

Research paper

Resilience does not mediate the association between adverse childhood experiences and later life depression. Findings from the Irish Longitudinal Study on Ageing (TILDA)



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ABSTRACT

Background: Resilience has been found to moderate the association between childhood trauma and later depression. We examined whether resilience mediates the association between Adverse Childhood Experiences (ACEs) and later life depression among older adults.

Methods: Data were from The Irish Longitudinal Study on Ageing (TILDA), a prospective study of 8,500 community-dwelling adults aged ≥ 50 years. Negative binomial regressions were used to examine the relationships between ACEs, resilience, and depression and path analysis was conducted to test the potential mediating effect of resilience on the association between ACEs and depressive symptoms.

Results: Mean CES-D8 depression score was 3.3 from a maximum of 24. The average resilience score from a maximum of 15 was 8.9. 26.0% of participants had experienced at least one ACE before the age of 18. A history of ACEs was associated with increased depressive symptomatology. The strongest association was between physical abuse and depressive symptoms followed by sexual abuse, parental drug or alcohol use, and childhood poverty. Our path analyses showed that there was no evidence that resilience mediated the association between ACEs and depressive symptoms among this cohort.

Limitations: Information on ACEs was collected retrospectively. The resilience measure depended on experience of stressful life events in the last five years and therefore some participants were excluded.

Conclusions: ACEs were associated with an increased likelihood of late-life depressive symptoms. Higher resilience was associated with decreased likelihood of late-life depressive symptoms. A history of ACEs is associated with lower resilience. The association between ACEs and late-life depressive symptoms is not mediated by resilience.

1. Introduction

Seen in the context of aging populations, depression in later life is a major challenge for societies. Population studies of older people indicate that typically one-in-ten older adults meet the criteria for clinical depression (Briggs et al., 2018; Cable et al., 2017; Franz et al., 2011; Regan et al., 2013; Tsai and Chang, 2016) which independently confers an increased risk of several adverse health outcomes, including functional decline (Lenze et al., 2005; Oslin et al., 2000), dementia (John et al., 2019), cardiovascular events and all-cause mortality (Baldwin et al., 2006). Depression is also an important risk factor for death by suicide (Briggs et al., 2018; Shah et al., 2016; Van Orden and Conwell, 2011). In addition to the negative impact depression has on health, this condition is also harmful to daily functioning including

participation in paid employment (Steadman and Tasika, 2015).

Numerous factors contribute to later life depression including personal vulnerabilities, such as poor social support, cognitive impairment, comorbid pain conditions, and sleep disturbance (Wu et al., 2017). Other contributors include the strength of protective factors such as psychological resilience (Laird et al., 2019). Resilience, defined as the capacity to “remain well, recover, or even thrive in the face of adversity” (Hardy et al., 2004: 257), is regarded as the ability to maintain or regain well-being following negative events (MacLeod et al., 2016) and is believed to be a dynamic process within each individual, changing over time in response to different life experiences (van Kessel, 2013). Resilience is the manifestation of an individual's ability to utilize their own intrinsic capacity and harness available external supports. Resilience has also been described as a positive outcome response to

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oftentimes serious adversity (Masten, 2001). Higher levels of resilience have been previously found to protect against or moderate the association between childhood trauma and later depression (Wingo et al., 2010), even among individuals with a genetic predisposition for developing depression (Navrady et al., 2018).

Adverse Childhood Experiences (ACEs) has emerged over the last two decades as a major research theme (Kelly-Irving and Delpierre, 2019) and this area of study has further advanced our understanding of the impact of early life events on the development of later life depression (Chapman et al., 2004), the risk of suicide (Dube et al., 2001), and disease risk (McCrory et al., 2015; O'Hare et al., 2017). For example, a recent meta-analysis by Hughes and colleagues concluded that the relationship between ACEs and the subsequent development of mental health difficulties is stronger than that of the association between depression and physical health conditions (Hughes et al., 2017).

