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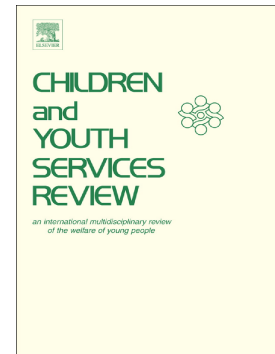
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Comparison of suicidal ideation, suicide attempt and suicide in children and young people in care and non-care populations: Systematic review and meta-analysis of prevalence

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ACCEPTED MANUSCRIPT

Abstract

Suicide in children and young people is a major public health concern. However, it is unknown whether individuals who have been in the care of the child welfare system are at an elevated risk. Care is presently defined as statutory provision of in-home care (e.g. child living with birth family but in receipt of legal order involving supervision by social workers) or out-of-home care (e.g. foster care, residential care and kinship care). This present paper presents a systematic review and meta-analysis comparing the prevalence of suicidal ideation, suicide attempt and suicide in children and young people placed in care with non-care populations. A systematic search was conducted of 14 electronic bibliographic databases and 32 websites. Of 2811 unique articles identified, five studies published between 2001 and 2011 met the inclusion criteria. Studies reported on 2448 incidents of suicidal ideation, 3456 attempted suicides and 250 suicides. The estimated prevalence of suicidal ideation was 24.7% in children and young people in care compared to 11.4% in non-care populations. The prevalence of suicide attempt was 3.6% compared to 0.8%. Two studies reported on suicide. Suicide risk in children and young people in care was lower in one study (0% vs 0.9%) and higher in the second (0.27% vs 0.06%). The results of the systematic review and meta-analysis confirm that suicide attempts are more than three times as likely in children and young people placed in the care compared to non-care populations. Targeted interventions to prevent or reduce suicide attempt in this population may be required. Further comparative studies are needed to establish if children and young people in care are at an elevated risk of suicidal ideation and suicide.

Keywords: suicide; children; adolescents; group home; foster home care; systematic review

1. Introduction

Suicidal ideation, suicide attempt and suicide amongst children and young people is a major global concern (WHO, 2014). Suicidal ideation (thoughts of suicide) often precedes suicide attempt with more than a third of adolescent ideators going on to make an attempt on their life (Nock et al., 2013). Prevalence of suicidal ideation is reported in 17% of adolescents in the USA (Centre for Disease Control, 2017). Community samples have reported that 8% of high school students in the USA have attempted suicide within the past twelve months, with 2.7% requiring medical treatment (Centers for Disease Control and Prevention, 2017). Prior suicide attempt is a key risk factor for suicide. Young people up to the age of 25 years old who die by suicide are sixteen times more likely to have made a previous attempt on their life than non-suicidal individuals (Beautrais et al., 1996). While routinely underestimated due to incomplete data capture (Gosney & Hawton, 2007; Hawton et al., 2012; Kolves, 2010), suicide remains the second leading cause of death globally for 15-29 year olds (WHO, 2014). It is the second leading cause of death for 10-24 year olds in the USA (Centers for Disease Control and Prevention, 2017) Despite the growing evidence base reporting the prevalence of suicide-related outcomes amongst children and young people at the population-level, there is more limited research exploring which population subgroups are at an elevated risk. This includes children and young people who have been in the care of the child welfare system. For the purposes of this study we define care as statutory provision of supported in-home or out-of-home care. In home care refers to care system practices where children live with their birth families but are under a legal order by the welfare system and are in receipt of close supervision by social workers or other care professionals. Out of home care is inclusive of foster care, residential care and kinship care.

A small number of studies have attempted to estimate the prevalence of suicide-related outcomes in children and young people in care. Suicidal ideation has been estimated, with reports of prevalence ranging from 10.24% to 26.72% (Gabrielli et al., 2015; Harkess-Murphy et al., 2013; Taussig et al., 2014; Zapata et al., 2013). Data from the National Survey of Child and Adolescent Well-being (NSCAW), a nationally representative study of youth in the USA child welfare system, reports that individuals in group homes are more than seven times as likely to express suicidal ideation than those in kinship care, whilst individuals in foster care are more than three times as likely (Anderson, 2011). Meanwhile data from the USA Fostering Healthy Futures randomized controlled trial indicated that 3.69% of children aged 9-11 years entering foster care due to maltreatment attempted suicide (Taussig et al.,

2014). Other studies have reported higher prevalence rates of suicide attempt (Bronsard et al., 2011; Cousins et al., 2008; Cousins et al., 2010; Harkess-Murphy et al., 2013; Hukkanen et al., 2003), particularly amongst individuals in group homes. A USA survey of adolescents residing in group home placements and participating in an alcohol prevention project, Kids Independent of Drugs, indicated a prevalence rate of 28% (Johnson et al., 2000; Li et al., 2001). One of the most methodologically robust estimates of suicide prevalence comes from a Finnish national cohort study on individuals in foster care and residential care (Kalland et al., 2001). Of a population of 13371 individuals the prevalence of suicide was reported at 0.26%.

