

THE CHANGING PATTERN OF THE CLINICAL CHARACTERISTICS OF SELF-HARM  
ACROSS THE LIFESPAN: HOW DO HOSPITAL SERVICES RESPOND?

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## ABSTRACT

### *Introduction*

Self-harm is a substantial problem in the UK with significant human and economic costs. It is one of the most common reasons for acute admission to hospital in the UK and is an important risk factor for suicide. Psychological theory and empirical studies indicate that the characteristics of self-harm may differ in people of different ages, and that these characteristics may influence the care that people receive when they attend hospital after self-harm.

### *Method*

The study data were collected as part of a UK multi-centre self-harm monitoring project. The data cover 11,243 consecutive attendances at hospital emergency departments in Leeds made by 6292 individuals between 1 October 2004 and 30 September 2007. The data were analysed across the age range using comparison of odds ratios, linear chi squared tests for trend and survival analysis.

### *Results*

Characteristics of self-harm and hospital management differ for people of different ages. Severity of self-harm increases with increasing age, but service provision is not closely linked to severity. The youngest and oldest age groups receive the best service and the working age adults, who conduct medically serious self-harm and are at high risk of repeating self-harm, receive the worst service. The oldest age group appear to be substantially different from the younger groups in terms of their history.

### *Discussion*

The differences in the characteristics of self-harm across the age range are compatible with psychological theory relating to the reasons people may conduct self-harm at different ages. Adult mental health services could learn from the high standards of care provided to the youngest and oldest people who self-harm. Further research to explore self-harm in different age groups is recommended.

## CONTENTS

<b>ACKNOWLEDGEMENTS</b> .....	2
<b>ABSTRACT</b> .....	3
<b>LIST OF TABLES</b> .....	6
<b>LIST OF FIGURES</b> .....	7
<b>ABBREVIATIONS</b> .....	8
<b>CHAPTER 1: INTRODUCTION AND LITERATURE REVIEW</b> .....	9
Introduction .....	9
<i>Literature search</i> .....	9
<i>Definitions</i> .....	9
<i>Suicidal intent in self-harm</i> .....	10
Psychological Theory of Self-Harm .....	12
<i>General theory of self-harm</i> .....	13
<i>Self-injury without suicidal intent</i> .....	13
<i>Suicidal behaviour</i> .....	19
<i>Adolescence, approximately age 12 to 18</i> .....	22
<i>Early adulthood, approximately age 18 to 30</i> .....	24
<i>Middle to later adulthood, approximately age 30 to 65</i> .....	24
<i>Older adulthood, approximately age 65 and over</i> .....	25
Epidemiology of Self-Harm .....	29
<i>Self-harm and suicide</i> .....	29
<i>Rates of self-harm</i> .....	30
<i>Methods and characteristics of self-harm</i> .....	32
<i>Psychosocial assessment in the ED</i> .....	34
<i>Assessment and hospital services</i> .....	35
<i>Treatment and follow-up after ED attendance</i> .....	38
<i>Patient opinions</i> .....	39
Psychological Interventions for Self-Harm .....	40
Summary, Aims and Hypotheses .....	40
<b>CHAPTER 2: METHOD</b> .....	42
<i>Data collection</i> .....	42
<i>Ethical aspects</i> .....	42
<i>Information available for analysis</i> .....	43
<i>Analysis</i> .....	45
<i>Decisions about age bands</i> .....	45
<i>Example of analysis of a variable</i> .....	46
<i>Data manipulation</i> .....	48
<i>Missing data</i> .....	50
<i>Summary</i> .....	50
<b>CHAPTER 3: RESULTS</b> .....	51
Incidence Rates of Self-Harm.....	51
Section 1: Information about the Person .....	53
<i>Gender</i> .....	54
<i>Previous and recent self-harm history</i> .....	55
<i>Previous mental health history</i> .....	56
<i>Current mental health contact</i> .....	57
<i>Current mental health inpatient status</i> .....	58
<i>Summary</i> .....	59
Section 2: Information about the Episode of Self-Harm .....	59
<i>Mode of arrival at the ED</i> .....	61
<i>Method of self-harm: Overall proportions</i> .....	63

<i>Methods across the age groups</i> .....	63
<i>Drugs taken in self-poisoning</i> .....	64
<i>Number of substances taken</i> .....	66
<i>Methods used in self-injury</i> .....	67
<i>Self-cutting</i> .....	69
<i>Alcohol use</i> .....	70
<i>Summary</i> .....	71
Section 3: Hospital Management of Self-Harm .....	72
<i>Triage</i> .....	74
<i>Alertness</i> .....	75
<i>Medical treatment for self-poisoning</i> .....	76
<i>Medical treatment for self-injury</i> .....	78
<i>Declining treatment</i> .....	79
<i>Psychosocial assessment</i> .....	79
<i>Outcome on leaving the ED</i> .....	82
<i>Aftercare arrangements</i> .....	84
<i>Summary</i> .....	86
Section 4: Repetition of Self-Harm .....	87
<i>Number of repetitions</i> .....	91
<i>Multiple repetitions</i> .....	92
<i>Switching method</i> .....	93
<i>Summary</i> .....	94
<b>CHAPTER 4: DISCUSSION</b> .....	95
Summary of Results and Discussion in the Context of the Wider Literature .....	95
<i>Rates of self-harm</i> .....	95
<i>Information about the person</i> .....	95
<i>Information about the episode of self-harm</i> .....	97
<i>Information about the hospital management of self-harm</i> .....	98
<i>Repetition of self-harm</i> .....	100
Characteristics of Self-harm and Service Provision in Each Age Group.....	101
12-17.....	101
18-29.....	101
30-39.....	101
40-49.....	102
50-59.....	102
60+ .....	102
<i>Patterns and change points</i> .....	103
<i>Links to psychological theory</i> .....	104
Methodological Limitations.....	106
Clinical Implications .....	108
Further Research .....	110
<b>REFERENCES</b> .....	112
<b>APPENDIX</b> .....	120