A recent publication on the interplay between ACEs, resilience, and the development of depression highlighted how individual and social resources were associated with lower mental distress in later life (Cosco et al., 2018). However, this study did not use a direct measure of resilience, but rather individual factors considered to confer resilience.

1.1. Aims of the study

Our aim here was to examine if resilience mediates the association between ACEs and later life depression among a population representative sample of community-dwelling adults aged 50 years and older. To answer this question, we tested four hypotheses – Hypothesis 1: ACEs are associated with increased likelihood of late-life depressive symptoms. Hypothesis 2: Higher resilience is associated with decreased likelihood of late-life depressive symptoms. Hypothesis 3: ACEs are associated with lower resilience. Hypothesis 4: The association between ACEs and late-life depressive symptoms is mediated by resilience.

2. Methods

2.1. Data source

Data were from The Irish Longitudinal Study on Ageing (TILDA), a prospective, nationally representative study of community-dwelling adults aged ≥ 50 years resident in the Republic of Ireland. Details of the methodology employed by TILDA are described in detail elsewhere (Donoghue et al., 2018; Kearney et al., 2011; Kenny et al., 2010; Whelan and Savva, 2013). In summary, TILDA participants were selected using multi-stage stratified random sampling whereby 640 geographical areas, stratified by socioeconomic characteristics, were initially selected. Forty households were then randomly selected within each of these areas. The Irish GeoDirectory listing of all residential addresses provided the sampling frame. The first Wave of data collection was conducted between 2009 and 2011, with subsequent waves collected at two-year intervals. Our analyses were based on data from the third wave of data collection (2014/15). Wave 3 data was chosen because the resilience measure we used was collected for the first time at this wave. At Wave 3, 6425 CAPI interviews were completed, and 83% ($n = 5353$) of these participants returned Self-Completion Questionnaires (SCQs). Details of the sample maintenance strategies used by TILDA are also available elsewhere (Donoghue et al., 2017). To account for stratification and clustering due to the sampling design, inverse probability weights were constructed and applied to all analyses. Separate weights were applied to account for non-response to the SCQ and attrition.

3. Measures

Depressive symptomology was measured using the short 8-item version of the centre for Epidemiological Studies Depression (CES-D) scale

(Radloff, 1977). This validated scale measures the frequency that respondents experienced a variety of depressive symptoms within the past week, with higher scores indicating increased depressive symptomology (Karim et al., 2015; O'Halloran et al., 2014). The CES-D8 has been shown to be a valid short form of the original longer form CES-D, with high reliability (0.72; O'Halloran et al., 2014). CES-D8 scores ranged from zero to 24 and a score > 8 has been shown to identify those with clinically significant depressive symptoms (Briggs et al., 2018).

3.1. Mediating variable

To complete the Resilience Scale, participants identified the most stressful life event, from nine possibilities, that they experienced in the past five years. The events presented to participants were: new residence or change in living arrangements; serious financial difficulty; experienced a crime e.g. mugging, burglary or theft; a relative or close friend had a serious injury or illness; a relative or close friend died; participant had a serious injury or illness; spouse/partner had a serious injury or illness; spouse/partner died; participants child died. In the original questionnaire, respondents were then asked a series of nine questions about their experiences following the chosen stressful event (Hardy et al., 2004). These questions focused on how the individual felt or responded to the event (for example, "After this event, how much worse did you feel than before it happened?"; "After this event, how much more discouraged were you?"). During feasibility, piloting and interviewer feedback, the original nine-item resilience scale was considered too long and that the questions were somewhat repetitive and potentially unsettling to participants. As a result of this feedback, it was decided to remove the question that asked "After this event, how much more discouraged were you?" as it captured similar information and was highly correlated with the question "After this event, how much worse did you feel than before it happened?" Items 8 ("Has this event made a permanent change in how you feel about your life?") and 9 ("Is that change for the better or for the worse?") were also combined. The revised version of the scale therefore included seven of the nine original items. The Resilience Scale had good internal reliability with an alpha coefficient of 0.70 and test-retest reliability with an intraclass correlation coefficient of 0.57. Validity was based on a significant correlation between resilience and having fewer depressive symptoms and good to excellent self-rated health (Hardy et al., 2004). Scores were summed to produce a score from 0 (least resilient) to 15 (most resilient).