Within these studies, there have been attempts to identify which particular individuals in care are vulnerable to suicide-related outcomes. To date there is no evidence to support that outcomes are patterned by age (Taussig et al., 2014). Females in care are reported as being more likely to attempt suicide (Bronsard et al., 2011; Cousins et al., 2010), and are at increased risk of suicide (Kalland et al., 2001). Evidence on outcomes by ethnicity is limited, although there is some report that suicide ideation is higher in Hispanic populations (Taussig et al., 2014) and suicide attempts are more prevalent in white populations (Johnson et al., 2000; Taussig et al., 2014). Selected studies have considered the patterning of outcomes according to the reasons for entry into care. Taussig et al. (2014) found higher rates of suicidal ideation in children who have been physically or sexually abused compared to other forms of maltreatment, whilst children exposed to multiple forms of maltreatment are at a higher risk of ideation than those exposed to one form of abuse. Individuals who attempt suicide are more likely to have experienced sexual abuse compared to other forms of maltreatment. They are also more likely to have had a higher number of prior referrals to the child welfare system, a higher number of household transitions and a longer period of time in foster care. In Cousins et al.'s (2008) study, children and young people in residential care, foster care and kinship care who attempt suicide had higher scores on the Strengths and Difficulties Questionnaire (a composite measure of emotional symptoms, conduct problems, inattention hyperactivity, peer problems and pro-social behaviours). A recent study by Wadham et al. (2017) offers some suggestion that young people in care experience emotional states and responses to self-harming practices that might motivate such behaviours. For example, this group report immediately feeling better after engaging in self-harm, and also experience fearlessness of death and impulsivity following recent self-harming practices. Johnson et al. (2000) also report on the prevalence of suicide outcomes according to family

background, with young people in residential care who make multiple suicide attempts being more likely to have a family history of drug use or nervous breakdown, compared to those who do not make an attempt on their life.

These studies are subject to a number of limitations. Particularly problematic is the fact that very few include a comparator population. As such, we do not clearly know if children and young people in care are distinctly vulnerable and if suicide prevention and intervention needs to be prioritised within this group. We might hypothesise that this population will be at an elevated risk as they are more likely to be exposed to established risk factors for suicide-related outcomes. Physical abuse and psychological maltreatment are a major risk for suicide attempt (Thompson et al., 2005; Sigfusdottir et al., 2013), and the chronicity of maltreatment experienced by children and young people is one of the main reasons for their entry into the child welfare system (Pears et al., 2008). Psychiatric disorders are associated with suicide attempt in adolescence (Nock et al., 2013). It is estimated that up to 50% of children and young people in care have a mental health disorder (Lehmann et al., 2013), with the number of psychiatric diagnoses being almost five times higher than those living in private households (Ford et al., 2007). Individuals in care are more likely to experience substance use (Long et al., 2017), which is linked to increased prevalence of suicidal ideation and suicide attempt (Hallfors et al., 2004). Maternal depression, psychosis and referral to psychiatric services are associated with a child entering into care (Simkiss et al., 2012) and also predict suicide attempt (Hammerton et al., 2015).

The present systematic review and meta-analysis estimates and compares the prevalence rates of suicidal ideation, suicide attempt and suicide in children and young people that have been placed in care and non-care populations. The review compares both relative and absolute risk. We present risk differences as they more clearly convey relative effect size with rare outcomes such as suicide. In anticipation of potential heterogeneity in studies, the review a priori specified the conduct of subgroup analysis according to sample characteristics (community vs clinical) and ascertainment of outcome (self-reporting vs clinical ascertainment).

2. Method

The systematic review and meta-analysis are presented in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Liberati et al., 2009).

2.1. Formulation of the Research Question

The study research question was formulated in accordance with the PICO (Population, Indicator, Comparator, Outcome) framework in order to develop an operational search strategy. The research question was expressed as: What is the prevalence of suicidal ideation, suicide attempt, and suicide (O) in children and young people (P) in care (I) compared to non-care populations (C)?

2.2. Search Strategy

A search was conducted for published and unpublished studies across 14 electronic bibliographic databases and 32 websites. A panel of international experts were contacted for recommendations. Citation tracking and reference list checking was undertaken with included articles. Studies were identified from 1959, demarcating inception of the UN Convention on the Rights of the Child, which offered the first major international consensus on state responsibility in the safeguarding of children. Searches were conducted in November 2014 and updated in October 2015 and July 2016. Databases searched were: ASSIA; CINAHL; EMBASE; EPPI Centre DoPHER; HMIC; MEDLINE; MEDLINE in Process; OpenGrey; PsycINFO; Social Care Online; Social Science Citation Index & Conference Proceedings Citation Index – Science and Social Science & Humanities; Social Services Abstracts; Sociological Abstracts; Scopus. A sensitive search strategy was developed in Ovid MEDLINE, before being adapted to the search functions of each database and website to maximise sensitivity. Searching combined keywords and medical subject headings pertaining to care (*substitute care, local authority care, out-of-home care, state care, public care, refugee, asylum, residential care, foster care, kinship care, children's home, in care, custody, supported living, looked after, orphan, institution, nonparent care*) and terms related to self-harm and suicide (*auto-mutilation, self-cutting, self-defeating behaviour, self-destructive behaviour, self-inflicted, self-injury, self-harm, self-immolation, self-laceration, self-mutilation, self-poisoning, suicidal ideation, parasuicide, attempted suicide, overdose, fatal behaviour, suicide*). Self-harm terms were included to enhance search strategy sensitivity, as an incident of self-harm and suicide attempt may not be clearly differentiable. Searches were conducted by specialist systematic reviewers. Yielded studies were stored and managed using RevMan version 5.5.5 bibliographic software package.