## LIST OF TABLES

Table 1. Example of crosstabulation for gender in the 12-17 years age group vs. the rest of the sample.....	46
Table 2. Odds ratios for gender by age group .....	47
Table 3. Number of episodes comprising each age group.....	51
Table 4. Estimated rates of self-harm in Leeds per 100,000 of the population per year 2004-2007 .....	52
Table 5. Summary of variables within the person information category .....	53
Table 6. Proportions and 95% CIs for gender across the age groups .....	54
Table 7. Proportions and 95% CIs across the age groups for number of episodes where the person has previous self-harm.....	56
Table 8. Proportions and 95% CIs across the age groups for number of episodes where the person has previous mental health history .....	57
Table 9. Proportions and 95% CIs across the age groups for number of episodes where the person has current contact with mental health services .....	58
Table 10. Summary of variables within the episode of self-harm category .....	60
Table 11. Proportions and 95% CIs for mode of arrival at the ED .....	61
Table 12. Patterns across the age range for likelihood of arriving at the ED by each mode of transport .....	63
Table 13. Proportions taking each substance in self-poisoning episodes .....	64
Table 14. Patterns across the age range of likelihood of having taken substances in self-poisoning.....	65
Table 15. Proportions using each method of self-injury.....	67
Table 16. Patterns across the age range for likelihood of using specific methods of self-injury	67
Table 17. Proportions and 95% CIs for alcohol use across the age groups .....	70
Table 18. Summary of variables within the hospital management category .....	73
Table 19. Proportions and 95% CIs for number of episodes triaged as urgent in each age group .....	74
Table 20. Proportions and 95% CIs for number of episodes in which the individual was alert at presentation to the ED.....	75
Table 21. Proportions and 95% CIs receiving each type of treatment for self-poisoning .....	77
Table 22. Proportions and 95% CIs receiving each type of treatment for self-injury.....	79
Table 23. Proportions and 95% CIs for psychosocial assessment across the age groups.....	80
Table 24. Proportions and 95% CIs for profession/role conducting the psychosocial assessment .....	81
Table 25. Proportions and 95% CIs for outcome on leaving the ED .....	82
Table 26. Proportions and 95% CIs for aftercare arrangements at discharge.....	84
Table 27. Patterns across the age range for likelihood of being offered each type of aftercare	85
Table 28. Proportions and 95% CIs for repetition across the age groups .....	87
Table 29. Results of Cox regression for repetition according to six age groups.....	91
Table 30. Proportions and 95% CIs for switching of method at repetition across the age groups .....	93
Table 31. Comparison of proportions with certain characteristics between the present study and those of Hawton and Harriss (2006; 2007) .....	96

## LIST OF FIGURES

Figure 1. Differential algorithm of self-harm (Mangnall & Yurkovich, 2008). .....	12
Figure 2. Biopsychosocial vulnerability factors, potential motivations and life stage triggers for self-harm. ....	26
Figure 3. Chart showing odds ratios for gender by age group.....	47
Figure 4. Estimated rates of self-harm in Leeds per 100,000 of the population per year for males and females across the age range. ....	53
Figure 5. ORs across the age groups for gender. ....	54
Figure 6. ORs across the age groups for previous self-harm history. ....	56
Figure 7. ORs across the age groups for previous mental health history.....	57
Figure 8. ORs across the age groups for current mental health contact. ....	58
Figure 9. ORs across the age groups for arrival at ED by ambulance. ....	61
Figure 10. ORs across the age groups for arrival at ED by car. ....	62
Figure 11. ORs across the age groups for use of self-poisoning. ....	64
Figure 12. ORs across the age groups for use of NSAIDs in self-poisoning episodes. ....	66
Figure 13. ORs across the age groups for four or more drugs taken.....	66
Figure 14. ORs across the age groups for use of violent self-injury methods. ....	68
Figure 15. ORs across the age groups for using a self-injury method other than cutting. ....	69
Figure 16. OR across the age groups for two or more sites cut.....	69
Figure 17. ORs across the age groups for alcohol use around the time of self-harm as recorded in the database. ....	71
Figure 18. ORs across the age groups for alcohol use around the time of self-harm using multiple imputation. ....	71
Figure 19. ORs across the age groups for being classified as urgent at triage. ....	75
Figure 20. ORs across the age groups for alert on arrival at ED. ....	76
Figure 21. ORs across the age groups for receiving a psychosocial assessment in the ED.....	80
Figure 22. ORs across the age groups for admission to general or psychiatric hospital from the ED after self-harm. ....	83
Figure 23. ORs across the age groups for receiving higher-level aftercare. ....	86
Figure 24. ORs across the age groups for repetition of self-harm.....	87
Figure 25. KM survival curve for the whole sample over the entire study period. ....	88
Figure 26. KM survival curves for each age group over the entire study period.....	89
Figure 27. Thirty day KM survival curves for each age group.....	90
Figure 28. Mean number of repetitions according to age group. Errors bars are SDs. ....	92
Figure 29. ORs across the age groups for greater than mean number of repetitions.....	93
Figure 30. ORs across the age groups for switching of method at repetition. ....	94
Figure 31. ORs across the age groups for previous self-harm with five-year age bands.....	120
Figure 32. ORs across the age groups for previous self-harm with service defined age bands. ....	120
Figure 33. ORs across the age groups for previous self-harm with the age bands used in the study.....	121
Figure 34. ORs across the age groups for previous self-harm plotted with a linear scale on the y axis. ....	121
Figure 35. ORs across the age groups for drugs taken in self-poisoning. ....	122
Figure 36. ORs across the age groups for method of self-injury used.....	123

## ABBREVIATIONS

ANOVA: Analysis of variance  
BPD: Borderline Personality Disorder  
CAMHS: Child and Adolescent Mental Health Services  
CI: Confidence interval  
CO: Carbon monoxide  
CPN: Community Psychiatric Nurse  
CRT: Crisis Resolution Team  
DoH: Department of Health  
DSH: Deliberate self-harm  
ED: Emergency department  
EM: Expectation-maximisation  
GP: General Practitioner  
KM: Kaplan-Meier  
MCAR: Missing completely at random  
NHS: National Health Service  
NICE: National Institute of Clinical Excellence  
NIGB: National Information Governance Board  
NPIS: National Poisons Information Service  
NSAID: Non-steroidal anti-inflammatory drug  
NSSI: Non-suicidal self-injury  
ONS: Office for National Statistics  
OR: Odds ratio  
OTC: Over the counter  
PASW: Predictive Analytics Software  
PCT: Primary Care Trust  
PIAG: Patient Information Advisory Group  
R&D: Research and Development  
REC: Research Ethics Committee  
SAMS: Schematic Appraisal Model of Suicide  
SD: Standard deviation  
SHO: Senior House Officer  
SIS: Suicidal Intent Scale  
SpR: Specialist Registrar  
SPSS: Statistical Package for Social Sciences  
TPB: Theory of Planned Behaviour  
UK: United Kingdom  
US: United States



