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Review article

Longitudinal association between self-injurious thoughts and behaviors and suicidal behavior in adolescents and young adults: A systematic review with meta-analysis

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ABSTRACT

Background: Adolescents with previous self-injurious thoughts and behaviors (SITB) have over 2-fold risk of dying by suicide, higher than older ages. This meta-analysis aims to disentangle the association of each SITB with subsequent suicidal behavior in adolescence/young adulthood, the contribution of each SITB, and the proportion of suicide deaths with no previous suicide attempt.

Methods: We searched 6 databases until June 2015. Inclusion criteria: 1. Assessment of any previous SITB [a) suicidal thoughts and behaviors (ideation; threat/gesture; plan; attempt); b) non-suicidal thoughts and behaviors (thoughts; threat/gesture; self-injury); c) self-harm] as a risk factor of suicide attempt or suicide death; 2. Case-control or cohort studies; 3. Subjects aged 12-26y. Random effect models, metaregression analyses including mental health and environmental variables, and population attributable risks (PAR)s were estimated.

Results: From 23,682 potentially eligible articles, 29 were included in the meta-analysis (1,122,054 individuals). While 68% of all youth suicide deaths had no previous suicide attempt, suicide death was very strongly associated with any previous SITB (OR=22.53, 95%CI: 18.40–27.58). Suicide attempts were also associated with a history of previous SITB (OR=3.48, 95%CI: 2.71–4.43). There were no moderating effects for mental health and environmental features. The PAR of previous SITB to suicide attempts is 26%.

Limitations: There is considerable heterogeneity between the available studies. Due to limitations in the original studies, an over-estimation of the proportion dying at their first attempt cannot be ruled out, since they might have missed unrecognized previous suicide attempts.

Conclusions: Although more than two thirds of suicide deaths in adolescence/young adulthood have occurred with no previous suicidal behavior, previous SITBs have a much higher risk of dying by suicide than previously reported in this age group.

Abbreviations: CI, Confidence Intervals; MOOSE, Meta-Analysis of Observational Studies in Epidemiology; NOS, Newcastle-Ottawa Scale; NSSI, Non-Suicidal Self-Injury; NSSIT, Non-Suicidal Self-Injury Thoughts; OR, Odds Ratio; PAR, Population Attributable Risk; RR, Relative Risk; SE, Standard Error; SITB, Self-Injurious Thoughts and Behaviors; US, United States; WHO, World Health Organization

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1. Introduction

The World Health Organization (WHO) has declared suicide a priority for global health. Overall more than 800,000 individuals of all ages commit suicide every year worldwide. Suicidal behaviors may be preventable using efficient prevention strategies at low cost. Nevertheless, over the past 45 years worldwide suicide rates have increased by 60%, youths being the group at highest risk in a third of countries (WHO, 2014), making it the second most important cause of death during adolescence and young adulthood in 2013 (Mokdad et al., 2016).

Suicide is rare in childhood and early adolescence, but it becomes more frequent with increasing age. Worldwide annual rates of suicide per 100,000 were 0.5 for females and 0.9 for males during childhood, and 12.0 for females and 14.2 for males during adolescence/young adulthood (Pelkonen and Marttunen, 2003). Adolescence and young adulthood is a crucial developmental period with an increasing autonomy but is also subject to rapid psychological, biological and social changes. Such changes may make youths vulnerable to environmental stress (Aro et al., 1993) which may contribute to psychopathology, alcohol and drug misuse, and risk behaviors (Aro et al., 1993; Arpawong et al., 2015; Pelkonen and Marttunen, 2003), and thus increase suicide risk and repeated suicide-related thoughts and behaviors (Castellvi et al., in press). SITBs are common in young people (Baetens et al., 2011), and 18% will repeat suicidal or non-suicidal behavior within a year (Hawton et al., 2007), which is strongly linked to suicide death with 40–60% of those who die by suicide having self-harmed in the past (Owens et al., 2002). Furthermore, self-harm has long-term health consequences such as mental illness and psychiatric hospitalization, even suicide death (Beckman et al., 2016).

Although, fortunately, suicide deaths are relatively uncommon in most populations (e.g. the one-year odds of dying by suicide in the United States is around 0.00013 persons/year ((CDC), 2012)), suicide has huge family and social consequences, even more when the victim is an adolescent or youth. Self-inflicted injuries are one of the main causes of disability-adjusted life-years lost (DALYs) worldwide. Each youth suicide represents a potential of 60 years of life lost (YLL)s and suicide attempts have a high potential impact in term of years lost because of disability (YLD)s (Mokdad et al., 2016).