2.3. Inclusion and Exclusion Criteria

Studies had to meet the following criteria to be included in the study. First, studies had to report prevalence rates for suicidal ideation, suicide attempt or suicide. If not provided sufficient data had to be included so that the prevalence rate could be calculated. Composite suicidality outcomes were excluded due to collapsing of categories of non-suicidal self-harm, suicidal ideation and suicide attempt. As such it would not be possible to estimate prevalence for each outcome. Second, prevalence data had to be reported for individuals aged ≤ 25 who had been in care. Care was defined as both statutory provision of in-home care and out-of-home care. Definitions of care provision had to specify statutory involvement. Third, studies had to report prevalence data for a comparator population aged ≤ 25 who had not been in care. We excluded national prevalence rates as comparator populations due to contamination by likely inclusion of in-care populations. Fourth, studies had to report primary data. Fifth, studies had to be published in the English language. The study design was not specified a priori. Study titles and abstracts were independently screened by two members of the review team, with disagreement settled by consensus. Full-texts of remaining articles were independently assessed against the inclusion criteria. Discrepancies were adjudicated by a third reviewer.

2.4.Data Extraction and Quality Appraisal

We developed and piloted a standardized extraction pro-forma, with calibration exercises being conducted with a subset of studies to ensure reviewer consistency. One reviewer conducted full data abstraction and two reviewers verified accuracy. Abstracted data included: citation details; country; data source; care definition; eligibility criteria; sampling strategy; care sample; comparator sample; response rate; outcome definition; analysis; prevalence of outcome in care sample; prevalence of outcome in comparator sample; risk factor covariates. Two authors were contacted to provide clarification on the definition of care and the method of ascertainment (Stewart et al., 2001; Pritchard & Williams, 2009). Disagreements in abstraction were resolved through discussion, with two reviewers adjudicating disagreements.

The methodological quality of included studies were independently assessed by two reviewers, using a checklist adapted from the National Institute of Clinical Excellence Quality Appraisal Checklist for Quantitative Studies Reporting Correlations and Associations. Eleven checklist items were included addressing four domains: population and sample; exposure definition and ascertainment; outcome definition and ascertainment; analytical approach. Each item was indexed as having a low risk of bias (++) , medium risk of

bias (+), or high risk of bias (-). A study was defined as “high quality” if it scored the maximal possible score across 60% of items (Kuijpers et al., 2004; Luppino et al., 2010), and did not score as having a high risk of bias on any item. A study was “low quality” if it scored a high risk of bias across $\geq 60\%$ of items. Disagreements were resolved through consensus.

2.5. Meta-analytic Procedures

Most studies had few events, so odds ratios and 95% confidence intervals were calculated with the use of the Mantel-Haenszel random effects model. This method has less biased effect size estimates, more statistical power, and greater coverage of confidence intervals than the inverse variance-weighted DerSimonian-Laird random effects model when events are rare and there is an imbalance in intervention and control group sizes (Bradburn et al., 2007; Sweeting et al., 2004). Heterogeneity between studies was quantified by I^2 tests. Forest plots were generated to present the study specific and pooled odds ratios for suicidal ideation, suicide attempt and suicide for individuals who had been in care and the comparator non-care population with 95% CIs. Analysis for publication bias was not conducted as there is a significant risk of false positives when tests of asymmetry are conducted on fewer than ten studies and when I^2 values are greater than 50% (Ioannidis & Trikalinos, 2007). Analyses were carried out using RevMan version 5.3.5.

As events of suicide-related outcomes are rare, risk differences and 95% confidence intervals were used to summarise the risk associated with care as they have been found to most clearly convey the relative size of effects (Rothman et al., 2008; Vandermeer et al., 2009).

Results

2.6. Included Studies

A total of 2811 unique articles were identified. Following the screening of titles and abstracts, 145 studies remained with 1347 not being relevant. Of these remaining studies, eight met the eligibility criteria. However, three did not report, or the authors could not provide, numerators and denominators for the care and comparator population so that prevalence rates could be calculated (Anderson, 2011; Beautrais, 1996; Vinnerljung et al., 2006). These studies were subsequently excluded. Five studies published between 2001 and 2011 provided sufficient data and were included in the present review and meta-analysis. Across these studies, there were 9321 individuals who had been in care and 373674 individuals from comparator populations. The process of study screening and retrieval is presented in Figure 1.