## CHAPTER 1: INTRODUCTION AND LITERATURE REVIEW

### *Introduction*

The present study aims to explore age-related differences in the clinical characteristics and hospital emergency department (ED) management of self-harm and to determine whether differences in service provision correspond to identified differences in severity and risk. A further aim is to identify any changes in the characteristics of self-harm around particular age points, examining whether any characteristics appear to change together and considering possible reasons for such changes. The study is an analysis of existing data collected in Leeds as part of a multi-centre self-harm monitoring project that was shared with Oxford and Manchester. The data cover 11,243 consecutive attendances at the ED in Leeds for self-harm made by 6292 individuals between 1 October 2004 and 30 September 2007. In this chapter I will introduce the background literature relevant to this study including use of language in discussing self-harm; suicidal intent and the link between self-harm and suicide; psychological theory of self-harm and suicidal behaviour; reasons that people may conduct self-harm at different ages; and the epidemiology and hospital management of self-harm. I will also present the aims and hypotheses of this study.

*Literature search.* I carried out a thorough search for published studies and review articles relating to self-harm using Embase, MEDLINE, PsycINFO and Google Scholar. Search terms included 'self-harm', 'self-injury', 'self-mutilation', 'attempted suicide', 'young', 'child', 'adolescent', 'adult', 'elderly' and 'geriatric'. I selected papers relevant to the psychological theory and functions of self-harm including qualitative accounts of meaning; and papers reporting information about epidemiology of self-harm, ED management of self-harm, and characteristics of self-harm in different age groups. I also acquired further secondary references which were mentioned in these papers.

*Definitions.* There are multiple terms used to describe behaviour in which individuals cause damage to their own bodies or attempt to end their own lives. Allen (2007) provides a critique of the common perspectives and use of language in addressing self-harm. Choice of language can reinforce power dynamics and can attribute functions and meaning to self-harm which may not be applicable or relevant to individual circumstances. Many of the terms used to denote self-harm have negative, pejorative and objectifying connotations. The redundant use of the word 'deliberate' as a prefix, for example, indicates a level of control and an ability to abstain from self-harm and it reinforces ideas about manipulative intent. In describing people by their condition or behaviour, for example as 'self-harmers' or 'cutters', Thompson (1998, as cited in Allen, 2007) argues that the human spirit becomes a powerless object in the medical discourse. This is proposed to perform a role in dehumanisation, leading to

discrimination and oppression. There are different discourses about the definition, function and meaning of self-harm, and a lack of agreement about the use of terminology related to self-harm results in an inability to speak a shared language (McAllister, 2003). This impacts on both the interpretation and comparison of theoretical and empirical studies and on the development of effective interventions. The 'semantic obfuscation' surrounding terminology is partially responsible for the relatively slow progress of research in this area (Prinstein, 2008). An explicit statement regarding the definition used for self-harm is therefore important in any work in this area.

Hawton, Harriss, Hall, Simkin, Bale and Bond (2003) define self-harm as intentional self-poisoning or self-injury, irrespective of motivation (whether or not there is evidence that the act was intended to result in death). Self-poisoning includes taking more than the recommended dose of medications and swallowing non-ingestible substances such as bleach or insecticide. Self-poisoning can also include overdoses of recreational drugs or severe alcohol intoxication where the motivation was to cause harm. Self-injury is any injury which has been intentionally self-inflicted. The most common form of self-injury is cutting. Alternative methods of self-injury include burning, hitting, stabbing, hair pulling, interference with wound healing, swallowing objects, embedding objects in the body, jumping from a height, hanging, drowning and traffic-related injuries. Alternative terms used to denote self-injury include 'self-mutilation', 'self-wounding', 'self-injurious behaviour', 'non-suicidal self-injury (NSSI)' and 'self-destructive behaviour'; all of these are in much more common use in the United States (US) than the United Kingdom (UK).

The definition of self-harm that I have used in this study is that used by Hawton et al. (2003): 'intentional self-poisoning or self-injury, irrespective of motivation'. This definition and the term 'self-harm' are preferred by clinicians and researchers in the UK to terms such as 'attempted suicide', 'failed suicide', 'non-fatal suicide' and 'parasuicide' as it is recognised that motivation for self-harming behaviour is complex. There are multiple possible meanings of self-harm and a person's ideas about the functions that self-harm performs for them can be subject to change and revision. Different episodes of self-harm may have different antecedents and serve different functions and a person's attribution of meaning for a single episode may change over time.

*Suicidal intent in self-harm.* The presence or absence of suicidal intent cannot be assumed; assessment and enquiry about the person's intent are required. Suicidal intent may be conceptualised as existing on a continuum and being flexible and context dependent. Studies from the US examining self-harm are generally based on an implicit or explicit assumption that a clear dichotomy exists between self-harm without suicidal intent and

'attempted suicide'. Such studies often choose to focus on one or the other but do not use a reliable method of determining suicidal intent or ideation such as Beck's Suicidal Intent Scale (SIS; Beck, Schuyler & Herman, 1974) or Scale of Suicidal Ideation (Beck, Kovacs & Weissman, 1979), thereby creating an artificial and non-evidence-based distinction.

Muehlenkamp and Gutierrez (2004) found differences on a measure of attitudes towards life between adolescents who engaged in 'self-injurious behaviour' and those who were considered by clinicians to have attempted suicide, providing preliminary evidence that it may be possible to establish categories of self-harm based on suicidal intent. This study was conducted with a community sample of adolescents and therefore cannot be generalised to hospital attendances for self-harm or to all age groups. Nock and Kessler (2006) found some significant differences between individuals who disclosed previously having self-harmed with the intent to die and those who described their self-harm as a 'cry for help'. In this study the people with suicidal intent were found to be more likely to possess certain demographic, diagnostic and abuse history characteristics known to be risk factors for suicide. The study was conducted in the US between 1990 and 1992, limiting generalisability to the current situation in the UK. A cross-sectional design and retrospective self-report of intent were used, therefore there is the possibility of recall bias and measurement error, further limiting the strength of this study.

