.05\*, 0.01\*\* and 0.005\*\*\*. Model 3 uses mean centred ACE and BCE scores as interaction terms.

**Table 3**  
Self-harm unadjusted and adjusted estimates from logistic regression.

Independent variables	Self-harm		
	Unadjusted OR	Adjusted OR Model 1	Adjusted OR Model 2
ACE score	2.00*** (1.72–2.32)	1.88*** (1.58–2.32)	1.87*** (1.55–2.23)
PCE score	0.87*** (0.81–0.92)	0.87** (0.82–0.96)	0.89** (0.82–0.97)
<b>Controls</b>			
Child age	1.26*** (1.15–1.37)	1.23*** (1.10–1.36)	1.23*** (1.11–1.36)
Child gender (male = 1)	0.38*** (0.25–0.59)	0.37*** (0.23–0.60)	0.37*** (0.23–0.61)
Child health (good health = 1)	0.23*** (0.14–0.36)	0.62 (0.36–1.09)	0.62 (0.36–1.09)
Child SEN (no SEN = 1)	0.63 (0.36–1.12)	0.66 (0.34–1.27)	0.66 (0.34–1.27)
Household receiving benefits (no benefits = 1)	0.61* (0.41–0.91)	0.90 (0.55–1.47)	0.90 (0.55–1.48)
Deprivation decile	0.98 (0.92–1.05)	1.08 (0.99–1.17)	0.99 (0.93–1.06)
<b>Interaction</b>			
ACE score * PCE score	–	–	0.99 (0.93–1.06)
<b>Model statistics</b>			
Omnibus test of model coefficients	–	$\chi^2 (8, N = 1141) = 148.47, p < 0.001$	$\chi^2 (9, N = 1141) = 148.56, p < 0.001$
Nagelkerke R square		0.265	0.265

Note. Significant at 0.05\*, 0.01\*\* and 0.005\*\*\*. Model 2 uses mean centred ACE and BCE scores as interaction terms.

associated with having self-harmed (Table 3). In adjusted analysis (Model 1), ACEs and PCEs retained significant associations with self-harm after controlling for a range of covariates. ACEs were significantly associated with an increase in the likelihood of having self-harmed (OR = 1.88), while PCEs were associated with a significant decrease (OR = 0.93). Moderation analysis (Model 2) showed no significant interaction between ACEs, PCEs and the likelihood of having self-harmed (OR = 1.04). Although results were not statistically significant, Fig. 2 shows a slight increase in the effect of PCEs on the probability of self-harming at above average levels of ACE exposure. The Omnibus Test of Coefficients showed that Model 2 was a significantly better fit than Model 1 ( $\chi^2 (9, N = 1141) = 148.56, p < 0.001$ ). Examination of variable correlations showed no problems with multicollinearity and all values were  $< 0.4$ .

### 6.2.3. Suicidal ideation

In simple logistic regression, ACE scores, PCE scores, age, gender, health and special educational need status were all individually associated with having ever thought about or attempted suicide (Table 4). In adjusted analysis (Model 1), ACEs and PCEs retained significant associations with risk of suicidal ideation after controlling for a range of covariates. ACEs were significantly associated with an increase in the likelihood of having ever thought about or attempted suicide (OR = 1.88), while PCEs were associated with a