Figure 1. Flowchart of Study Selection (Adapted from Preferred Reporting Items for Systematic Review and Meta-analyses (PRISMA) flow diagram)

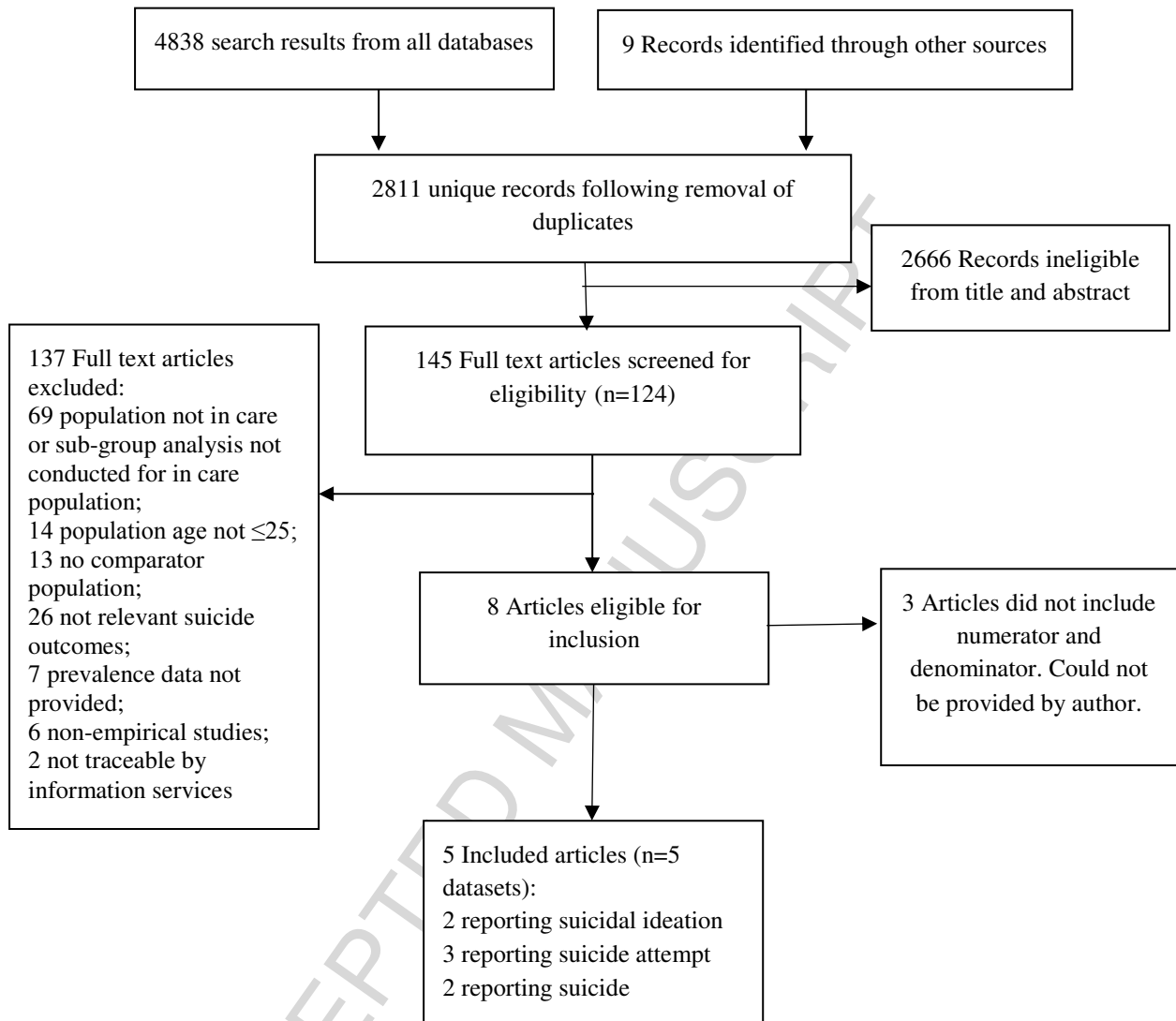


Table 1 shows that studies were heterogeneous in terms of country, design, definition of the care population, definition of comparator population, and definition of outcome. Two studies were conducted in Canada (Katz et al., 2011; Stewart et al., 2001), one in the U.S.A (Pilowsky & Wu., 2006), one in England (Pritchard & Williams, 2009) and one from Australia (Sawyer et al., 2007). Care comprised legal status as being in care or residential care (Pritchard & Wu, 2009), foster care (Katz et al., 2011; Sawyer et al., 2007) and a combination of different types of out-of-home care (Katz et al., 2011; Stewart et al., 2001). The comparator in four studies was defined as individuals who had not been in care (Katz et al., 2011; Pilowsky & Wu, 2006; Sawyer et al., 2007; Stewart et al., 2001), while the comparator in Pritchard and Williams's (2009) study comprised young people who had permanently been excluded from school. Suicidal ideation was measured by self-report in two studies (Pilowsky & Wu, 2006; Sawyer et al., 2007). Suicide attempt was assessed via self-report in two studies (Pilowsky & Wu, 2006; Sawyer et al., 2007), hospital recording of ICD-9 codes or ICD-10-CA codes in one study (Katz et al., 2011) and independent assessment by three physicians on presentation to ER in a fourth study (Stewart et al., 2001). Suicide was reported as being verified by ICD-10 (Katz et al., 2011) or ICD-9 codes (Pritchard & Wu, 2009). Frequency of previous suicide-related outcomes was not reported, with the exception of Stewart et al. (2001) where both the care and comparator population had been admitted to ER with an attempt six months prior. The risk of bias varied across studies, with one being rated as low risk (++) (Katz et al., 2011), three as medium risk (+) (Pilowsky & Wu, 2006; Sawyer et al., 2007; Stewart et al., 2001), and one as high risk (-) (Pritchard & Williams, 2009).