3.2. Independent variables

We included four retrospectively recalled ACEs that occurred before the age of 18 and also a cumulative count of these events. This information was collected as part of the SCQ during Wave 1 data collection. Three of these items were adapted from the 22-item lifetime trauma list (Krause et al., 2004). Of these, two items asked whether respondents had experienced physical abuse by a parent, or physical abuse by some other person, prior to 18 years of age. The third item asked whether either of the respondent's parents drank or used drugs so often it caused problems in the family before the age of 18. Responses to the two physical abuse questions were aggregated to create one physical abuse indicator (experienced physical abuse yes/no). Two further items asked whether respondents had experienced sexual abuse by a parent, or sexual abuse by some other person, prior to 18 years of age. These two items were also aggregated to create one sexual abuse variable (yes/no). An additional variable was included that captures poverty during childhood. For this, respondents were asked to rate the financial circumstances of the household between birth and 14 years of age. Three response categories were available: pretty well off financially, about average, poor. A binary response was derived from these categories (poor yes/no). Finally, a cumulative ACE count variable was created to capture different levels of exposure. This was achieved by

summing the scores of the four ACE variables and is reported at three levels: no ACE, one ACE, two or more ACEs.

3.3. Covariates

We controlled for a number of socio-demographic characteristics associated with depression (Briggs et al., 2018). These were: age, sex, education, and marital status. Problematic alcohol consumption (yes/no) was based on the ‘Cut down, Annoyed, Guilty, Eye-opener’ (CAGE) questionnaire (Mayfield et al., 1974). A CAGE score of ≥ 2 indicated problem alcohol use.

A count of chronic conditions (none, one, two or more) was derived from self-reports. The conditions included here were: urinary incontinence, cataracts, glaucoma, age-related macular degeneration, lung disease, asthma, arthritis, osteoporosis, cancer, Parkinson's disease, peptic ulcer, varicose ulcer, liver disease, thyroid problems, chronic kidney disease, and severe anemia. Self-reported cardiovascular conditions (none, one, two or more) were also adjusted for. The conditions considered were: high blood pressure, angina, heart attack, heart failure, diabetes, stroke, transient ischemic attack, heart murmur, abnormal heart rhythm. We also included a variable that captured whether participants used any antidepressant medications (yes/no). Self-reported antidepressant medication (Anatomic Therapeutic Chemical Classification N06A) use was verified by examination of medication records in participants' home.

4. Statistical analysis

To examine the bivariate relationships between ACEs, resilience, and depression, a negative binomial regression was used as the outcome variable (CES-D8 depression score) was zero inflated, and over-dispersed meaning that the variance (14.8) was greater than the mean (3.3) (Sarma and Simpson, 2006). The dispersion parameter α confirmed that the data was over-dispersed (model $\alpha > 0$). Unstandardised coefficients (β) from these regressions denote the difference in the expected log count of the number of depressive symptoms. Descriptive statistics were estimated using Stata/MP 14.2 (StataCorp, 2015) while the mediation path analysis was conducted using Mplus V6.12 (Muthén and Muthén, 2011).

4.1. Path modeling

Path analysis was conducted to test the indirect effect of resilience on the association between ACEs and depressive symptoms (Hypothesis 4). The path model measures (1) direct effect from ACEs to depressive symptoms, (2) the indirect effect from ACEs to depressive symptoms via resilience, and (3) the total direct effect of ACEs on depressive

symptoms. Our conceptual model is represented in Fig. 1. The arrows show the paths that were estimated to test our hypothesis that the association between ACEs and depressive symptoms was mediated by resilience. These measures were considered endogenous as they are predicted by at least one variable in the model. Error terms (e) represent the variances of the endogenous variables that are not explained by other variables in our model. Fig. 1 also shows the model's independent exogenous variables, which are the covariates included in the analyses. The proportion of the mediating (indirect) effect as a proportion of the total effect was also calculated (Stride et al., 2015). Analysis was performed with robust maximum likelihood (MLR) due to the non-normal distribution of the dependent variable. Unstandardised coefficients (β) represent the difference in the expected log count of the number of depressive symptoms by each predictor variable.