**Table 4**  
Suicidal ideation unadjusted and adjusted estimates from logistic regression.

Independent variables	Suicidal ideation		
	Unadjusted OR	Adjusted OR Model 1	Adjusted OR Model 2
ACE score	1.94*** (1.68–2.36)	1.88*** (1.59–2.22)	1.96*** (1.64–2.33)
PCE score	0.89*** (0.84–0.94)	0.93* (0.86–1.00)	0.91* (0.85–0.98)
<b>Controls</b>			
Child age	1.35*** (1.24–1.45)	1.36*** (1.23–1.49)	1.36*** (1.24–1.50)
Child gender (male = 1)	0.67** (0.12–0.27)	0.73 (0.49–1.10)	0.72 (0.48–1.08)
Child Health (good health = 1)	0.18*** (0.14–0.36)	0.45*** (0.28–0.72)	0.45*** (0.28–0.73)
Child SEN (no SEN = 1)	0.44*** (0.28–0.71)	0.54* (0.31–0.96)	0.54* (0.30–0.95)
Household receiving benefits (no benefits = 1)	0.76 (0.53–1.09)	1.07 (0.68–1.69)	1.05 (0.69–1.66)
Deprivation decile	1.01 (0.95–1.07)	1.08 (1.01–1.17)	1.09 (1.01–1.17)
<b>Interaction</b>			
ACE score * PCE score	–	–	1.04 (0.98–1.11)
<b>Model statistics</b>			
Omnibus test of model coefficients		$\chi^2 (8, N = 1141) = 178.52, p < 0.001$	$\chi^2 (9, N = 1141) = 180.46, p < 0.001$
Nagelkerke R square		0.278	0.281

Note. Significant at 0.05\*, 0.01\*\* and 0.005\*\*\*. Model 2 uses mean centred ACE and BCE scores as interaction terms.

significant decrease (OR = 0.93). Moderation analysis (Model 2) showed no significant interaction between ACEs, PCEs and the likelihood of having thought about or attempted suicide (OR = 1.04). As Fig. 3 illustrates, having above average PCEs decreased the risk of suicidal ideation compared to those with below average PCEs by 2–3 % across all levels of ACE exposure (below average, average, above average). The Omnibus Test of Coefficients showed that Model 2 was a significantly better fit than Model 1 ( $\chi^2(9, N = 1141) = 180.46, p < 0.001$ ). Examination of variable correlations showed no problems with multicollinearity and all values were  $< 0.4$ .

## 7. Discussion

In a nationally representative sample of young people aged 11–19 years, 16 % met the clinical criteria for any common mood or anxiety disorder, 10 %, reported having self-harmed and 12 % reported having ever thought about or attempted suicide. The average number of ACEs was 0.73 (Range = 9) and the average numbers of PCEs, as measured by the Benevolent Childhood Experiences Scales, was 7.64 (Range = 10). After controlling for a range of child, parent and socio-economic factors, ACEs and PCEs both independently predicted common mood and anxiety disorders, self-harming behaviour and suicidal ideation in 11–19 year olds. Every additional ACE increased the likelihood of a common mood and anxiety disorder, self-harming behaviour and suicidal ideation by 81 %, 88 % and 88 %, respectively. Importantly, every additional PCE reduced the likelihood of a common mood and anxiety disorder, self-harming behaviour and suicidal ideation by 14 %, 13 % and 7 %, respectively. These results are in keeping with the findings from various studies conducted in adult populations (Bethell et al., 2019; Crandall et al., 2019; Crandall et al., 2020; Daines et al., 2021; Doom et al., 2021; Narayan et al., 2018) and provide further support for PCEs as a mechanism in the promotion of healthy social, mental and emotional development. From the perspective of developmental psychology, early social experiences such as attachments with caregivers, relationships with peers, teachers and extended family, together with a positive sense of self, provide the foundation for the integration of these social experiences into healthy future healthy relationships (Narayan et al., 2018).

However, the largely neutralizing effects of PCEs noted in the adult literature (Crandall et al., 2019, 2020), were not evident in this study and, as with other research with youth populations (Qu et al., 2022), ACEs still retained large significant effect, regardless of positive childhood experiences. In addition to the compensatory, protective and challenge models of resilience, Sacker and Schoon (2007) proposed an additional model, the “reserve capacity” model, which refers to exposure to protective factors that do not result in immediate positive change but have a positive effect later in life. Although the cross sectional nature of the study did not allow for testing of this hypothesis, as demonstrated in Crandall et al.'s (2020) longitudinal study, it may be that as these young people move into adulthood PCEs provide a foundation which acts to further ameliorate the effects of ACEs on adult mental health outcomes.