Table 1.Characteristics of studies included in the systematic review

| | Katz et al. (2011) | Pilowsky & Wu (2006) | Pritchard & Williams (2009) | Sawyer et al. (2007) | Stewart et al. (2001) |
|--------------------------|--|---|---|--|---|
| Country | Canada | U.S | England | Australia | Canada |
| Design | Cohort | Cross-sectional | Cohort | Cross-sectional | Cohort |
| Age at Baseline | 5-17yrs | 12-17yrs | 16-24yrs | 13-17yrs | 7-19yrs |
| Follow-up | 5-7yrs | - | 5yrs | - | 6 months |
| Exposure | Out of home care; first time in care; care duration ≥ 30 days. | Foster care; any lifetime exposure | Residential care; any lifetime exposure | Foster care; current | Foster care/group home; any lifetime exposure |
| Exposure Ascertainment | Population Health Research Data Repository/Manitoba Vital Certificates Mortality Data | National Household on Drug Abuse Survey (NHSDA) | County Records | Questionnaire | Admitted to ER and medical records |
| Exposed Sample Size | 8279 | 464 | 438 | 90 | 50 |
| Comparator | Not in care | No history of foster care | Permanently excluded from school | Residing in private households | No history of foster care/group home; |
| Comparator Ascertainment | Population Health Research Data Repository/Mani-toba Vital Certificates Mortality Data | National Household on Drug Abuse Survey (NHSDA) | County Records | Child and Adolescent component of National Survey of Mental Health and Wellbeing | Admitted to ER and medical records |
| Comparator Sample Size | 353050 | 18966 | 215 | 1269 | 174 |
| Outcome | Suicide attempt; lifetime Suicide | Suicide ideation; 12 months Suicide attempt; 12 months | Suicide | Suicide ideation; 12 months Suicide attempt; lifetime; 12 months | Suicide attempt; 6months |

| Outcome Measurement | Suicide attempt: ICD-9 codes /ICD-10-CA codes Suicide: ICD-10 codes | Self-report | Suicide: ICD-9 codes | Self-report; Youth Risk Behaviour Surveillance System Questionnaire | Independent assessment by three physicians |
|------------------------|--|--|----------------------|---|--|
| Prevalence Exposed: | | | | | |
| Suicidal Ideation | | 26.8% (n=124) | | 14.4% (n=13) | |
| Suicide Attempt | 2.7% (n=225) | 15.3% (n=71) | | 10% (n=9) | 38% (n=19) |
| Suicide | 0.7% (n=22) | | 0% (n=0) | | |
| Prevalence Comparator: | | | | | |
| Suicidal Ideation | | 11.4% (n=2162) | | 11.8% (n=149) | |
| Suicide Attempt | 0.6% (n=2245) | 4.2% (n=797) | | 4.3% (n=54) | 20.7% (n=36) |
| Suicide | 0.06% (n=226) | | 0.9% (n=2) | | |
| Covariates | Care status; age; sex; SES; presence of parental psychopathology; presence of psychiatric disorder | Age; gender; race/ethnicity; family income; population density | Not reported | Not reported | Not reported |
| Study Quality | High (++) | Medium (+) | Low (-) | Medium (+) | Medium (+) |

2.7.Suicidal Ideation

Studies reporting on suicidal ideation included 2488 cases across 20789 individuals (Pilowsky & Wu, 2006; Sawyer et al., 2007). The pooled prevalence was 24.7% in children and young people in care and 11.4% in the comparator non-care populations (See Figure 2). Individuals who had been in care were approximately twice as likely to express suicidal ideation as those in the comparator populations (OR=2.00, 95%CI: 0.91-4.38). These differences should not be treated as significant. The pooled risk difference between the two populations was 0.09 (95%CI: -0.03-0.22). There was a large amount of heterogeneity between studies ($I^2=83%$, $p=0.01$).