Harriss, Hawton and Zahl (2005) and Harriss and Hawton (2005) reported on the association between suicidal intent measured by the Suicidal Intent Scale (SIS) at the time of self-harm and subsequent suicide. Suicidal intent does not conform to a bimodal 'present or absent' distribution, therefore the authors in these studies classified intent as 'high' or 'low' based on either the median score on the SIS or on receiver operating characteristic curves to maximise sensitivity and specificity. These are well conducted UK studies with large samples, though there were some missing data and data collection took place between 1993 and 1997 so the findings may not fully reflect current trends. A robust association was found between suicidal intent and eventual suicide, especially within the first year after self-harm and among females. The positive predictive value of the SIS was low, however, due to the low prevalence of suicide as an outcome, meaning that suicidal intent at the time of self-harm cannot be used to predict accurately which individuals will go on to die by suicide.

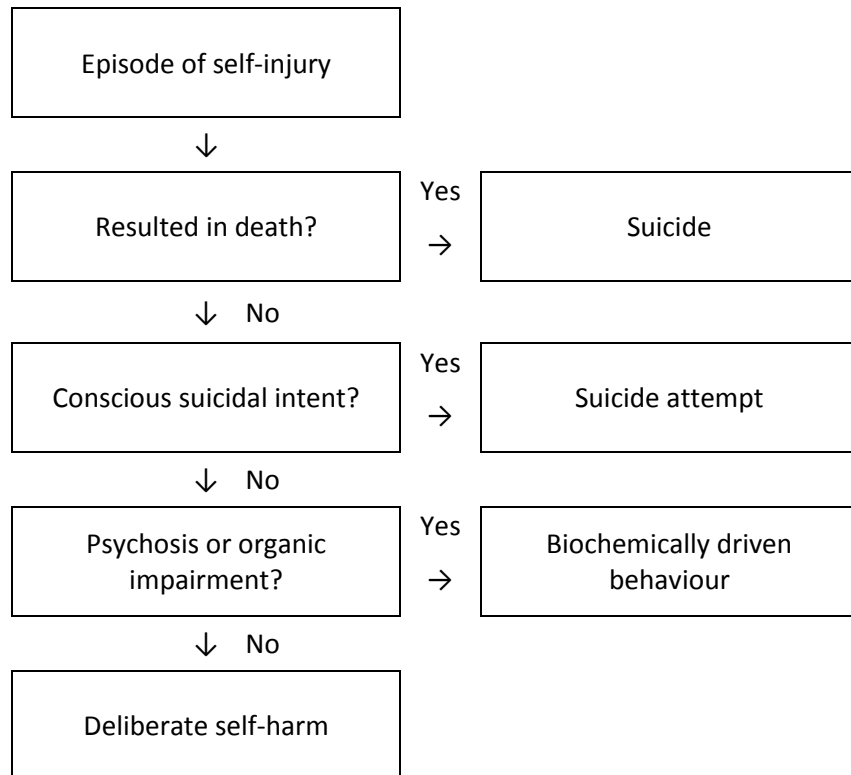
The above studies indicate that it is possible for a distinction to be drawn between self-harm with higher and lower levels of suicidal intent. The studies also indicate that making such a distinction, in combination with consideration of other risk factors, is valuable in risk assessment after self-harm, though not sufficient to predict who will go on to die by suicide. Assessment of intent should therefore form part of risk assessment and needs assessment but

should not be used to make decisions in isolation. For the purposes of the current study, suicidal intent was not measured and all attendances at the ED that were due to intentional self-poisoning or self-injury were included in the research. I will therefore not make any distinctions in my analysis based on assumptions about suicidal intent.

*Psychological Theory of Self-Harm*

Individual episodes of self-harming behaviour can be associated with differing psychological mechanisms, both between individuals and within an individual at different times. The literature on functions and motivations of self-harm makes a distinct division between self-harm that is seen as a suicide attempt and self-injury without suicidal intent which is defined, for example, by Gratz (2003) as ‘the deliberate, direct destruction or alteration of body tissue, without conscious suicidal intent but resulting in injury severe enough for tissue damage to occur.’ Figure 1 below illustrates a differential algorithm of ‘deliberate self-harm’ produced by Mangnall and Yurkovich (2008). This algorithm is simplistic in that it assumes that a clear distinction can be made between episodes with and without suicidal intent; as previously discussed it is not possible to do this with accuracy. This is, nevertheless, the basic algorithm underlying the terminology of much research in this area.

Figure 1. Differential algorithm of self-harm (Mangnall & Yurkovich, 2008).



*General theory of self-harm.* As mentioned above, the literature regarding the theory of self-harm generally makes a clear distinction between behaviours classed as 'suicide attempts' and those classed as 'deliberate self-harm', which is often denoted by the acronym DSH. Some authors have, however, proposed models or theories based on self-harm as a broader concept encompassing both types of behaviour. Toftthagen and Fagerstrom (2009) reviewed medical and nursing literature and used evolutionary concept analysis (Rodgers, 2000) to clarify the context, surrogate terms, antecedents, attributes and consequences of the concept of self-harm. They concluded that people who self-harm are expressing mental pain and that infliction of physical pain appears to alleviate various forms of inner pain. The search strategy and inclusion criteria for this analysis were not particularly robust, but the essentially descriptive conclusion appears at face value to be sound and is recognised as providing a first step towards further theoretical development.

Lewis, Rosenrot and Santor (2011) used the Theory of Planned Behaviour (TPB; Ajzen, 1991) to produce an integrated model of self-harm. The TPB is a social-cognitive model of behaviour in which a person's intention to engage in a behaviour is influenced by their values and attitudes towards the behaviour, their perceived level of control over engaging in and conducting the behaviour and others' attitudes towards the behaviour (subjective norms). If personal attitudes and subjective norms about a behaviour are positive, such beliefs are likely to increase the individual's intent to engage in that behaviour. Generally a high level of perceived control will increase intent to engage in a behaviour. In the case of self-harm, however, the authors proposed that a lack of perceived control is a frequently reported factor and may therefore increase the likelihood of engaging in the behaviour.