While there was support for the compensatory model of resilience, there was no support for the protective model of resilience. Contrary to Qu et al. (2022), this study found no significant interaction effects of ACEs and PCEs on any of the outcome variables, indicating that PCEs act largely independently of ACEs in promoting improved outcomes and confer neither reduced or increased benefits at higher levels of ACE exposure. This difference may be due to a variety of factors. Firstly, while Qu et al. focused on very similar categorisations of adversity, they used a more detailed measure for assessing maltreatment related adversity, together with a more abbreviated seven-item PCE measure. Secondly, Qu et al.'s (2022) sample was recruited from eight schools located in the Anhui Province of China, as opposed to a national random probability household survey. While these methodological differences likely contribute to some of the differences in findings, cultural and experiential differences undoubtedly play a significant role (Djundeva, Dykstra, & Emery, 2019). Equally, as only a small proportion of young people reported experiencing no or low PCEs, the lack of interaction in the present study could be due to the low variability and high average PCE scores within the Northern Ireland youth population.

In addition to ACEs and PCEs, being older significantly increased the likelihood of all three outcomes; being female significantly increased the likelihood of common mood and anxiety disorders and self-harm but not suicidal ideation; and having poor health and a special educational need increased the likelihood of mood and anxiety disorders and suicidal ideation but not self-harm. Family and area level socio-economic factors did not remain significant after controlling for child factors. The influence of age and gender is in keeping with the literature which highlights how mental health problems increase as children get older with older teenage girls having the highest rates of various mental disorders, as well as higher rates of self-harming behaviour (Bor, Dean, Najman, & Hayatbakhsh, 2014; Kessler et al., 2007). Similarly, there is a longstanding association between physical health and mental health with children who have chronic physical illnesses and disabilities having much higher rates of mental disorders than typically developing children and adolescents (Augestad, 2017; Pinqart & Shen, 2011a, 2011b).

### 7.1. Limitations

As with any research design, there are various limitations and potential sources of bias. While the NIYWS achieved a relatively high response rate, there is still the possibility that the sample who did participate are not precisely representative of those who decided not to participate and of the wider population. The standardised measures used, although well tested, also have their limitations and the measurement of different types of childhood adversity was primarily based on responses to single items reported retrospectively by parents and young people. Importantly, as noted above, the cross-sectional nature of the data, in combination with unobserved characteristics that contribute to selection into ACEs and PCEs and mental health outcomes, mean that causal inferences are not possible. As such, decisions to treat certain variables as independent variables, although supported by the literature, should be viewed with caution.

Although the NIYWS was designed to collect data that would enable as comprehensive and multi-factorial exploration of the mental health and wellbeing of children as possible, inevitably, there are many more characteristics of children, families, and environments

that could possibly affect a child's likelihood of ACE and PCE exposure than those included in the present analysis. Future research may benefit from the inclusion of a wider range of variables, as well as examination of the possibility of non-linear associations between ACEs, PCEs and mental health outcomes. Equally, while this analysis focused broadly on common mood and anxiety disorders, future research could focus on investigating the extent to which PCEs are associated with specific disorders within this generic grouping.

## 8. Conclusion

This study provides evidence for the Compensatory Model of Resiliency but not the Protective Model of Resiliency. It found direct independent associations between ACEs and PCEs in relation to young people's mental health outcomes with ACEs increasing the risk of common mood and anxiety disorders, self-harm and suicide ideation and PCEs acting as promotive factors in reducing the risk of each these outcomes. There was no moderating effect of ACEs and PCEs on any of the outcome variables, indicating that PCEs act largely independently of ACEs within the context of the Northern Ireland youth population. Although the lack of moderation suggests no particular benefit in targeting those young people who have higher levels of ACE exposure, the findings do suggest that initiatives to promote positive experiences among those with average or below average BCEs (more than two thirds of the 11–19 population) have the potential to improve youth mental well-being. The findings also indicate that initiatives to increase PCEs will have more impact on common mood and anxiety disorders and self-harm but somewhat more limited impact in relation to suicidal ideation.

## Data availability

The authors do not have permission to share data.

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