BMJ Public Health

Cross-sectional study exploring the prevalence and associated risk factors for suicidality among apprentices in the Irish construction industry

Jack Sweeney [1], Shane O'Donnell [1], P J White [2], Paula Carroll [3], Michael Harrison,[3] Noel Richardson [1]

To cite: Sweeney J, O'Donnell S, White PJ, *et al*. Cross-sectional study exploring the prevalence and associated risk factors for suicidality among apprentices in the Irish construction industry. *BMJ Public Health* 2026;**4**:e004497. doi:10.1136/bmjph-2025-004497

► Additional supplemental material is published online only. To view, please visit the journal online (https://doi.org/10.1136/bmjph-2025-004497).

Received 17 November 2025
Accepted 21 January 2026

[1]Health and Sport Science, South East Technological University, Carlow, Ireland
[2]designCORE Humanities, South East Technological University, Carlow, Ireland
[3]Sport and Exercise Science, South East Technological University, Waterford Campus, Waterford, Ireland

Correspondence to
Noel Richardson;
noel.richardson@setu.ie

ABSTRACT

Introduction Suicide among male construction workers is reported to be disproportionally high compared with the working age population, with younger construction workers being at particular risk. However, there is limited understanding of the prevalence and associated factors for suicidal ideation, non-suicidal self-injury and suicide attempt among this occupational group globally or among apprentices pursuing this career.

Methods A cross-sectional study was conducted on a sample of male Irish construction-related apprentices in Ireland (n = 651). We investigated the prevalence of suicidal ideation, non-suicidal self-injury and suicide attempts and sociodemographic, occupational and mental health factors associated with these three outcomes. A logistic regression with backward selection of variables was used to explore factors related to suicidal ideation, non-suicidal self-injury and suicide attempt.

Results The prevalence rate for suicidal ideation was 40.5%, 13.3% for non-suicidal self-injury and 9.3% for suicide attempt. Analysis of suicidal ideation showed previous mental health difficulties, levels of depression and low self-esteem remained significant. Analysis of non-suicidal self-injury showed living in rented accommodation, financial worries, previous mental health difficulties, levels of anxiety and depression remained significant factors in the final model. Analysis of suicide attempts showed living in rented accommodation, financial worries, previous mental health difficulties, levels of depression and low self-esteem remained significant.

Conclusion Suicidal ideation, non-suicidal self-injury and suicide attempt are significant issues for apprentices working in the construction industry. Findings highlight a need for support at an earlier stage in their journey. They also highlight the need for the early detection and treatment of generalised anxiety disorder, low self-esteem and depression in order to intervene in, and potentially prevent, suicidality among construction workers.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Previous literature has explored the suicidality among construction workers across the globe but minimal research has been conducted on those pursuing apprenticeships in construction and none on those pursuing apprenticeships in Ireland.

WHAT THIS STUDY ADDS

⇒ This study explores the suicidality and associated risk factors of apprentices entering the construction industry in Ireland.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Our findings suggest high levels of suicidality and mental health distress among this population which may provide evidence and cause for policy change in educational training boards or sites, or future research into interventions designed to target this population specifically.

INTRODUCTION

Globally, suicide accounts for more than 700 000 deaths annually (1.3% of global deaths in 2019) and is the leading cause of death among 15–29 year olds.[1] Males account for a disproportionate number of these deaths, with the rate of suicide being two to three times higher among males in the majority of Western countries.[2] Although females typically report higher rates of suicidal ideation, non-suicidal self-injury (NSSI) and suicide attempts,[3] as well as higher rates of common mental health problems such as anxiety and depression,[4] this is not necessarily an indication of better mental health outcomes among males. Rather, it reflects their increased likelihood to use more lethal methods for suicide, their lower likelihood to engage with service providers around their mental health and/or to be formally diagnosed with a mental health problem.[5 6] This leads to an under-reporting of suicidal ideation, self-harming behaviours and suicide attempts by males. This is compounded by a lack of data on deaths by suicide collected not only in Ireland, but

internationally. This has led to the use of proxy outcomes such as mental health variables, suicidal ideation, NSSI and suicide attempt.

The construction industry is a male-dominated industry (ie, those industries comprising >70% male employees) and, in high-income countries, those working in the construction industry are considered at increased risk of suicide.[7 8] In Ireland, the construction workforce includes a large proportion of young males who enter the sector through apprenticeship schemes shortly after leaving school. This means that apprentices represent an important subgroup of the younger male population already known to be at heightened risk of suicide. Considerable research has been conducted over the past decade investigating the disproportionately high rates of suicide within the construction sector globally.[9–12] There has been a particular focus on the increased risk of suicide among younger and lower-skilled construction workers within an Australian[13 14] and Irish context.[10] Given that most apprentices in Ireland are within the early career and 16–24 year age range, this age profile overlaps with the demographic most affected by suicide risk nationally, underscoring the relevance of focusing specifically on apprentices. The risk factors most associated with suicide in the construction sector include depression, long working hours, financial stress caused by low income levels, job insecurity, unrealistic job expectations, drug/opioid use, alcohol abuse, poor physical health and suicide bereavement.[12 15–18] Suicide risk within the industry is compounded by an industry culture which upholds more traditional masculine beliefs such as self-reliance and stoicism. This serves as a barrier to help seeking[19 20] and, in common with other male-dominated industries, further exacerbates and perpetuates mental health issues such as psychological distress[21] and depression[22] and increases the risk of suicide.[23] Within this context, apprentices and younger construction workers are particularly vulnerable. In addition to being exposed to the normal pressures of examination during the educational phase of training, apprentices and younger construction workers can be exposed to additional pressure in the form of bullying and hazing.[24] As these apprentices are typically within the age range of 16–24 years, and with apprenticeships lasting 3–4 years, they face considerable additional challenges to their mental health over and above the challenges faced by young adults more generally.