4.2. Missing data

Full information maximum likelihood (FIML) estimation was employed to address missing data. By this method, parameter estimates were calculated using all available information, including cases with missing data on covariates (Asparouhov and Muthén, 2010). In sensitivity analysis we re-estimated our path models restricted to participants who had full data available on the three key variables (ACEs, resilience, and depressive symptoms; $n = 3413$). We also estimated our models stratified by gender (applying both FIML and listwise deletion to handle missing data).

Because completion of the resilience scale was dependent on participants having experienced one of nine adverse events list above (Hardy et al., 2004), we conducted sensitivity tests to assess whether completion of the resilience scale was itself related to the experience of ACEs or the presence of depressive symptomatology. To test this, we examined if those missing on ACEs variables differed in their resilience scores and, also whether those who completed the resilience scale had higher depressive symptoms than those who did not complete it. Finally, we repeated our path analyses with a dichotomous mediator variable that captured whether participants completed the resilience scale (yes/no), in place of the valid resilience scores.

5. Results

Our analytic sample included 6127 participants. The distribution of both endogenous and exogenous variables included in our analyses are presented in Table 1. The average age of participants was 66.4 years and ranged from 54 to 94 years. The mean CES-D8 depression score was 3.3 from a maximum of 24. Incident depression (CES-D8 > 8) was observed in 11.2% of participants. The average resilience score from a

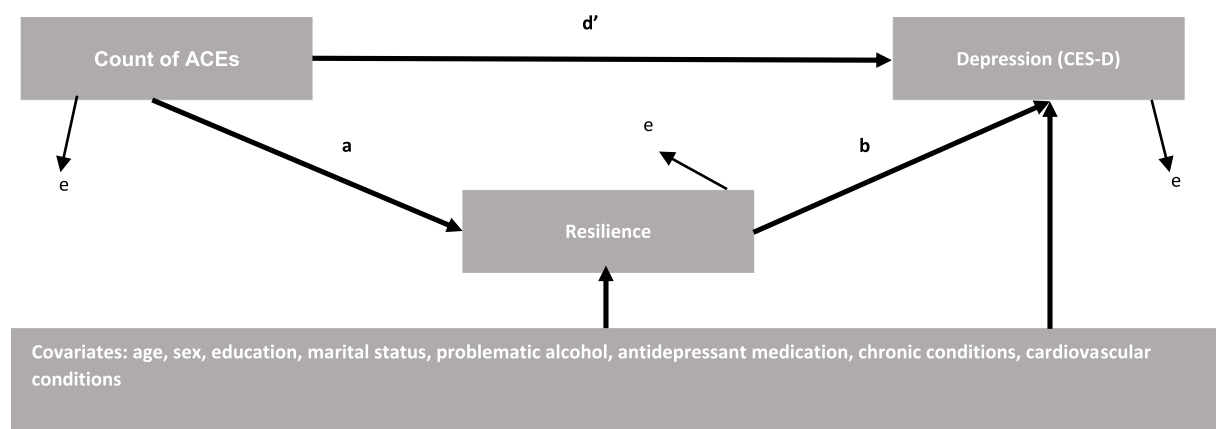


Fig. 1. Path model of relationship between ACEs and depressive symptoms. Direct effect = d' ; total indirect effect = $a + b$; total effect $d = d' + a + b$; e is the error term.

Table 1
Distribution of key characteristics of analytic sample ($N = 6127$).