2.8.Suicide Attempt

Studies reporting on suicide attempt presented 3456 cases in 382342 individuals. The pooled prevalence was 3.6% in children and young people in care and 0.8% in the comparator non-care populations (See Figure 3). (Katz et al., 2011; Pilowsky & Wu, 2006; Sawyer et al., 2007; Stewart et al., 2001). Individuals who had been in care were more than three times as likely to attempt suicide (OR=3.89, 95% CI: 3.14-4.83). The pooled risk difference was 0.08 (95% CI: 0.01-0.15). There was a moderate amount of between study heterogeneity ($I^2=41%$, $P=0.17$). A sensitivity analysis removing Stewart et al.'s (2001) study, due to the sample being repeat admissions to hospital because of suicide ideation, plans, or attempts, had little effect on the risk associated with being in care and suicide attempt. Following study removal, individuals in care were more than four times as likely to attempt suicide (OR=4.22, 95% CI: 3.68-4.84).

2.9.Suicide

Two studies estimated the risk associated with being placed in the care of the child welfare system and suicide (Katz et al., 2011; Pritchard & Williams, 2009). Together these studies reported on 22 cases of suicide across 361982 individuals. The different direction of effects and lack of overlap in 95% CIs suggested that construction of a pooled odds ratio would not meaningfully characterise the difference in prevalence rates between populations. As a result studies are reported narratively. In Pritchard and Williams (2009) the prevalence of suicide in the care population was 0% and 0.9% in the comparator population. In Katz et al. (2011) the prevalence of suicide in the in care population was 0.27% and 0.06% in the comparator population. The calculated odds ratio was 0.10 (95% CI: 0.00-2.04) in the first study (Pritchard & Williams, 2009) and 4.15 (95% CI: 2.69-6.41) in the second (Katz et al., 2011).

Figure 2: Forest plot comparing risk of suicidal ideation in children and young people in care and a comparator population (n=20,789)

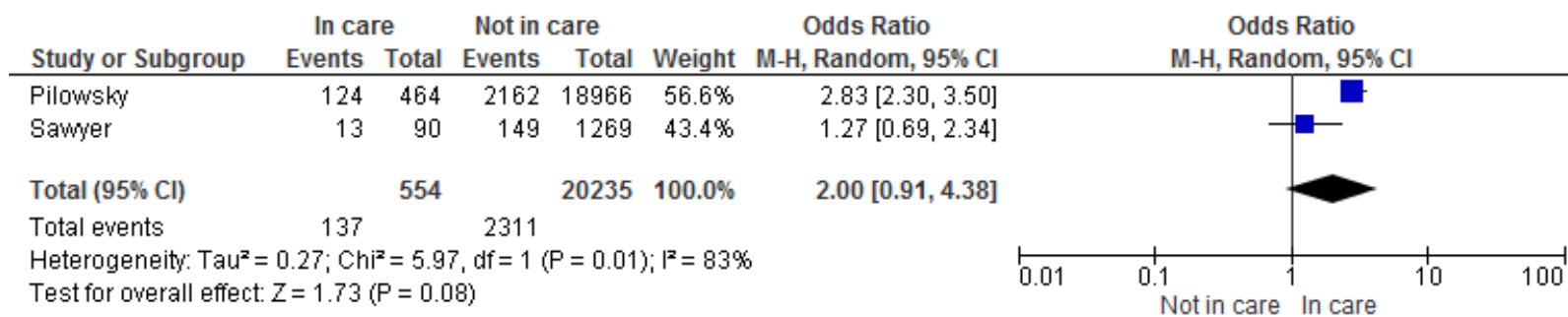
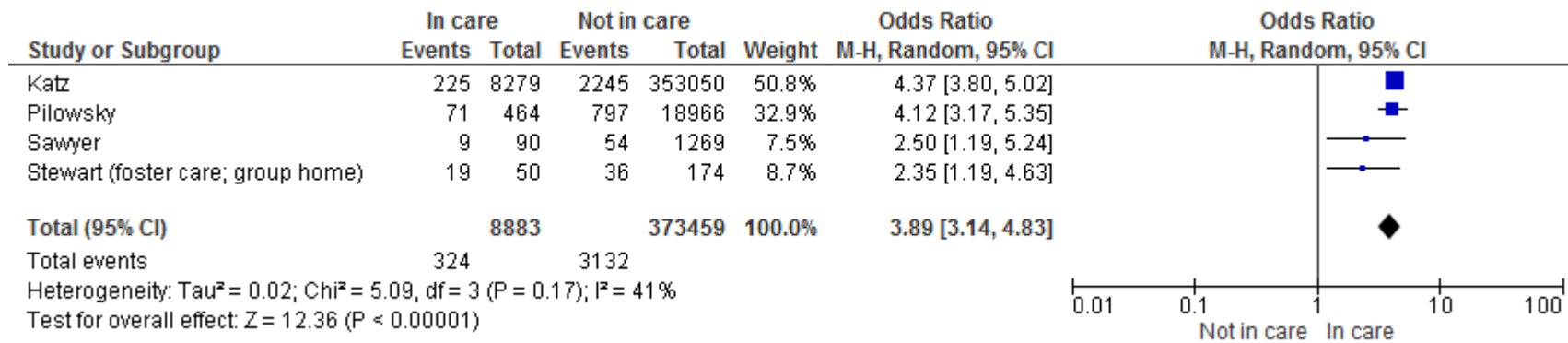