Adolescence can be a particularly challenging time for those who experience difficulty in adapting to changes in high cognitive functioning, reasoning and interpersonal interactions, cognitive control of emotions, risk-versus-reward appraisal and motivation.[25] Adolescents who experience such difficulties are at increased risk of psychological, affective and addictive disorders,[26] often leading to an underdevelopment of appropriate coping mechanisms in early adulthood.[27] This is compounded by adolescents' and young adults' propensity to use more maladaptive coping mechanisms compared with middle-aged or early old age adults.[28] Young males, specifically, often find it difficult to interpret, manage and communicate distress, which can result in them reverting to avoidance mechanisms,[29] often waiting until severely distressed before seeking help.[30 31] This partly explains the high rates of suicide among males aged 15–24,[32 33] especially in Ireland, where suicide is the most common cause of death for males aged 20–24.[34] Lack of or low self-esteem is often under-reported or not reported in suicidality measures but can play an important role in deaths by suicide among younger males who may not present with symptoms of depression.[35] Additionally, young workers with high psychological demands at work are almost twice as likely to experience the onset of new depression and anxiety disorders.[36] In summary, therefore, the challenges of transitioning to adulthood combined with psychological stressors, an innate macho culture and other risk factors present in the construction industry,[19] place apprentices pursuing a career in the construction industry at increased risk of mental health disorders and suicide risk.[23] While O'Donnell *et al*[10] reported suicidal ideation, NSSI and suicide attempts among 1585 male construction workers in Ireland. Prevalence rates were 22% for suicidal ideation, 6% for NSSI and 6% for suicide attempts. Younger age, not being in a relationship, suicide bereavement and higher levels of depression and anxiety were key risk factors. No study to date has investigated the mental health and suicide risk of construction apprentices specifically in Ireland.

The aim of the study was to explore the prevalence of and associated risk factors for suicidal ideation, NSSI and suicide attempt among apprentices in the Irish construction industry. This study also sought to address this gap in knowledge by establishing whether apprentices differed from construction workers as a whole in Ireland[10] in terms of associations between sociodemographic, occupational and mental health variables on the one hand, and suicidal ideation, NSSI and suicide attempt on the other. This was to better inform the development and roll-out of a general awareness training programme tailored, as appropriate, to the specific needs of apprentices. This study was part of a wider study (Construction Alliance to Reduce Suicide 'CAIRDE') designed to inform the development of targeted and culturally appropriate suicide prevention measures within the construction industry in Ireland.

METHODOLOGY

Study design

A cross-sectional study was conducted across the Education Training Boards (ETBs)—the oversight body for apprenticeship training in Ireland—between 3 November 2022 and 7 February 2023.

Participant involvement

Participants were involved as part of a wider research project, with the design and implementation of the

research as a whole developed with participants through codesign workshops and focus groups. During these workshops and focus groups, the research questions, outcome measures, methods of recruitment and appropriate language were informed.

Participation and data collection

At the time of data collection, there were 27 470 apprentices enrolled in state apprenticeship programmes in Ireland, with 5477 of these aligned to the Irish construction industry, training as woodworkers, electricians, plasterers, plumbers, metal workers, etc.[37] The present apprentice sample was collected independently of the O'Donnell *et al* data set and does not overlap with that population. Individuals were eligible to participate in the study if they were ≥18 years old and were enrolled in an apprenticeship programme relating to the construction industry in Ireland. Convenience sampling methods were used to recruit participants; sampling consisted of individuals who were physically present within the ETB and were willing to participate at the time of recruitment. As such, not all construction-related apprenticeships were captured. The lead author emailed the apprenticeship programme co-ordinators of all ETBs across Ireland, requesting them to act as gatekeepers for this study. A total of 10 out of 16 agreed to do so and subsequently coordinated the administration of the survey when apprentices attended their designated ETB for classroom-based learning as part of their apprenticeship programme. Classrooms provided 1 m spacing between participants to ensure privacy, given the nature of the survey. Prior to survey administration, the primary researcher provided a brief verbal overview of the context and objectives of the study, distributed study information sheets and obtained written informed consent. Participants returned the survey into a sealed box to safeguard participant confidentiality. All participants were offered details of local mental health and support services both before and after the survey. Both the research team member (JS) and ETB staff members who were present during data collection were trained in mental health first aid and/or Applied Suicide Intervention Skills Training (ASIST) (suicide prevention), to respond appropriately, in the event that someone became distressed.

Materials

The survey consisted of 23 questions. The survey questions were piloted with 13 apprentices from diverse apprenticeship programmes and at different stages of training, to assess comprehension of the questions, the perceived relevance of the questions and the time to complete the survey (≈15 min). Apprentices reported some labelling discrepancies such as titling errors for trades which were amended for the final survey. The variables included in the survey are outlined below and described in more detail in online supplemental table 1.

Sociodemographic variables

Seven sociodemographic items were included: age (18–24; 24+); country of birth (Ireland; Native English speaking; non-native English speaking); sexual orientation (heterosexual; lesbian, gay, bisexual, queer, transgender, intersex, + (LGBTQI+)); relationship status (in a relationship; not in a relationship); educational level (secondary school or below; trade qualification or diploma; tertiary); rented accommodation (yes/no); and living alone (yes/no).

Occupation-specific variables

Five occupation-specific items were included: specific trade (electrician; woodworking; fabrication; plumbing and plastering); weekly income; hours worked per week (≤39 hour; 40–44 hour; 45–49 hour; ≥50 hour); shift work (always; sometimes; never) and commute time (≤1 hour; >1 hour).

General Help Seeking Questionnaire (GSHQ)

The General Help Seeking Questionnaire was used to measure participants' willingness to seek help across a variety of sources when in distress or experiencing suicidal ideation. These sources included both formal and informal help. Participants were asked to rank how likely they would be to reach out for help on a 7-point Likert scale (1=extremely unlikely; 3=unlikely; 5=likely; 7=extremely likely).