In applying a TPB model to self-harm Lewis et al. (2011) found that more favourable individual attitudes towards self-harm were correlated with greater intent to self-harm. A lack of perceived control was correlated with increased intent. Impulsivity is frequently cited as an antecedent to self-harm, particularly for adolescents, and it may be that perceived control and impulsivity are interrelated factors. Subjective norms were negatively correlated with intent, meaning that less favourable views from others regarding self-harm were related to lower intent to self-harm. This result is commensurate with research demonstrating the increased prevalence of self-harm in certain subcultures where subjective norms towards self-harm are more favourable, such as the 'goth' subculture (Young, 2006). Prospective examination of the TPB model with a larger sample would lend strength to this model of self-harm.

*Self-injury without suicidal intent.* Suyemoto (1998) reviewed the literature on 'self-mutilation' which is defined as a subset of self-harm behaviours that is differentiated by being: direct, as opposed to indirect self-harm (such as risk-taking behaviour like drink-driving and

substance misuse); socially unacceptable (unlike body piercing or tattooing); repetitive and resulting in minor to moderate harm (unlike more severe self-inflicted harm which is generally associated with psychosis and is usually not repetitive, and involves acts like eye enucleation and self-castration); lacking in suicidal intent; and not related to cognitive impairment (unlike the stereotypical self-injurious behaviour conducted by some individuals with learning disabilities). The definition given for self-mutilation is therefore:

A direct, socially unacceptable, repetitive behaviour that causes minor to moderate physical injury; when self-mutilating the individual is in a psychologically disturbed state but is not attempting suicide or responding to a need for self-stimulation or a stereotypic behaviour characteristic of mental retardation or autism. (Suyemoto, 1998).

While this definition has clearly been generated with care and precision, some of the wording is stigmatising and could be constructed more mindfully. The term 'psychologically disturbed state' for example implies mental health problems and an individualised rather than societal or contextual aetiology. Such associations brought by this use of language can lead to assumptions about personal controllability and manipulative intent. This in turn can lead to negative attitudes towards individuals who self-harm which then impact on provision of care. McHale and Felton (2010) reviewed the literature on staff attitudes towards people who self-harm and found that perception of control of self-harming behaviour was a key factor in the development of negative attitudes. The term 'self-mutilating' similarly has negative and pejorative connotations and I will instead use the term 'self-injury'. The term 'mental retardation' is acceptable in the American literature but would not be used in the UK.

Suyemoto (1998) identified and reviewed six functional models: the environmental model; the antisuicide and sexual drive models; two affect regulation models, one of which is particularly focused on dissociation; and the interpersonal boundaries model.

The environmental model encompasses both behavioural and systemic theoretical orientations and focuses on the interaction between the person who self-injures and their environment. Both predisposing and maintaining factors are addressed. This model proposes that self-injury begins through one of two social modelling routes. One route is through familial abuse which leads the person to associate care with pain and then to attempt to self-care through self-injury. In the other route the person discovers the benefits of self-injury through social learning. They observe others conducting self-injury and the rewards or secondary gains that this delivers, then imitate the behaviour. Self-injury is then proposed to be reinforced by both internal effects such as affect regulation and by environmental and systemic reactions such as receiving attention and concern from others. Self-injury thereby lets

the person obtain at least some of what they need from their environment through secondary gains. It is also proposed to maintain homeostasis in the system (family or hospital ward, for example) by expressing or deflecting attention away from systemic conflicts.

The drive models (antisuicide and sexual) are based on a psychoanalytic understanding in which self-injury is conceptualised as an expression or repression of drives related to life, death and sex. The antisuicide model sees self-injury as a compromise between life and death drives. As a coping mechanism it is used to avoid suicide by embracing self-destructive feelings, simultaneously protecting against and enacting the death drive; a way of expressing suicidal thought without risking death.

The sexual model proposes that self-injury stems from conflicts regarding sexuality. Several possible functions for self-injury included are in this model: offering sexual gratification; punishing or attempting to avoid sexual feelings; and trying to control sexuality or maturation. In this model self-injury is seen variously as an attempt to destroy or purify the body which is forcing the person to have Oedipal fantasies, with the genitals being the unconscious target of destruction and with the state of calm after self-injury being understood as relief that the genitals are safe in spite of the injury; an attempt to take control of and relieve anxiety about sexual impulses and penetration through the use of self-penetration; negative reactions and conflict regarding menstruation, displacing conflict from the genitals and allowing exposure and control of the bleeding; and a sado-masochistic need for control of pain, though self-harm is not about masochistic enjoyment of pain, rather the individual becomes sadistic in relation to parts of the self (Collins, 1996, as cited in Russell, 2010).

The affect regulation and dissociation models are drawn from psychodynamic, object relations and ego psychology perspectives and are concerned with expressing and externalising or containing need and emotion. The affect regulation model views self-injury as a way to express, externalise or cope with emotion or conflict which threatens to overwhelm the individual, their sense of self and their connectedness to the world. It is proposed that self-injury provides physical evidence of emotional injury, which allows emotion to be seen as real or tolerable, expressing and validating the emotion. Self-injury is used as an evocative symbol where the person is unable to use the symbols of language to communicate and regulate their affective experience. Regulation of overwhelming affect is achieved when the passive pain of abandonment can be turned into active, controllable pain or the passive wounds of castration or menstruation can be turned into active, controlled wounds.

In terms of development in the affect regulation model, the key task in adolescence of differentiation from the mother (love object) coupled with an inability to break ties is seen to lead to defensive mechanisms against the need for the love object. The hostility of

defending against this need becomes intolerable and is itself defended against through projection of anger and hatred either outwards to the object or inwards towards the self through self-injury. Doctors (1981, as cited in Suyemoto, 1998) hypothesises that self-hatred originates from a failure in empathy of the mother in responding to the child's needs. This prevents the child from internalising a stable 'good' object and from learning to self-soothe and leads to a negative self-representation. Perceived abandonment by the 'uncertain' object leads to overwhelming aggressive feelings which activate the negative self-representation. Self-injury protects the object from the rage or need which is perceived as potentially annihilating and punishes the self for that rage and need.

The dissociation model also views self-injury as a way to regulate affect, but focuses on the interaction with dissociation and the need for maintenance of a sense of self when experiencing overwhelming emotion. Generally this is in the context of self-injury being used to end a dissociative episode, though the mechanisms by which this is achieved are unclear. The scars left by self-injury may provide a continuity of existence by connecting episodes of dissociation or marking events or emotions that cannot be integrated into the sense of self (Miller & Bashkin, 1974, as cited in Suyemoto, 1998). Self-injury may also enable distancing and externalising of emotions in order to create a dissociated state.