	% or mean (Std. Error)
Mean age (54–95 years)	66.4 (0.171) (range = 54–95, median = 66)
Male	47.5% (0.006)
Female	52.5% (0.006)
Married / partner	67.7% (0.007)
Primary education	34.9% (0.009)
Secondary education	44.1% (0.008)
3rd level education	21.0% (0.007)
Mean CES-D depression	3.3 (0.049) (range = 0–24, median = 2)
Incident depression	11.2% (0.005)
Antidepressant medications	10.0% (0.004)
Mean resilience score (0–15)	8.9 (0.070) (range = 0–15, median = 10)
Sexual abuse	5.9% (0.003)
Physical abuse	6.5% (0.004)
Parental substance misuse	9.3% (0.005)
Childhood poverty	22.6% (0.007)
No ACE	66.6% (0.008)
One ACE	26.0% (0.007)
2 or more ACEs	7.5% (0.004)
Problematic alcohol	9.9% (0.004)
No chronic disease	37.8% (0.007)
One chronic disease	30.8% (0.007)
2 or more chronic diseases	31.5% (0.007)
No cardiovascular disease	50.8% (0.007)
One cardiovascular disease	34.0% (0.007)
2 or more cardiovascular diseases	15.2% (0.005)

maximum of 15 was 8.9. In terms of exposure to ACEs, 5.9% had experienced sexual abuse before the age of 18, 6.5% had experienced physical abuse, 9.3% parental alcohol or drug use, and 22.6% childhood poverty. Overall, 26.0% of participants had experienced at least one of the adverse events considered here while 7.5% had experienced two or more. 9.9% had a CAGE score ≥ 2 indicating problematic alcohol use. In terms of pre-existing conditions, 62.2% of participants had at least one chronic condition while 49.2% reported a cardiovascular condition.

Table 2 shows the results of multivariable negative binomial regressions to measure the association between both individual ACEs and a count of the total number of ACEs and depressive symptoms. The association between resilience and depressive symptoms are also shown. Model 1 shows the strength of each association independent of covariates. Having controlled for covariates in Model 2, the expected log count of depressive symptoms increased with a history of each of the individual ACEs and the sum of ACEs. The strongest association was between physical abuse and depressive symptoms followed by sexual abuse, parental drug or alcohol use, and childhood poverty. Each extra ACE was associated with an increase of 0.145 ($p < 0.001$) in the expected log count of depressive symptoms. Higher resilience scores were associated with a reduced expected log count of depressive symptoms.

Table 2
Depressive symptoms by ACEs (individual and count) and resilience (negative binomial regressions) ($N = 6127$).

	Model 1			Model 2		
	β	SE	P	B	SE	P
Sexual abuse	0.343	0.064	<0.001	0.235	0.061	<0.001
Physical abuse	0.393	0.063	<0.001	0.293	0.062	<0.001
Parental drug/alcohol use	0.264	0.061	<0.001	0.196	0.061	<0.001
Childhood poverty	0.197	0.041	<0.001	0.160	0.041	<0.001
Count of ACEs	0.188	0.022	<0.001	0.145	0.023	<0.001
Resilience	−0.109	0.006	<0.001	−0.094	0.006	<0.001

Model 1. Unadjusted; Model 2. Adjusted for age, age², sex, education, marital status, problematic alcohol, antidepressant medications, chronic conditions, cardiovascular conditions.

Table 3
Path coefficients (negative binomial) between ACEs and depressive symptoms (CES-D) ($N = 6127$).