Suicidality outcomes

Three items were adapted from the Adult Psychiatric Morbidity Survey (APMS)[38] in accordance with the corresponding survey conducted on the general construction industry in Ireland.[10] These assessed suicidal ideation (yes/no); NSSI (yes/no) and suicide attempt (yes/no), respectively. By answering yes to any of these questions, participants were then asked when they had last experienced these outcomes (within the past year; more than 1 year ago). These suicidality measures were previously used to assess suicidality among a representative sample of the Irish population[39] and were taken from the Clinical Interview Schedule Revised.[40]

Mental health variables

The Generalised Anxiety Disorder-7 (GAD-7) and the Patient Health Questionnaire-9 (PHQ-9) were used to screen for GAD and depression, respectively.[41 42] These validated scales required participants to rank, on a four-point Likert scale (0=not at all; 3=nearly every day), how often they had been affected by a problem over the previous 2 weeks. Scores are summed and then categorised according to severity of GAD (GAD-7: 0–4=minimal; 5–9=mild; 10–14=moderate; 15+=severe) and depression (PHQ-9: 0–4=minimal; 5–9=mild; 10–14=moderate; 15–19=moderate/severe; 20+=severe). The Devaluation and Discrimination Scale (D–D Scale) was used to measure attitudes towards people receiving mental health treatment along with an additional four questions relating to personal stigma, which were adapted from the D–D Scale.[43 44] This adaptation has previously shown a moderately high internal consistency with a Cronbach's alpha (α) of 0.78 among college-aged participants.[45]

Participants were asked to rank the extent to which they agreed/disagreed with each of the 12 statements on a 5-point Likert scale (1=strongly agree; 3=no opinion; 5=strongly disagree), with higher scores corresponding to a higher perceived stigma. The data were then dichotomised (low or high stigma; mean threshold=3.0) for analysis. The Rosenberg Self-Esteem Scale was used to measure levels of self-esteem.[46] Participants were asked to rank the extent to which they agreed/disagreed with each of 10 statements on a 4-point Likert scale (1=strongly agree; 2=agree; 3=disagree; 4=strongly disagree). Items 2, 5, 6, 8 and 9 were reverse scored and higher total scores corresponded to a higher perceived stigma. In the General Help Seeking Questionnaire, questions 1 and 2 were used to measure participants' help-seeking intentions for personal or emotional problems and for suicidal ideation.[47] Participants were asked to rank their intention to seek help from each help source listed on a 7-point Likert scale (1=extremely unlikely; 3=unlikely; 5=likely; 7=extremely likely). Financial worry was also included (measured on a 10-point Likert scale and recoded into five categories (1=not at all worried; 2=somewhat worried; 3=worried; 4=very worried; 5=extremely worried). Suicide bereavement (yes/no) was also included.

Data analysis

All analysis was conducted in SPSS V.29.0.1.0 (171). Cronbach's α was computed as a measure of internal reliability for GAD-7 (*α:.885*); PHQ-9 (*α:.869*); D-D Scale (*α:.885 & α:.764*); and the Rosenberg Self-Esteem Scale (*α:.891*). Variance inflation factor values were within an acceptable range across models (1.021–2.406). Characteristics of participants experiencing or not experiencing each suicidality outcome (suicidal ideation, SI and suicide attempt) were compared using χ^2 tests and t tests as appropriate. Not all participants answered all questions. Separate backwards logistic regression analyses were used to explore the relationship between 16 predictor variables and (1) suicidal ideation, (2) SI and (3) suicide attempt. The criteria for removal were 0.10. Each of the three final models had adequate fit, based on the Hosmer and Lemeshow test[48] and all relevant assumptions were met. A preliminary analysis suggested that the assumption of multicollinearity was met for all three dependent variables (tolerance=0.86).

RESULTS

A total of 651 male apprentices in apprenticeship programmes relating to the construction industry completed the survey in 10 ETBs across the collection timeframe that is, 11.9% of the apprentice population in Ireland. These ETBs were geographically spread across all four provinces (Munster n=3; Connacht n=2; Ulster n=2; Leinster n=3). Apprentices were male, 93% were born in Ireland, 62% were in a committed relationship, 32% resided in rented accommodation, 4.7% lived alone and 4% had completed a university or college level course. The proportion of the sample that screened positive for depression and GAD in the previous 2 weeks was 17.7% and 25.1%, respectively, with 26.5% of participants reporting low self-esteem. Some 50.2% of participants were bereaved by suicide. Participants' characteristics as they relate to suicidal ideation, NSSI and suicide attempt are provided in online supplemental table 1, with p values derived from χ^2 testing representing differences within the examined variables across the suicidality outcomes. Participants' help-seeking intentions for distress and suicidal ideation varied across each of the help sources. With regard to distress, apprentices were more likely to seek help from informal sources (M=17.16, SD=5.80) such as an intimate partner (M=4.96, SD=1.89, 66.9%) or friends (M=4.56, SD=1.78, 56.9%). Formal sources, such as mental health professionals (M=3.30, SD=1.97, 28.9%) and doctors/general practitioners (M=2.81, SD=1.83, 20.5%), were less likely to be utilised (M=10.07, SD=5.36), with ministers or religious leaders being the least likely to be sought out for help (M=1.63, SD=1.29, 5.1%). A third of apprentices reported that they would not seek help from any source when in distress (M=4.95, SD=1.89, 33.2%) (see online supplemental table 1). With regard to suicidal ideation, apprentices were also more likely to seek help from informal sources (M=17.11, SD=7.10) such as an intimate partner (M=4.77, SD=2.11, 63.0%) or friends (M=4.56, SD=2.03, 57.7%) than they were from formal sources, such as mental health professionals (M=3.74, SD=2.17, 40%), although the latter was higher than the equivalent help-seeking intention in relation to feeling distressed. Help-seeking intentions around suicidal ideation in relation to the use of phone helplines (M=2.68, SD=1.85, 18.4%) or a minister/religious leader (M=1.78, SD=1.37, 6.0%) remained low. The total help-seeking score for distress (M=31.82, SD=10.21) was slightly lower than for suicide (M=33.52, SD=12.07) with informal help-seeking sources being favoured over more formal sources in both cases.