Figure 3: Forest plot comparing risk of suicide attempt in children and young people in care and a comparator population (n=382,342)



3. Discussion

This is the first systematic synthesis and meta-analysis comparing the prevalence of suicidal ideation, suicide attempt and suicide in children and young people who have been in care with individuals that have not been in care. For children and young people who have been in care the pooled prevalence rate of suicidal ideation was 24.7%, suicide attempt was 3.6%, and suicide was 0% and 0.27%, based on five independent samples including 9321 individuals. As hypothesized, suicide attempts were more prevalent when compared to non-care populations, with children and young people in care being more than three times as likely to make an attempt on their life (Katz et al., 2011; Pilowsky & Wu, 2006; Sawyer et al., 2007; Stewart et al., 2001). The prevalence of suicidal ideation was not significantly higher amongst individuals in care (Pilowsky & Wu, 2006; Sawyer et al., 2007). Of the two studies reporting on suicide, one found that it was more than four times as likely in children and young people in care (Katz et al., 2011). The second study reported no statistically significant difference in prevalence rates (Pritchard & Williams, 2009). The limited number of studies reporting on the comparative prevalence of suicidal ideation and completed suicide makes it premature to draw any conclusions for these outcomes.

The review hypothesised that children and young people in care would be at an elevated risk of suicide-related outcomes due to increased exposure to established risk factors. However, studies included in the review did not present comprehensive data on the risk profiles across populations. As such, we are unsure how well matched the populations are and how the differences in risk profiles might explain the elevated risk of suicide attempt in those in care. Potential differences in risk profiles may account for the fact that in the two studies reporting on suicide, one found an increased risk associated with care and one indicated no difference in prevalence rates (Katz et al., 2011; Pritchard & Williams, 2009). These studies included different comparator populations. Katz et al.'s (2011) comparison group comprised young people who had not been in care, whilst Pritchard and Williams (2009) used adolescents permanently excluded from school. The latter population is arguably more comparable to those in care due to the sharing of risk factors associated with suicide attempt, such as academic attainment and criminal activity (Beautrais, 2001; Goldman-Mellor et al., 2013).

The review a priori specified the conduct of subgroup analysis according to sample characteristics and ascertainment of outcomes. However, there were an inadequate number of studies included in the review to conduct this analysis. The heterogeneity between studies in sample characteristics, variations in the definition of care and comparator populations, and

outcome assessment measures, may therefore have contributed to differences in prevalence rates between studies. Study samples presented some diversity in terms of the included age range, which is significant given that prevalence of self-harm, suicide attempt and suicide increase throughout childhood and adolescence (Hawton et al., 2012; National Center for Injury Prevention and Control, 2015). For example, the included community studies reporting on suicide attempt presented data from 5-17 year olds (Katz et al., 2011), 12-17 year olds (Pilowsky & Wu, 2009) and 13-17 year olds (Sawyer et al., 2007). The prevalence rate for attempt was lower in the Katz et al (2011) study, which may reflect the inclusion of a younger cohort.

Studies did not report a standardised definition of care. For the studies reporting on suicidal ideation and suicide attempt, two reported 'lifetime' experience of being in the child welfare system (Pilowsky & Wu, 2006; Stewart et al., 2001). Two defined individuals as 'currently' in care and having been so for at least a month (Katz et al., 2011; Sawyer et al., 2007). As length of residency in the child welfare system is reported as a risk factor for suicide attempt (Taussig et al., 2014), we might explain why individuals with 'lifetime' exposure present a higher prevalence of suicide-related outcomes. Some definitions of care also give rise to the potential risk of misclassification bias. Outcomes for suicidal ideation and suicide attempt in four studies were measured for the previous six or 12 months (Stewart et al., 2001; Pilowsky & Wu, 2006; Sawyer et al., 2007) or during lifetime (Katz et al., 2011). It is possible that these outcomes occurred prior to young people's entry into the care system, thus meaning that events were potentially misclassified occurring in care when they were not.

There was also variation in reporting measures for outcomes across studies. Both studies reporting on suicidal ideation utilised self-report (Pilowsky & Wu, 2006; Sawyer et al., 2007). There was substantial variation in the assessment of suicide attempts. Two studies were reliant on self-report by the young person (Pilowsky & Wu, 2006; Sawyer et al., 2007). One study estimated prevalence through independent assessment by three physicians (Stewart et al., 2001). One verified attempt with ICD-9 or ICD-10-CACodes (Katz et al., 2011). However, the methods for recording prevalence rates were the same for care and non-care populations *within* each study. This between-study heterogeneity is therefore unlikely to have biased prevalence rates to be higher in either care or non-care populations.