Path from	Path to	β	SE	P
Sexual abuse				
Sexual abuse	Depressive symptoms	0.283	0.062	<0.001
Resilience	Depressive symptoms	−0.090	0.006	<0.001
Sexual abuse	Resilience	0.075	0.237	0.758
Physical abuse				
Physical abuse	Depressive symptoms	0.286	0.059	<0.001
Resilience	Depressive symptoms	−0.089	0.006	<0.001
Physical abuse	Resilience	−0.304	0.259	0.240
Parental drugs / alcohol				
Parental drugs / alcohol	Depressive symptoms	0.214	0.062	<0.001
Resilience	Depressive symptoms	−0.092	0.006	<0.001
Parental drugs / alcohol	Resilience	−0.096	0.217	0.657
Childhood poverty				
Childhood poverty	Depressive symptoms	0.150	0.044	<0.001
Resilience	Depressive symptoms	−0.091	0.006	<0.001
Childhood poverty	Resilience	−0.111	0.161	0.491
Count of ACEs				
Count of ACEs	Depressive symptoms	0.147	0.023	<0.001
Resilience	Depressive symptoms	−0.090	0.006	<0.001
Count of ACEs	Resilience	−0.090	0.088	0.307

Adjusted for age, age², sex, education, marital status, problematic alcohol, antidepressant medications, chronic conditions, cardiovascular conditions.

Table 3 shows the unstandardised path coefficients for the relationship between ACEs and depressive symptoms as described in the path model in Fig. 1. Path coefficients are shown separately for each of the individual ACEs and the total count of ACEs. The patterns of associations were uniformly similar for each with each ACE variable associated with an increase in the expected log count of depressive symptoms. While ACEs were associated with a small decrease in resilience, these associations were not statistically significant. The association between sexual abuse and resilience was different to that of the other ACEs in that it was associated with higher resilience scores. However, this association did not reach statistical significance. The strength of the association between sexual abuse, physical abuse, parental drugs or alcohol, and depression were very similar. The association between childhood poverty and depressive symptoms was the weakest of the individual ACEs. The effect of resilience on depressive symptoms ranged from −0.089 to −0.092.

In the final step of our analysis we estimated direct, indirect, and total effects for each path model (Table 4). The size of the direct and total effects in each model were broadly similar. Based on these estimated indirect effects, we found no evidence that resilience mediated the association between ACEs and depressive symptoms.

5.1. Results of sensitivity analyses

When listwise deletion was applied to address missing data, we found that the direction and strength of associations did not differ substantively. Our analyses stratified by gender showed an association between childhood poverty and resilience among women only ($\beta = -0.510$, $p < 0.05$) and an indirect effect of childhood poverty on depressive symptoms via resilience ($\beta = 0.050$, $p < 0.05$), however, these associations were accounted for by the inclusion of covariates. Participants who completed the resilience scale had higher depressive symptoms than those who did not complete it (3.7 vs. 3.0). We also found that participants who had experienced physical or sexual abuse were more likely to have completed the resilience questionnaire, so it appears they were more likely to have experienced at least one of the nine recent adverse events. Our final sensitivity analysis aimed to test whether completion of the resilience scale itself mediated the pathway between ACEs and depressive symptomatology. This was done by repeating our path analyses with a dichotomous indicator capturing whether participants completed the resilience scale (yes/no), in place of

Table 4
Decomposition of effects between ACEs and depressive symptoms (CES-D) (N = 6127).

	β	SE	P
Sexual abuse			
Direct effect of sexual abuse	0.283	0.062	<0.001
Indirect effect via resilience	−0.007	0.021	=0.751
Total effect	0.276	0.062	<0.001
Physical abuse			
Direct effect of physical abuse	0.286	0.059	<0.001
Indirect effect via resilience	0.027	0.023	=0.242
Total effect	0.313	0.06	<0.000
Parental drugs / alcohol			
Direct effect of parental drugs / alcohol	0.214	0.062	=0.001
Indirect effect via resilience	0.009	0.02	=0.657
Total effect	0.223	0.062	<0.001
Childhood poverty			
Direct effect of childhood poverty	0.150	0.044	<0.001
Indirect effect via resilience	0.010	0.015	=0.494
Total effect	0.161	0.044	<0.001
Count of ACEs			
Direct effect of count of ACEs	0.147	0.023	<0.001
Indirect effect via resilience	0.008	0.008	=0.311
Total effect	0.155	0.023	<0.001

the resilience scores. The results of this analysis showed that completion of the resilience scale did not mediate the pathway between any of the ACEs and depressive symptomatology.