Prevalence of suicidal ideation, NSSI and suicide attempt

As per online supplemental table 1, apprentices reported prevalence rates of 40.5% for suicidal ideation, 13.3% for NSSI and 9.3% for suicide attempt. The 12-month prevalence rates were 22.2% for suicidal ideation, 4.7% for NSSI and 2.8% for suicide attempts. There were significantly higher rates of suicidal ideation among apprentices who: trained in woodworking or metalworking (49.0% and 49.3%; p=0.036); were very or extremely worried about financial matters (52% and 67%; p<0.001); had experienced suicide bereavement (45%; p=0.046); had moderate or severe GAD (64% and 81%; p<0.001); had moderate/severe or severe depression (83% and 83%; p<0.001) or had low self-esteem (71.5%; p<0.001). There was a significantly higher rate of NSSI among apprentices who: lived in rented accommodation (19%; p=0.002); trained in plastering or metalworking (30% and 25.4%; p=0.004); were very or extremely worried about financial matters (19% and 36%; p<0.001); had experienced

Table 1 Logistic regression with backward selection of variables of suicidal ideation

	Suicidal ideation					
Variables	B	SE	Sig.	Exp(B)	Lower	Upper
Previous mental health difficulties						
No	Ref.	–				
Yes	2.234	0.274	<0.001	9.338	5.462	15.965
PHQ-9 category						
No depression	Ref.	–	<0.001			
Mild depression	−0.026	0.248	0.917	0.974	0.600	1.583
Moderate depression	1.035	0.323	0.001	2.816	1.496	5.304
Moderate/severe depression	1.296	0.499	0.009	3.655	1.375	9.716
Severe depression	1.252	0.637	0.049	3.497	1.004	12.186
Rosenberg's self-esteem category						
Low self-esteem	Ref.	–				
Normal levels of self-esteem	0.967	0.262	<0.001	2.63	1.57	4.39

PHQ-9, Patient Health Questionnaire-9.

suicide bereavement (17%; p=0.011); had moderate or severe GAD (27% and 36%; p<0.001); had moderate/severe or severe depression (36% and 29%; p<0.001) and who had low self-esteem (28.7%; p<0.001). There was a significantly higher rate of suicide attempt among apprentices who: trained in metal working (15.5%; p=0.003); were very or extremely worried about financial matters (9% and 33%; p<0.001); had previous mental health difficulties (14%; p<0.001); had moderate or severe GAD (16% and 36%; p<0.001); had moderate/severe or severe depression (25% and 42%; p<0.001) and who had low self-esteem (19.8%; p<0.001).

Factors associated with suicidal ideation, NSSI and suicide attempt

Logistic regression with backward selection of variables of suicidal ideation

Logistic regression with backward selection of variables was performed, beginning with 16 candidate variables. These variables included trade category, increased severity of financial worries, suicide bereavement, increased severity of GAD, increased severity of depression and lower self-esteem. Fourteen elimination steps were required to reach the final model. Previous mental health difficulties, levels of depression and low self-esteem remained significant factors in the final model shown in table 1. The model as a whole explained between 31.7% (Cox and Snell R^2) and 42.6% (Nagelkerke R^2) of the variance in suicidal ideation, and correctly classified 75.5% of cases.

Logistic regression with backward selection of variables of NSSI

Logistic regression with backward selection of variables was performed, beginning with 16 candidate variables. These variables included trade category, increased severity of financial worries, suicide bereavement, increased severity of GAD, increased severity of depression and lower self-esteem. Twelve elimination steps were required to reach the final model. Living in rented accommodation, financial worries, previous mental health difficulties, levels of anxiety and depression remained significant factors in the final model shown in table 2. The model as a whole explained between 20.1% (Cox and Snell R^2) and 35.9% (Nagelkerke R^2) of the variance in suicidal ideation and correctly classified 86.9% of cases.

Logistic regression with backward selection of variables of suicide attempt

Logistic regression with backward selection of variables was performed, beginning with 16 candidate variables. These variables included trade category, increased severity of financial worries, suicide bereavement, increased severity of GAD, increased severity of depression and lower self-esteem. Twelve elimination steps were required to reach the final model. Living in rented accommodation, financial worries, previous mental health difficulties, levels of depression and low self-esteem remained significant factors in the final model shown in table 3. The model as a whole explained between 12.8% (Cox and Snell R^2) and 27.6% (Nagelkerke R^2) of the variance in suicidal ideation, and correctly classified 90.7% of cases.

DISCUSSION

This study sought to explore the prevalence of and variables associated with suicidal ideation, NSSI and suicide attempt among apprentices in the Irish construction industry. Findings highlight the complex interplay of sociodemographic factors, work characteristics, attitudes and mental health status that shape the risks of suicidality in the construction sector.

Apprentices in the Irish construction industry reported a prevalence rate of 40.5% for suicidal ideation, 13.3% for NSSI and 9.3% for suicide attempt. The 12-month

Table 2 Logistic regression with backward selection of variables analysis of NSSI

	Non-suicidal self-injury					
Variables	**B**	**SE**	**Sig.**	**Exp(B)**	**Lower**	**Upper**
In rental accommodation						
Yes	Ref.	–				
No	−0.976	0.286	<0.001	0.377	0.215	0.660
Financial worries						
Not at all worried	Ref.	–	0.062			
Somewhat worried	−1.162	0.599	0.053	0.313	0.097	1.013
Worried	−1.439	0.573	0.012	0.237	0.077	0.729
Very worried	−1.205	0.573	0.036	0.300	0.097	0.922
Extremely worried	−0.417	0.701	0.552	0.659	0.167	2.605
Previous mental health difficulties						
No	Ref.	–				
Yes	3.724	1.042	<0.001	41.436	5.372	319.610
GAD-7 category						
Minimal GAD	Ref.	–	0.040			
Mild GAD	1.189	0.430	0.006	3.284	1.415	7.622
Moderate GAD	1.031	0.525	0.050	2.803	1.002	7.842
Severe GAD	1.433	0.665	0.031	4.193	1.140	15.423
PHQ-9 category						
No depression	Ref.	–	0.058			
Mild depression	0.281	0.440	0.524	1.324	0.559	3.137
Moderate depression	1.164	0.482	0.016	3.204	1.246	8.240
Moderate/severe depression	1.301	0.578	0.025	3.672	1.182	11.410
Severe depression	0.885	0.706	0.210	2.422	0.608	9.656