Studies further varied in terms of methodological quality, including sampling procedures and response rates. Two studies employed robust sampling strategies, using nationally representative datasets (National Household of Drug Abuse Survey (NHSDA) (Pilowsky &

Wu, 2006) and data-linkage of the Population Health Research Data Repository and Manitoba Vital Certificates (Katz et al., 2011) to provide both the state care and comparator populations. In contrast, Sawyer et al.'s (2007) community-based study in a metropolitan area was at risk of selection bias due to a 73% response rate, with non-responders being more likely to be Aboriginal or Torres Strait Islanders. Rates of suicide in children and young people within this population are more than twelve times higher than the general population (Soole et al., 2014). Stewart et al.'s (2001) hospital-based cohort study was limited to those admitted to hospital with suicidal ideation, suicide plan or suicide attempt, with the outcome being a subsequent suicide attempt within six months, suggesting prevalence was very likely to be higher in this high-risk group than in the community-based studies.

The limited number of studies included in the review highlights the need for more methodologically robust comparative studies, although we acknowledge some high quality studies that did not meet the inclusion criteria of the review due to their broader age range (Vinnerljung & Ribe, 2001; Vinnerljung & Hjern, 2011). Future research should collect more comprehensive data on the risk factors associated with suicidal ideation, suicide attempt and suicide in both children and young people who have been in care and those who have not so that the composition of risk profiles across populations can be matched. This data should be systematically collected on entry into the child welfare system and should include but not be limited to: age; gender; frequency and type of care placement; type of maltreatment; history of mental health illness; and family-level risk factors, such as maternal psychiatric diagnosis and substance use. These data need to be ascertained longitudinally so it possible to disentangle the effects of care from the effect of pre-care risk factors (e.g. maltreatment). Data requires collection at the level of the welfare agency, due to the potential for children and young people's variable access to school or other services.

The elevated risk of suicide attempt in individuals in care provides impetus for development of prevention and intervention approaches. Indeed, despite suicide attempt being a rare event in the small number of individuals in care, the difference in risk remains important as previous attempt on life is one of the highest risk factors for suicide (WHO, 2014), and the health costs incurred by individuals more than double in the year following a suicide attempt (Stensland et al., 2010). To date, we are not aware of effective interventions directly targeted at this population. Some of strongest evidence for prevention is provided by school-based, population-level intervention. The multicentre, cluster randomised controlled trial of Saving and Empowering Lives in Europe (SEYLE) reported that the Youth Aware of Mental Health

Program provided a 55% reduction in incidence of suicide attempt at 12 months (Wasserman et al., 2015). However, as individuals in state care often experience unstable educational placements (Ferguson et al., 2012), and females are three times more likely to be permanently expelled or excluded in comparison to the general population (Viner et al., 2005), school-based programmes may not always serve as the appropriate intervention site.

Future intervention studies should investigate improving access to population-level, school-based approaches for individuals in care, but also consider delivery of additional suicide prevention approaches in other settings, such as foster care or residential care. To date effective provision is limited. Foster care, specifically Multi-dimensional Treatment Foster Care (MTFC), has been offered as an intervention to girls leaving juvenile placements but this has shown only a minimal effect for suicidal ideation and no impact for suicide attempt (Kerr et al., 2014). Gatekeeper training for social care professionals is also available, such as the Applied Suicide Intervention Skills Training (ASIST) (LivingWorks, 2010) and the Tennessee Gatekeeper Training Implementation Support System (GTISS) (Suicide Prevention Resource Center, 2017). However, these training approaches are not specifically targeted at the social care profession and the evidence base for their effectiveness amongst this professional group has not been established. Further attention has been paid to the introduction of screening for suicide risk, whereby children and young people receive an intake assessment and ongoing monitoring within the care placement (Penta & Caine, 2006). The relative costs and benefits of such an approach remains unclear, as does the capacity of the social welfare and health care system to address the needs of screen-positive individuals. Multi-agency working has been reported to be largely ineffective (House of Commons Education Committee 2016; York and Jones, 2017), with social care professionals experiencing challenges in securing support from mental health professionals (Stanley, 2007).

4. Conclusion

Children and young people who have been in the care are more likely to attempt suicide than individuals who have not been in care. The number of studies reporting on suicidal ideation and suicide, combined with the small size of the in care population, means that the results for these outcomes should be interpreted with caution. The limited number of included studies provides a clear agenda for future research of suicide-related outcomes in this population. Methodologically robust, comparative research is required to that better matches the risk profiles across children and young people in care and non-care populations. Suicide prevention interventions that are specific to the needs of children and young people in care

may require development, or at least further work needs to be undertaken to ensure their engagement with population-level approaches.

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Comparison of suicidal ideation, suicide attempt and suicide in children and young people in care and non-care populations: Systematic review and meta-analysis of prevalence

Conflict of Interest

The authors have no conflict of interests to report.

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Comparison of suicidal ideation, suicide attempt and suicide in children and young people in care and non-care populations: Systematic review and meta-analysis of prevalence

Highlights

- Global problem of suicidal ideation, suicide attempt and suicide amongst young people
- Unknown if young people in care are at an elevated risk
- Systematic review comparing prevalence between care and non-care populations
- Suicide attempt is more than three times as likely amongst those in care
- Further comparative studies are required