6. Discussion

Using data from a large prospective cohort study of older community-dwelling adults, we found that resilience did not mediate the association between ACEs and later life depression. Our discussion is structured around our four *a priori* hypotheses – (1) ACEs are associated with increased likelihood of late-life depressive symptoms; (2) higher resilience is associated with decreased likelihood of late-life depressive symptoms; (3) a history of ACEs is associated with lower resilience; and (4) the association between ACEs and late-life depressive symptoms is not mediated by resilience.

Our findings support the first hypothesis. Each of the four individual ACEs and the count of these ACEs were associated with increased depression. These results concur with the systematic review of Hughes and colleagues which determined that there was a strong effect of experiencing ACEs on mental health outcomes (Hughes et al., 2017). Our study adds to these findings by examining individual ACEs rather than focusing on counts of events that may mask important heterogeneity in the effect of different events on psychological wellbeing. In doing so, our results show the strongest association was between physical abuse and depressive symptoms followed by sexual abuse, parental drug or alcohol use, and financial disadvantage.

In line with earlier cited research (Navrady et al., 2018; Wingo et al., 2010) our findings also support the second hypothesis that higher resilience is associated with a decreased likelihood of later life depressive symptoms. It is notable that the relationship was robust to controlling for a number of established risk factors for depression such as marital status, problematic alcohol use (Van Loo et al., 2018), education, and health status (Davison et al., 2019).

Our third hypothesis was not wholly supported. Despite the negative direction of the effect indicating that ACEs are associated with lower resilience, the coefficients for the ACE to resilience pathways did not reach statistical significance. While somewhat counterintuitive given this hypothesis was based on the original Center of Disease Control ACE pyramid (Giovannelli et al., 2019), there are some plausible explanations. One issue with the ACE pyramid is that it does not account for resilience or the receipt of interventions, instead focusing solely on the journey from childhood traumatic events to early

mortality. This does not consider that a number of circumstances have been found to counteract the adverse effect of ACEs. For example, research from The Chicago Longitudinal Study showed that the risk of a felony charge can be significantly reduced among those with two or more ACEs (Giovannelli et al., 2019). A previous TILDA study found that those who reported a past experience of childhood sexual abuse had in fact better global cognition, memory, executive function and processing than those who had not experienced such trauma despite having poorer psychological wellbeing (Feeney et al., 2013). Given these findings it is reasonable to conclude that the relationship between ACEs and long-term outcomes is complex, potentially malleable, and may not always follow the expected path.

The fourth hypothesis that the association between ACEs and late-life depressive symptoms is mediated by resilience, was not confirmed by our results. Given the failure to observe an association between our ACE indicators and resilience scores, our pathway analysis confirmed that there was no significant indirect effects for any of the ACE indicators on depressive symptomatology via resilience. There are a number of possible explanations for not finding the mediating effect of resilience to the development of depression among those with ACEs. From a methodological perspective, classification and measurement procedures are important to consider. Two thirds of the cohort reported no ACE and 22.6% of those classified as “ACE-positive” was due solely to childhood poverty. There has been substantial discourse in the literature about the classification of ACEs and particularly the inclusion of childhood poverty (Hartas, 2019). However, in order to be able to compare our findings to other studies we followed the conventional approach (Cheong et al., 2017). As well as the challenge associated with classifying ACEs, the measurement of resilience is also difficult (MacLeod et al., 2016; Mendenhall and Kim, 2019). While a standardised tool was used in this study a scientific review of the resilience scales published up to 2011 determined none are a “gold-standard” measure (Windle et al., 2011). It is also important to consider non-methodological explanations and review the findings of other studies that have examined this question. A Canadian study had similar mixed findings on the potential moderating and mediating effect of factors related to resilience on later life mental distress (Cosco et al., 2018). While social support and neighborhood cohesion explained substantial proportions of the relationship between early life adversity and later life mental distress, they only partly mediated the relationship and there was no moderation of the associations between early psychosocial adversity and mental distress through these resources. Furthermore, they examined if any factors were particularly protective in high risk groups by investigating whether there was an interaction between psychosocial adversities and resources however, none were found.