GAD-7, Generalised Anxiety Disorder-7; NSSI, non-suicidal self-injury; PHQ-9, Patient Health Questionnaire-9.

prevalence rates were 22.2% for suicidal ideation, 4.7% for NSSI and 2.8% for suicide attempt. The 12-month suicidal ideation rate is in line with what has been found among Australian apprentices (29.4%), while the proportion of Irish apprentices who reported having experienced bereavement by suicide (50.2%) is also similar to their Australian counterparts (55%)[23] and extended Irish construction industry (46.1%).[39] Both the lifetime and 12-month figures are higher than those previously reported in other comparable studies, including male construction workers in Ireland,[10] and with respect to suicidal ideation and NSSI, higher than those reported among construction workers in the USA[15] and Australia,[12] and higher also than a national representative sample of the Irish population.[39] Based on the APMS measure of current suicidal ideation as per Tyler *et al.* and O'Donnell *et al*, the 12-month rate for apprentices in Ireland (22.2%) was more than twice the rate for construction workers in Ireland (10.2%) and three times higher than the rate for construction workers in Australia (7.4%). The suicidal ideation prevalence rate of 40.5% for apprentices in Ireland was almost double that reported in the construction industry in Ireland (22.4%)[10] and considerably higher than that reported from the USA (2.5%).[15] Prevalence rates of NSSI and suicide attempt were also higher than those reported in the general construction worker population in Ireland (9.3% vs 6.1% and 13.3% vs 6%, respectively). This trend continues in relation to the 12-month prevalence rates for NSSI (4.7 vs 1.1%) and suicide attempt (2.8% vs 1%). No comparative data are available for NSSI or suicide attempt in the construction industry internationally.

Comparative national statistics data showed that the prevalence rate for NSSI (12.9%) was similar to apprentices in this study (13.3%), with the prevalence rate for suicide attempt being slightly higher in the national study (11.2% vs 9.3%).[39] It should be acknowledged that data of Hyland *et al*[37] were non-sex disaggregated. Their study was also conducted during the COVID-19 global pandemic and therefore may not be representative of the population under normal circumstances. The lower rate of reported suicide attempts in this primarily male apprentices' study may also be accounted for by gendered patterns of suicidal behaviour. Males are more likely to use more lethal methods for suicide, which accounts for their higher suicide rates more broadly.[48] Pressure to conform

Table 3 Logistic regression with backward selection of variables of suicide attempt

	Suicide attempt					
Variables	**B**	**SE**	**Sig.**	**Exp(B)**	**Lower**	**Upper**
In rental accommodation						
Yes	Ref.	–				
No	−0.665	0.327	<0.042	0.514	0.271	0.977
Financial worries						
Not at all worried	Ref.	–	0.016			
Somewhat worried	−0.248	0.652	0.704	0.780	0.217	2.802
Worried	−0.666	0.644	0.301	0.514	0.145	1.816
Very worried	−1.127	0.577	0.096	0.324	0.086	1.221
Extremely worried	0.640	0.745	0.390	1.896	0.441	8.158
Previous mental health difficulties						
No	Ref.	–				
Yes	2.406	0.757	0.001	11.088	2.513	48.931
PHQ-9 category						
No depression	Ref.	–	0.023			
Mild depression	0.185	0.469	0.694	1.203	0.480	3.013
Moderate depression	0.379	0.536	0.479	1.461	0.511	4.175
Moderate/severe depression	1.042	0.614	0.090	2.834	0.851	9.438
Severe depression	2.020	0.663	0.002	7.540	2.055	27.663
Rosenberg's self-esteem category						
Low self-esteem	Ref.	–				
Normal levels of self-esteem	−0.702	0.396	0.076	0.495	0.228	1.076

PHQ-9, Patient Health Questionnaire-9.

to more traditional or restrictive masculinity norms, such as being autonomous and self-reliant and not showing vulnerability, has also been found to be particularly prevalent in what can be more macho male-dominated industries, including the construction sector.[49] These can serve to undermine men's ability to understand, process and recognise psychological distress,[50] and to act as a barrier to help seeking.[19] This is borne out in the current findings, with between a quarter (25.3%) and a third (33.2%) of apprentices indicating that they would not seek help from any source if distressed or feeling suicidal, respectively. These findings underline the importance of early interventions that destigmatise help-seeking and increase younger construction workers' mental health literacy, utilising information about health consequences from credible sources and self-reflections[51] as part of wider efforts to bring about more systemic cultural change within the construction industry to support help-seeking behaviours. This may begin with the development of more informal support systems for apprentices to seek help for both distress and suicidal ideation.

The 9.3% prevalence rate for suicide attempt reported in this study is considerably higher than global estimates of 2.7% in high-income countries,[52] while the prevalence rate for NSSI of 13.3% is also higher than global estimates of 10.5% for young adults and 4.2% for adults in high-income countries.[53] Apprentices, therefore, are more than three times more likely to have experience of NSSI compared with adults in high-income countries. As highlighted by O'Donnell *et al* nationally and substantiated internationally,[15 23] findings from this study highlight young construction workers as being particularly vulnerable to suicidal ideation, NSSI and suicide attempt. This conflicts with national trends which show a higher prevalence of suicidal ideation and deaths by suicide among older males in Ireland.[34 54] This again underlines the importance of early intervention and industry-wide commitment and endorsement of mental health promotion and suicide prevention efforts designed to mitigate the factors associated with these suicidal trajectories. It is acknowledged that a robust comparison with international studies is challenging given the different outcome measures for suicidality used in different studies. This study shows the risk of major mental health conditions and suicidality among apprentices is higher when compared with construction workers more generally and considerably higher than the general population. While prevalence patterns resembled those found among Australian apprentices,[23] contextual factors, such as Ireland's apprenticeship system, housing market

pressures, smaller employer size and limited mental-health supports, may influence risk differently. These contextual differences should be considered when transferring interventions across settings.