Previous self-injurious thoughts and behaviors (SITB) are considered one of the strongest predictors of suicide attempts and suicide death (Bridge et al., 2006; McLoughlin et al., 2015). A large amount of research has been published linking the association between any previous SITB and further suicide attempts and suicide death among adolescents and youths. However, the real magnitude of the risks among this population remains unclear with large variations in the risk being reported (Conner et al., 2014; Miranda et al., 2014; Wichstrom and Hegna, 2003), and some studies have even reported non-significant effects (Guan et al., 2012; Nock and Banaji, 2007; Nrugham et al., 2008). These discrepancies raise doubts about the true effect of previous SITBs on future suicidal behaviors among youths. A recent meta-analysis estimated that individuals with a history of any SITB had a more than 2-fold risk of subsequent suicide attempts (Ribeiro et al., 2016) and 1.5-fold risk of dying by suicide, when compared with those persons with no previous SITB. This association has been found across all ages. While the authors concluded that all ages are at risk when they have a history of any SITB, adolescents are the group most at risk of dying by suicide (Ribeiro et al., 2016), no meta-analyses have been conducted specifically to calculate the risks of suicidal behaviors during adolescence and youth in terms of previous specific SITB.

A recently meta-analysis showed that adolescents and young adults with a history of previous SITB are the most vulnerable group for presenting future SITBs (Ribeiro et al., 2016). Therefore, we conducted a new systematic review to deepen the understanding of these associations by assessing in this population: (i) the effect size of each previous SITB as a risk factor of suicide attempt and suicide death; (ii) whether there was a moderating effect by key psychopathological and environmental variables; (iii) the population attributable risk (PAR) of each previous SITB; and (iv) the proportion of suicide deaths with no previous suicide attempt. This knowledge should be useful for suicide prevention among adolescents and young adults. We hypothesized that young individuals with any type of SITB would have higher rates of suicide attempts and suicide deaths than their counterparts without any prior SITBs, and also that rates would be higher among those with previous suicidal thoughts and behaviors than among those presenting non-suicidal self-injurious thoughts and behaviors. As mentioned above, youths and adolescents with any previous SITB will be at risk of making a suicide attempt or dying by suicide. In contrast to non-suicidal thoughts and behaviors, suicidal thoughts and behaviors include the intention to die. Additionally, the main motivation of non-suicidal behaviors is instead to communicate distress and/or to seek help from others (Nock and Kessler, 2006).

2. Method

2.1. Search strategy

This article is based on data extracted from a broad systematic review to identify a comprehensive list of risk factors of suicidal behaviors in individuals aged from 12 to 26 years. The original research protocol was previously registered at PROSPERO (Reg: CRD42013005775) (Alonso et al., 2013). Recommendations from the MOOSE guidelines for systematic reviews (Stroup et al., 2000) in relation to handling and reporting of results were considered (see MOOSE checklist at supplementary material Table S1). The search strategy was devised for Medline by two investigators with previous experience in performing systematic reviews of observational studies (PC; OPB) and adapted to the other databases. More information about the search strategy and selection criteria of the broad systematic review is provided in Text S1 (see supplementary material Text S1).

2.2. Inclusion and exclusion criteria

For this article, we added the following specific selection criteria: population-based longitudinal studies (non-clinical and non-institutionalized sample cohorts; or case-control studies where the control group was of the same age range as the case group and both non-clinical and non-institutionalized) which assessed any form of previous SITB as a risk factor of suicide attempts or suicide death. Initially, we adopted the conceptual framework proposed by Nock for SITB definitions (Nock, 2010), differentiating previous suicidal and non-suicidal behaviors. However, inconsistent terms and definitions have historically been used for each SITB by previous authors and we included two additional terms which Nock's nomenclature did not contemplate: (i) self-harm as a separate risk behavior (NICE, 2011), and (ii) suicide threat as a suicidal behavior, because some authors consider suicide threat as a suicidal behavior due to intentionality (Silverman and Berman, 2007). Nock considers only suicide threat/gesture as non-suicidal behavior. So, our SITB final classification was: 1) Suicidal thoughts and behaviors (ideation; threat; plan; attempt); 2) Non-suicidal thoughts and behaviors (self-injurious thoughts [NSSIT]; threat/gesture; self-injury [NSSI]); and 3) Self-harm (which includes suicide attempt and NSSI) (See typology and definitions of each type of SITB in supplementary material Table S2). Information on eligible studies included: author; year of publication; study; country; study design; type of sample recruited; sample size; age range; mean age; number of females; type of outcome; type of SITB assessed; time prevalence of SITB; percentage of people exposed to SITB; instrument used; and variables included in multivariate analyses. From cohort studies, additional data were extracted relating to the follow-up: length; attrition rates; percentage of incident suicide attempt or completed suicides.

Information abstracted about risk factors consisted of: odds ratio