Our analysis also highlights a potential methodological problem with the common practice of using unweighted counts of ACEs in many studies (Hughes et al., 2017). At issue is the possibility that counts of events may mask important differences in the effect of different ACEs on outcomes in later life. Furthermore, this approach may limit our ability to identify mechanisms that may explain the association between ACEs and these outcomes. For example, the pathway between childhood poverty and poorer outcomes is likely different than that which explains the deleterious effect of sexual abuse. Indeed, our analysis demonstrated that there can be variance in the impact of specific ACEs as we found that the relationship between sexual abuse and resilience was different to that of the other ACEs in that it was associated with higher resilience scores.

6.1. Relevance to policy

The relevance of these findings to policy must be caveated by highlighting that ACEs were never intended as a diagnostic tool, rather they are a probabilistic population-level tool (Kelly-Irving and Delpierre, 2019). This is an important distinction in today's world of child protection, prevention and early intervention. Commentaries have

been written on the potential misuse of ACEs in trauma informed policing (Bateson et al., 2019) and argued against widespread screening (Finkelhor, 2018). However, these advisories are not always heeded. For example, the American Academy of Paediatrics have encouraged medics to screen for toxic stress and this has informed the inclusion of screening for ACEs in care models in some medical services (Purewal et al., 2016). Furthermore, there have been similar national policy developments worldwide (Ford et al., 2019). While there are potential benefits to these actions there is also the possibility of harm (Afifi, 2018).

What our findings do tell us is that there are long term consequences of ACEs within the Irish context and the increased risk among affected individuals is independent of other risk factors for depressive illness. Reducing the prevalence of ACEs within the Irish population will bring about gains to society including reduced risk for depression in later life. However, achieving this reduction is unlikely to be brought about by the health service as its focus is treatment when depressive illness emerges in later life, not prevention. Utilizing an ecological framework to understand and address the risk factors for child maltreatment such as that published in the European Status Report on Preventing Child Maltreatment is more likely to lead to effective population level policies that address the core contributors to ACEs (Sethi et al., 2018).

6.2. Limitations

The limitations of this study are largely measurement related. With regards to the data on ACEs we are reliant on self-report data collected retrospectively. There is therefore the possibility of recall bias. Furthermore, we lack information regarding the age of onset and duration of abuse which is also a limitation given the effects of stress on the brain during childhood and adolescence may depend on whether the stressor occurs during critical windows for the development of particular brain structures. Also, our data points were limited to start (< 18 years) and end-point (> 53 years) only meaning we could not examine possibly critical events in the intervening period that a fuller life course approach such as that employed by Kelly-Irving et al. would have enabled (Kelly-Irving et al., 2013). The resilience scale used focuses on experience of stressful life events in the last five years and therefore some of the sample who experience ACEs did not meet this inclusion criterion and therefore would not have been routed to answer the resilience questions. However, our sensitivity analysis does address this to some extent. The outcome variable of interest, later life depression, was based on validated screening tools rather than gold standard clinical diagnosis. However, the CES-D has been validated against clinical diagnoses and is recommended for use in community populations.

7. Conclusion

Later life depression is a possible outcome of early childhood trauma that may or may not be responsive to the protective influence of resilience. Further research in other population level studies to determine the robustness and reproducibility of our findings is warranted. Further examining what, if any, influence other individual level characteristics such as coping style or personality may have on the pathway would be a positive addition to the knowledge base in this field.

Author contribution

RAK is the Principal Investigator and project coordinator of the TILDA study. MW and NT conceived the paper and wrote the initial draft of the manuscript. MW conducted the analysis. RB, AO'H, and RAK critically revised and edited the manuscript. MW finalized the manuscript for submission. All authors had responsibility for accuracy of the final content, and read and approved the final manuscript.

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Declaration of Competing Interest

None.

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