Findings shed considerable light on those variables that were associated with different suicidal trajectories that can be utilised to inform ongoing suicide prevention strategies among apprentices in construction in Ireland. Mental health factors, including previous mental health difficulties and depression in particular, were the most significant predictors across all suicidality measures. The relationship between increasing severity levels of depression with increased likelihood of suicidal ideation, NSSI and suicide attempts aligns with previous literature that includes young adults[10 55] and apprentice populations.[23] Individuals with severe depression are at greater risk of suicidal behaviours due to factors such as impaired coping mechanisms and increased hopelessness.[56] Notably, self-esteem acted as a protective factor whereby apprentices with normal levels of self-esteem showed reduced odds of engaging in suicidal behaviours. This is consistent with previous research which indicates that positive self-concepts can buffer against mental health difficulties, reducing the likelihood of suicidal ideation and suicidal behaviours.[57–59] Financial worries were also significantly associated with both NSSI and suicide attempt, highlighting the role of economic stress as a potential risk factor for mental health difficulties and suicidal behaviours among apprentices. Financial insecurity may also be particularly acute for apprentices who typically earn lower wages than qualified construction workers, equating approximately to the minimum wage in Ireland. Apprentices therefore face greater financial instability as they juggle the rotating demands of third-level and industry placements across a 3–4 year apprenticeship cycle, each with vastly different remuneration arrangements and geographical work placement locations. Economic concerns have been identified as a significant stressor that can exacerbate mental health symptoms and contribute to suicidal ideation and suicidal behaviours.[32 60 61] The variety of geographical work placement and training placement locations, over which the apprentices have no control, may be a contributory factor to the higher rates of NSSI. The higher risk of suicidality among specific trades such as metalworking and plumbing could reflect unique occupational stressors associated with these trades, such as hazardous work environments, arduous physical demands, high-stress tasks and financial stressors associated, in particular, with transience of work within these trades.[62] There may also be a connection between the physicality, pain levels and exposure to injury risk experienced by these trades and higher levels of depression, anxiety and stress severity.[61 63] Specific factors such as previous bereavement through suicide did not show a significant effect on suicide attempt at 0.052. The findings should be interpreted with caution as the sample comprised predominantly Irish male apprentices, which may limit generalisability to other construction populations or international contexts.

Given the strong associations between mental health variables and risk of suicidality, apprenticeship programmes could benefit from implementing targeted and culturally appropriate mental health support measures. In terms of reach, apprentices are a captive audience, a key consideration in health promotion interventions, as they are required to attend regular blocks of class-based learning in a university setting. The development of bespoke and gender-responsive health promotion resources and interventions within the apprenticeship framework could promote improved mental health literacy and early identification of those at risk, potentially reducing the risk of suicidal behaviours and the further development of mental health difficulties as apprentices transition into the workplace full-time.[64] Those delivering the apprentice programmes may also benefit from education around mental health and the psychological and emotional struggles faced by apprentices. Additionally, the clear relationship between financial worry and mental health outcomes suggests that financial advice and support may play an essential role in reducing mental health risks. Apprenticeship programmes could also consider providing financial literacy training and resources for managing personal finances, budgeting and debt.

Limitations

This study has a number of limitations that should be taken into consideration. The directionality of the variables with the suicidality outcomes could not be assessed due to the cross-sectional nature of the study. As the study relied on self-reported data, there is potential for response biases, such as the under-reporting of sensitive topics like suicidal ideation and NSSI. As with the Irish construction industry study conducted by O'Donnell *et al*, distal risk factors were the primary focus of the study and so proximal factors such as drug and alcohol misuse, psychosocial job adversity and physical working conditions, which may significantly influence some suicidality outcomes, were not included. Additionally, the age of participants was collected categorically, rather than as a continuous variable. Methods were intentionally aligned with those of O'Donnell *et al* to enable valid cross-study comparison; however, this paper's analytic focus and population (apprentices) are distinct. The questions used to assess the suicidality outcomes were chosen to allow comparison with previous construction population and general population studies, but the psychometric properties of these suicidality questions have not been reported in literature as reported previously.

CONCLUSION

This study underscores the critical role of mental health difficulties, financial worry, demographic and occupation-specific factors such as living in rented

accommodation, in influencing suicidal ideation, NSSI and suicide attempt among apprentices in Ireland. Findings highlight the need for comprehensive mental health support and tailored, culturally appropriate interventions within apprenticeship programmes to address these risks. Future research could benefit from a longitudinal design to explore how mental health difficulties, financial stress and occupational stressors interact over time. This would allow for a clearer understanding of the causal pathways leading to suicidal behaviours among apprentices. Qualitative studies could provide deeper insight into the experiences of apprentices in different trades. Understanding apprentices' perspectives on mental health stressors, financial worries and coping mechanisms could inform more nuanced and targeted interventions. Given the associations between certain trades and elevated mental health risks, further research into occupational health and safety measures for apprentices is also warranted. Exploring the specific stressors and risks associated with trades like metalworking and plumbing could inform tailored interventions that improve both physical and mental health outcomes.

Contributors Conceptualisation was conducted by JS, SO and NR; methodology was developed by JS, SO, MH and NR; resources were acquired by JS; writing—original draft preparation was done by JS; writing—review and editing was done by JS, SO, PC, PJW, MH and NR; visualisation was done by JS; supervision was carried out by PC, PJW and NR. NR is the guarantor. All authors have read and agreed to the published version of the manuscript.

Funding Research was funded by Irish Research Council, grant number EBPPH/2022/9 and by the South East Technological University (grant/award number: not applicable). This study forms part of a wider study that is commissioned by the Men's Health Forum in Ireland and funded by the National Office for Suicide Prevention. The APC was funded by the South East Technological University.

Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants. Ethical approval was granted by the Southeast Technological University Carlow Ethics Committee (Reference no 391). The study was approved by the Institutional Ethics Committee of South East Technological University (reference #313—5 November 2021). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request.