The boundaries model is based on interpersonal and object relations theory. In terms of development, this model suggests that insecure attachment in early childhood leads to an inability to adequately individuate from the mother. When confronted with abandonment during the course of adolescence, primary identification with and wish for merger with the mother occur as defensive mechanisms. This leads to a blurring of boundaries on attempting to merge with the object (Freud, 1958, as cited in Suyemoto, 1998). When the individual is faced with and unable to complete the adolescent task of breaking their ties to the object, a loss of sense of self occurs because the self remains merged with the other. Self-injury is viewed as a way to define the boundaries of the self, create a distinction between the self and others and assert autonomy. Self-injury can also serve to create an identity, particularly in adolescents where self-harm is an accepted aspect of particular subcultures. Suyemoto concludes that any of these models may apply to an individual at different times, but the affect regulation and boundaries models are the most empirically supported.

Klonsky (2007) produced a similar and updated review of the evidence relating to the functions of self-injury, defined as 'the intentional and direct injuring of body tissue without suicidal intent'. Seven functional models were identified. The models are not represented as mutually exclusive; functions may overlap conceptually and may co-occur within an individual. In addition to the antisuicide, interpersonal boundaries, affect regulation and anti-dissociation



models already mentioned, Klonsky discussed functions related to interpersonal influence, self-punishment and sensation-seeking.

In the interpersonal influence model self-injury is conceptualised as a way of affecting others' behaviour which produces reinforcing responses. The individual may or may not be aware of this function of their behaviour. This model can be considered conceptually related to the environment model discussed by Suyemoto (1998). The self-punishment model proposes that individuals have learned from their environment to punish themselves, with self-injury representing an expression of self-directed hatred or anger. This model is also conceptually similar to the environment model. The sensation-seeking model sees self-injury as a way of generating stimulation and excitement. In reviewing the literature Klonsky found the strongest evidence supporting the affect regulation model. Several studies provided strong support for the self-punishment model and the other models received moderate support.

Gratz (2003) reviewed the clinical literature and reported that self-injury may function in one or more of the following ways: relief of anxiety; release of anger; relief of unpleasant thoughts and feelings; release of tension; relief of feelings of guilt, loneliness, alienation, self-hatred and depression; externalisation and concretisation of emotional pain; provision of escape from emotional pain; provision of a sense of security; provision of a sense of control; self-punishment; establishment of boundaries with others; termination of depersonalisation and derealisation; ending of flashbacks; and stopping of racing thoughts. These functions fit well with the affect regulation, boundaries and self-punishment models.

The empirical literature is consistent with the functions of self-harm identified in the clinical literature (Gratz, 2003). Further functions identified include facilitation of relaxation; reduction of stress and tension; expression of distressing emotions; communication of a need for help; protection of the individual from hurting others; protection from being overwhelmed; provision of an escape and a way to forget about worries and fears; diversion of attention from painful internal experiences; and expression of self-hatred. In contrast to one of the major proposed functions of self-injury in the general literature, elicitation of a caring response or attention from others was not frequently endorsed as an intended function in the empirical and clinical literature, weakening the concept that self-injury is an intentionally manipulative behaviour. Receipt of care and attention as unintended consequences of self-injury may, however, still reinforce the behaviour (Gratz, 2003).

Chapman, Gratz and Brown (2006) proposed a behavioural 'experiential avoidance' model which is grounded in research and encompasses the similarity between many of the models discussed previously, namely that there is an idea that self-harm enables the person to escape, manage or regulate emotions. Experiential avoidance is a class of behaviours which

function to avoid unwanted experiences and which are therefore maintained through negative reinforcement (removal of an unpleasant stimulus). In this model an event occurs which triggers an aversive emotional response. The individual experiences an urge to escape from this unpleasant state of arousal and carries out self-injury which reduces or removes the affective arousal. This escape from unwanted emotional arousal negatively reinforces the self-injury. Repeated negative reinforcement of self-injury strengthens the association between unpleasant emotional responses and self-injury and over time self-injury becomes an automatic, conditioned response to emotional arousal. Many studies support the notion of self-harm as an experiential avoidance strategy.

In relation to the experiential avoidance model, Chapman et al. (2006) presented some limited evidence in support of their proposal that individuals who self-injure may have a particularly strong response tendency towards avoidant or escape behaviours and may be more likely to develop clinical problems related to such behaviours, for example substance use, avoidant coping or thought suppression. Chapman et al. (2006) also discuss a link between Borderline Personality Disorder (BPD), a diagnosis highly associated with self-harm, the concept of emotional dysregulation (Linehan, 1993), and greater use of avoidance or escape coping strategies.

In terms of development of experiential avoidance tendencies, Chapman et al. (2006) suggested that such tendencies could be innate and hard-wired; related to heightened levels of arousal to aversive emotional events such that emotions are experienced as overwhelming; or related to lower tolerance for distress caused by emotional arousal. Another factor proposed for the development of experiential avoidance was lack of use of more adaptive emotion regulation strategies such as inhibiting impulsive, mood-driven behaviour and turning attention away from emotional stimuli. A person may have limited access to emotion regulation strategies because they do not have such strategies in their behavioural repertoire. This could be related to the prevention of acquisition of more adaptive self-soothing strategies by early attachment problems or emotional neglect. Alternatively, an individual may possess a repertoire of adaptive affect regulation behaviours, but become unable to implement these under conditions of intense emotional arousal as their cognitive and information processing abilities take on a narrow, threat focused quality. Problem solving is impaired under such conditions leading to difficulty in flexibly implementing adaptive coping strategies which may take some time to alleviate distress. Instead individuals may fall back on familiar, quick and easily executable strategies such as self-injury to regulate emotional distress.