ORCID iDs
Jack Sweeney https://orcid.org/0000-0001-8702-6470
Shane O'Donnell https://orcid.org/0000-0002-3840-1040
P J White https://orcid.org/0000-0002-5716-8643
Paula Carroll https://orcid.org/0000-0001-8465-4535
Noel Richardson https://orcid.org/0000-0002-2060-2338

REFERENCES

1 World Health Organisation. Suicide worldwide in 2019. 2021.
2 World Health Organization. Suicide in the world: global health estimates. Geneva World Health Organization; 2019.
3 Boyd A, Vilagut G, O'Neill S, *et al*. Gender differences in mental disorders and suicidality in Europe. *J Affect Disord* 2015;173:245–54.
4 Girgus JS, Yang K, Ferri CV. The Gender Difference in Depression: Are Elderly Women at Greater Risk for Depression Than Elderly Men? *Geriatrics (Basel)* 2017;2:35.
5 Martin LA, Neighbors HW, Griffith DM. The Experience of Symptoms of Depression in Men vs Women. *JAMA Psychiatry* 2013;70:1100.
6 Seidler ZE, Rice SM, River J, *et al*. Men's Mental Health Services: The Case for a Masculinities Model. *The Journal of Men's Studies* 2018;26:92–104.
7 Milner A, Spittal MJ, Pirkis J, *et al*. Suicide by occupation: Systematic review and meta-analysis. *Br J Psychiatry* 2013;203:409–16.
8 Tyler S, Hunkin H, Pusey K, *et al*. Suicide in the Construction Industry: A Targeted Meta-analysis. *Arch Suicide Res* 2023;27:1134–46.
9 Windsor-Shellard B, Gunnell D. Occupation-specific suicide risk in England: 2011-2015. *Br J Psychiatry* 2019;1–6.
10 O'Donnell S, Egan T, Clarke N, *et al*. Prevalence and associated risk factors for suicidal ideation, non-suicidal self-injury and suicide attempt among male construction workers in Ireland. *BMC Public Health* 2024;24:1263.
11 Roberts SE, Jaremin B, Lloyd K. High-risk occupations for suicide. *Psychol Med* 2013;43:1231–40.
12 Tyler S, Gunn K, Esterman A, *et al*. Suicidal Ideation in the Australian Construction Industry: Prevalence and the Associations of Psychosocial Job Adversity and Adherence to Traditional Masculine Norms. *IJERPH* 2022;19:15760.
13 Milner A, Niven H, LaMontagne A. Suicide by occupational skill level in the Australian construction industry: data from 2001 to 2010. *Aust N Z J Public Health* 2014;38:281–5.
14 Heller TS, Hawgood JL, Leo DD. Correlates of suicide in building industry workers. *Arch Suicide Res* 2007;11:105–17.
15 Dong XS, Brooks RD, Brown S, *et al*. Psychological distress and suicidal ideation among male construction workers in the United States. *Am J Ind Med* 2022;65:396–408.
16 Choi I, Petrie K, Einboden R, *et al*. Apprentices' Attitudes Toward Using a Mental Health Mobile App to Support Healthy Coping: Mixed Methods Study. *JMIR Hum Factors* 2022;9:e35661.
17 Einboden R, Choi I, Ryan R, *et al*. *'Having a thick skin is essential'*: mental health challenges for young apprentices in Australia. *J Youth Stud* 2021;24:355–71.
18 Tyler S, Gunn K, Clifford B, *et al*. "And you feel like you're suffocating … how the fuck am I going to get out of all this?" Drivers and experiences of suicidal ideation in the Australian construction industry. *Front Psychiatry* 2023;14:1144314.
19 Ross V, Caton N, Gullestrup J, *et al*. Understanding the Barriers and Pathways to Male Help-Seeking and Help-Offering: A Mixed Methods Study of the Impact of the Mates in Construction Program. *Int J Environ Res Public Health* 2019;16:2979.
20 Connell RW, Messerschmidt JW. Hegemonic Masculinity: Rethinking the Concept. *Gender and Society* 2005;19:829–59.
21 Considine R, Tynan R, James C, *et al*. The Contribution of Individual, Social and Work Characteristics to Employee Mental Health in a Coal Mining Industry Population. *PLoS ONE* 2017;12:e0168445.
22 Roche AM, Pidd K, Fischer JA, *et al*. Men, Work, and Mental Health: A Systematic Review of Depression in Male-dominated Industries and Occupations. *Saf Health Work* 2016;7:268–83.
23 Ross DV, Mathieu DS, Wardhani MR, *et al*. Suicidal ideation and related factors in construction industry apprentices. *J Affect Disord* 2022;297:294–300.
24 Riggall M, Skues J, Wise L. Apprenticeship bullying in the building and construction industry. *ET* 2017;59:502–15.
25 Spear LP. The adolescent brain and age-related behavioral manifestations. *Neurosci Biobehav Rev* 2000;24:417–63.

26 Paus T, Keshavan M, Giedd JN. Why do many psychiatric disorders emerge during adolescence? *Nat Rev Neurosci* 2008;9:947–57.
27 Cavicchioli M, Vassena G, Movalli M, *et al*. Addictive behaviors in alcohol use disorder: dysregulation of reward processing systems and maladaptive coping strategies. *J Addict Dis* 2018;37:173–84.
28 Diehl M, Chui H, Hay EL, *et al*. Change in coping and defense mechanisms across adulthood: longitudinal findings in a European American sample. *Dev Psychol* 2014;50:634–48.
29 Biddle L, Donovan J, Sharp D, *et al*. Explaining non-help-seeking amongst young adults with mental distress: a dynamic interpretive model of illness behaviour. *Sociology Health & Illness* 2007;29:983–1002.
30 Oliver MI, Pearson N, Coe N, *et al*. Help-seeking behaviour in men and women with common mental health problems: cross-sectional study. *Br J Psychiatry* 2005;186:297–301.
31 Cleary A. Suicidal action, emotional expression, and the performance of masculinities. *Soc Sci Med* 2012;74:498–505.
32 Richardson N, Clarke N, Fowler C. A report on the all-ireland young men and suicide project. Dublin Health and Research Board; 2013.
33 Klineberg E, Biddle L, Donovan J, *et al*. Symptom recognition and help seeking for depression in young adults: a vignette study. *Soc Psychiatry Psychiatr Epidemiol* 2011;46:495–505.
34 Central Statistics Ofice (Ireland). Suicide statistics 2020. Dublin CSO; 2023.
35 Rasmussen ML, Dyregrov K, Haavind H, *et al*. The Role of Self-Esteem in Suicides Among Young Men. *Omega (Westport)* 2018;77:217–39.
36 Melchior M, Caspi A, Milne BJ, *et al*. Work stress precipitates depression and anxiety in young, working women and men. *Psychol Med* 2007;37:1119–29.
37 National Apprenticeship Office. Progress report 2023 and plans 2024. Government of Ireland; 2024.
38 McManus S, Bebbinton P, Jenkins R, *et al*. 2016. Available: https://digital.nhs.uk/data-and-information/publications/statistical/adult-psychiatric-morbidity-survey/adult-psychiatric-morbidity-survey-survey-of-mental-health-and-wellbeing-england-2014
39 Hyland P, Rochford S, Munnelly A, *et al*. Predicting risk along the suicidality continuum: A longitudinal, nationally representative study of the Irish population during the COVID-19 pandemic. *Suicide Life Threat Behav* 2022;52:83–98.
40 Lewis G, Pelosi AJ, Araya R, *et al*. Measuring psychiatric disorder in the community: a standardized assessment for use by lay interviewers. *Psychol Med* 1992;22:465–86.
41 Kroenke K, Spitzer RL, Williams JBW. The PHQ-9. *J Gen Intern Med* 2001;16:606–13.
42 Spitzer RL, Kroenke K, Williams JBW, *et al*. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med* 2006;166:1092–7.
43 Lally J, ó Conghaile A, Quigley S, *et al*. Stigma of mental illness and help-seeking intention in university students. *Psychiatrist* 2013;37:253–60.
44 Link BG. Understanding Labeling Effects in the Area of Mental Disorders: An Assessment of the Effects of Expectations of Rejection. *Am Sociol Rev* 1987;52:96.
45 Eisenberg D, Downs MF, Golberstein E, *et al*. Stigma and help seeking for mental health among college students. *Med Care Res Rev* 2009;66:522–41.
46 Rosenberg M. Society and the adolescent self-image. Princeton University Press; 1965.
47 Wilson CJ, Deane FP, Ciarrochi JV, *et al*. Measuring help seeking intentions: Properties of the General Help Seeking Questionnaire. *Canadian Journal of Counselling* 2005;15–28.
48 Berardelli I, Rogante E, Sarubbi S, *et al*. Is Lethality Different between Males and Females? Clinical and Gender Differences in Inpatient Suicide Attempters. *IJERPH* 2022;19:13309.
49 Stergiou-Kita M, Mansfield E, Colantonio A, *et al*. What's gender got to do with it? Examining masculinities, health and safety and return to work in male dominated skilled trades. *Work* 2016;54:721–33.
50 Bennett S, Robb KA, Zortea TC, *et al*. Male suicide risk and recovery factors: A systematic review and qualitative metasynthesis of two decades of research. *Psychol Bull* 2023;149:371–417.
51 Sweeney J, O'Donnell S, Roche E, *et al*. Mental Health Stigma Reduction Interventions Among Men: A Systematic Review. *Am J Mens Health* 2024;18:15579883241299353.
52 Nock MK, Borges G, Bromet EJ, *et al*. Cross-national prevalence and risk factors for suicidal ideation, plans and attempts. *Br J Psychiatry* 2008;192:98–105.
53 Swannell SV, Martin GE, Page A, *et al*. Prevalence of Nonsuicidal Self-Injury in Nonclinical Samples: Systematic Review, Meta-Analysis and Meta-Regression. *Suicide & Life Threat Behav* 2014;44:273–303.
54 Wilson M, Byrne SJ, Fisher K, *et al*. Profiling 22,151 male presentations to emergency departments for suicidal ideation or self-harm in Ireland. 2023. Available: https://osf.io/preprints/psyarxiv/64qkc [Accessed 02 Oct 2024].
55 Gili M, Castellví P, Vives M, *et al*. Mental disorders as risk factors for suicidal behavior in young people: A meta-analysis and systematic review of longitudinal studies. *J Affect Disord* 2019;245:152–62.
56 Klonsky ED, May AM, Saffer BY. Suicide, Suicide Attempts, and Suicidal Ideation. *Annu Rev Clin Psychol* 2016;12:307–30.
57 Mann M, Hosman CMH, Schaalma HP, *et al*. Self-esteem in a broad-spectrum approach for mental health promotion. *Health Educ Res* 2004;19:357–72.
58 De Man AF, Gutiérrez BIB. The relationship between level of self-esteem and suicidal ideation with stability of self-esteem as moderator. *Canadian Journal of Behavioural Science / Revue Canadienne Des Sciences Du Comportement* 2002;34:235–8.
59 Soto-Sanz V, Piqueras JA, Rodríguez-Marín J, *et al*. Self-esteem and suicidal behaviour in youth: A meta-analysis of longitudinal studies. *Psicothema* 2019;31:246–54.
60 Weissman J, Russell D, Mann JJ. Sociodemographic Characteristics, Financial Worries and Serious Psychological Distress in U.S. Adults. *Community Ment Health J* 2020;56:606–13.
61 Milner A, Maheen H, Currier D, *et al*. Male suicide among construction workers in Australia: a qualitative analysis of the major stressors precipitating death. *BMC Public Health* 2017;17:584.
62 Barber LB, Neis B. Construction work and the mobility imperative: changing rhythms along uncertain paths. *Applied Mobilities* 2021;6:236–51.
63 Turner M, Lingard H. Examining the interaction between bodily pain and mental health of construction workers. *Construction Management and Economics* 2020;38:1009–23.
64 Fusar-Poli P. Integrated Mental Health Services for the Developmental Period (0 to 25 Years): A Critical Review of the Evidence. *Front Psychiatry* 2019;10:355.