Chapman et al. (2006) also proposed mechanisms by which self-injury could result in relief from unpleasant emotions. The opioid hypothesis asserts that self-injury elicits

endogenous opioids, creating relief from both physical and emotional pain. The distraction hypothesis posits that the pain stimulation provided by self-injury diverts the person's attention away from the emotional stimulus that is causing distress, shifting the attentional focus away from emotional pain and towards physical pain. The self-punishment hypothesis suggests that negative self-beliefs such as 'I deserve to be punished', when they are disconfirmed (punishment has not occurred), cause cognitive dissonance. This produces emotional arousal, an aversive feeling of tension and a feeling of lack of control. Self-injury restores a sense of control, confirms the person's beliefs about themselves (that they deserved to be and therefore have been punished) and emotional arousal decreases. Additionally, self-injury as self-punishment may alleviate distress by reducing interpersonal conflict or external punishment.

The literature on non-suicidal self-harm identifies a great variety of functions and models of self-harming behaviour, reflecting the myriad potential personal meanings of self-harm. An overarching concept appears to be that self-harm is used as a way to cope with emotional distress. The reasons for that distress, the reasons that a person employs self-harm in order to cope, and the mechanisms by which self-harm helps to relieve distress can be conceptualised using a variety of models drawn from different traditions of psychological theory. The models drawn from psychoanalytic and psychodynamic perspectives seem to focus particularly on the developmental challenges faced during adolescence as precipitating factors for use of self-harm as a coping mechanism, while the models drawn from a behavioural tradition may be more applicable across the entire lifespan. I will now go on to discuss theories of suicidal behaviour; the literature here is much less developed than the literature relating to non-suicidal self-harm and psychological theories of suicidal behaviour are largely untested.

*Suicidal behaviour.* In recent years a few psychological theories of suicidal behaviour have been emerging and are starting to be tested experimentally. Baumeister (1990) proposed an escape model of suicide in which he asserted that suicide is the action of escaping from the 'painful awareness of certain symbolic interpretations or implications about the self'. Williams and Pollock (2001, as cited in O'Connor, 2003) incorporated evolutionary and social rank theory to build upon this idea and developed an entrapment model in which suicidal behaviour is conceptualised as a 'cry of pain', rather than the traditional 'cry for help'. In this model, suicidal ideation and behaviour are proposed to occur as a response to a perception of being defeated and trapped in a stressful situation from which there is no way out or escape and no potential for rescue by others (no social support). O'Connor (2003) found that individuals who had carried out self-harm resulting in hospital attendance scored more highly than controls on

measures designed to assess defeat and lower on measures assessing escape potential and rescue in terms of social support.

Rasmussen et al. (2010) also investigated defeat, escape potential and rescue factors in people attending hospital after self-harm. They found that some relationships between these factors and suicidal ideation were mediated by the other factors, providing support for the cry of pain model. Both this study and that of O'Connor (2003) are limited by fairly small sample sizes and cross-sectional design, meaning that causality between the factors of the model and suicidal behaviour cannot be determined.

Johnson, Gooding and Tarrrier (2008) identified that a lack of clarity of the concepts of defeat, entrapment and rescue limit the utility of the 'cry of pain' model. They developed a model of suicidal behaviour specific to schizophrenia. Their Schematic Appraisal Model of Suicide (SAMS) purports that negative information processing biases, suicide schemas and an appraisal system interact to produce suicidal behaviour. Processing biases such as misattribution, selective attention and catastrophising maintain negative emotional states and can feed into and elaborate suicide schemas. These schemas are sets of thoughts, feelings and actions relating to suicide such as ideation, plans and intentions. The appraisal system makes value judgements about the current situation, the past, the future and the self which then determine how a person will view a situation and their ability to cope. This system can trigger suicide schemas and suicidal behaviour when situations are appraised via processing biases and the individual feels trapped and defeated. The SAMS model is consistent with current cognitive models of psychopathology, yields testable hypotheses and provides indications for intervention but it is not yet supported by experimental evidence.

Wenzel and Beck (2008) described a general cognitive model of suicidal behaviour. In this model dispositional vulnerability factors such as impulsivity, problem-solving deficits and maladaptive cognitive styles convey increased risk of psychological disturbance. Cognitive processes associated with such disturbance, such as information processing biases and cognitive distortions, increase the likelihood of suicide-relevant cognitive processes becoming activated. Such processes are analogous to the suicide schemas in the SAMS model. Stress increases the activation of both general maladaptive cognitive processes and suicide-relevant processes and the suicidal act is proposed to occur when the individual can no longer tolerate the distress associated with the thoughts and emotions that they are experiencing. In other words, they reach a threshold of tolerance in a diathesis-stress model. Like the SAMS model, this cognitive model provides treatment indications and targets for experimental evaluation, but has not been subject to experimental investigation.

In the interpersonal-psychological theory of suicidal behaviour (Joiner, 2005; Van Orden et al., 2010) an individual requires both the desire to die by suicide and the ability to do so. The desire to die is proposed to develop when, for a long period of time, a person bears psychological states of 'perceived burdensomeness' of the individual to family and friends and a 'sense of low belongingness or social isolation'. These feelings may engender a desire for suicide, but the ability to override the self-preservation instinct and conduct lethal self-injury must also be present. This ability is proposed to develop through repeated exposure and habituation to painful and fear-inducing events, which can include previous self-harm as well as trauma and abuse. Wenzel and Beck (2008) comment that perceptions of burdensomeness and low belongingness could be seen as feeding into suicide schemas while the ability to carry out a lethal act could be conceptualised as a dispositional vulnerability factor. The interpersonal-psychological and cognitive models are therefore compatible. Empirical studies have supported the interpersonal-psychological theory by demonstrating statistical interactions between perceived burdensomeness, low belongingness, acquired capability and suicide attempts in young adults (Van Orden, Witte, Gordon, Bender & Joiner, 2008; Joiner, 2009). Prospective data examining causality would strengthen the evidence in favour of this model.

The theories of suicidal behaviour discussed above contain some common ideas: being in a stress-inducing situation which is perceived (via cognitive processes) to be hopeless leads to unbearable emotional distress; suicidal ideation and cognitive processes related to suicide are activated; and suicidal behaviour provides the potential to escape from emotional pain. Such escape could be seen as similar to the experiential avoidance model of non-suicidal self-harm. None of these theories is particularly closely associated with suicidal behaviour at any specific developmental stage. During my therapeutic training I have developed an affinity for cognitive behavioural therapy and third-wave behavioural approaches. My preference, therefore, is to conceptualise self-harm and suicidal behaviour from a cognitive behavioural perspective.

Mental health problems - particularly depression, substance abuse, anxiety and personality disorder - are particular risk factors for self-harm across all age groups, and comorbidity is common (Skegg, 2005). Depression and substance misuse are common risk factors for self-harm in adolescents (Fortune & Hawton, 2005); depression, substance misuse and personality disorders are common in adults who self-harm (Haw et al., 2001); and high rates of depression are found in older adults who self-harm, though substance abuse and personality disorder are less common in this age group (Chan, Draper & Bannerjee, 2007).

I will now briefly consider some of the developmental and life-stage challenges faced at different times in life, the age-related reasons that people may experience distress and the reasons that people of different ages may use self-harm or suicidal behaviour in order to cope with overwhelming emotion. I will use Erikson's (1959) stage theory of psychosocial development and Hendry and Kloep's (2002) lifespan development model to illustrate the developmental challenges associated with different life stages. I considered other theoretical approaches to development including those of Freud (1956), Piaget (1955) and Vygotsky (1978). I decided to focus on the theories of Erikson (1959) and Hendry and Kloep (2002) since these appeared to be most applicable across the whole lifespan and to correspond well to an idea that there may be differences in the emotional challenges that people meet at different times of life. This section will necessarily make generalisations; I recognise, however, that not all individuals will face the same challenges or go through the same stages within the specified timeframes.

*Adolescence, approximately age 12 to 18.* Adolescence is a time of radical physical, cognitive, social and emotional development. Maturation of personality and sexuality are occurring and an adolescent's striving for increased independence and individuality can impact negatively on their relationships, particularly with parents and other authority figures. Concerns about body image and social belonging become much more significant and rates of depression and low self-esteem rise dramatically compared to childhood rates.

As a stage model, Erikson's (1959) theory asserts that individuals meet certain types of developmental challenges at particular life-stages. Meeting and overcoming each challenge leads to development and strengthening of resources while failure to negotiate the challenge leads to problems. According to Erikson's theory, the main challenge of adolescence is development of an individual identity and recognition of the social and occupational roles that will be adopted in order to fit into society. Difficulty negotiating this stage leads to a feeling of uncertainty about one's place in society and an unclear sense of personal identity. Many young people will experiment with a variety of roles and behaviours during this period. The adoption of personal ideologies can lead to conflict with authority figures as boundaries are re-negotiated and the young person develops an identity of their own, separate from their parents. As mentioned previously, the developmental challenges of adolescence have been particularly linked to psychoanalytic and psychodynamic theories of self-harm, with difficult emotions in relation to separation from the primary caregiver seen as being directed internally towards the self. This fits well with Erikson's conceptualisation of the challenges of adolescence.

Hendry and Kloep (2002) describe a model that applies to the entire lifespan, with development seen as continuous and lifelong. This model posits that throughout their lives, people meet various developmental challenges which need to be overcome. People vary in their potential resources (such as biological disposition, learned skills and social support) for meeting these challenges and when the demands of a challenge outweigh a person's resources they will feel anxiety and insecurity regarding their ability to meet the challenge. Successful navigation of challenges leads to change in the individual's coping resources as they add knowledge and strategies to their problem-solving repertoire, while unsuccessful solving of a challenge causes stagnation and leads to problems in meeting future challenges. The developmental challenges that people face can be maturational, such as puberty and menopause; normative - predictable, expected, prescribed shifts within a society, such as starting school and reaching pensionable age; quasi-normative - common within a certain age range for a particular cultural group, such as marriage, parenthood and loss of parents; and non-normative - challenges that are not shared by the majority of a cultural group, such as early bereavement, disability and divorce.

Some normative and quasi-normative challenges faced in adolescence include puberty, developing romantic relationships, increasing independence from parents, making occupational choices and developing an adult identity (Hendry & Kloep, 2002). Some non-normative adolescent life events include parents' divorce, loss of parents' jobs and consequent change in economic situation, changing schools and being bullied. Adolescents with low levels of potential coping resources and those facing non-normative and stressful challenges are likely to experience increased emotional distress.

Adolescence is a time of great change, emotional upheaval and experimentation with roles and identities. Self-harm may emerge as a potential coping strategy for overwhelming negative emotion through social learning and experimentation. If self-harm achieves its intended function of helping the person to deal with overwhelming emotion it may become a part of their coping repertoire for future stressful situations as well as part of their developing identity. Hawton and James (2005) identified the following potential motives for self-harm in young people: to die; to escape from unbearable anguish; to change the behaviour of others; to escape from a situation; to show desperation to others; to change the behaviour of others; to "get back at" other people or make them feel guilty; to gain relief of tension; and to seek help. The most common reasons given for self-harm among adolescents were 'escape' for self-poisoning and 'depression' for self-cutting (Rodham, Hawton & Evans, 2004). These motivations are not necessarily specific to young people, however, and there is considerable overlap with the functions of self-harm identified by Gratz (2003).

*Early adulthood, approximately age 18 to 30.* During early adulthood people gain official adult status in society. This is a time when most people consolidate an adult identity and become essentially independent from their parents. Important choices are generally made at this stage of life regarding occupation, lifestyle, marriage and family. Erikson (1959) describes the main challenge during this period as one of developing intimacy rather than becoming isolated. Once people have established their identities they become able to form long-lasting, intimate, reciprocal relationships with others. Rejection and pain are inevitable in the formation of intimate relationships and avoidance of relationships in order to avoid rejection leads to isolation. Hendry and Kloep (2002) identify challenges in early adulthood related to choices concerning career options, lifestyle and leisure pursuits as well as the formation of romantic relationships. There are normative pressures to have a stable romantic relationship which leads to marriage and child-rearing, while non-normative challenges can also occur, such as serious illness, incarceration, loss of a partner or infertility.

Early adulthood is the time that most people first experience being fully independent and responsible for their own wellbeing. If the challenges of becoming self-sufficient overwhelm a person's abilities they are likely to feel hopeless, helpless, and distressed. Difficulty with forming and maintaining relationships can lead to emotional distress and feelings of isolation. People with fewer coping resources are more likely to struggle with independence and self-reliance and more likely to find their emotional distress overwhelming. Feeling unable to cope, overwhelmed and unsupported are causal factors in the various models of suicidal behaviour and may lead a person to self-harm for the first time. If a person has found self-harm to be helpful in coping with their distress in the past, they may use it again in stressful circumstances.

*Middle to later adulthood, approximately age 30 to 65.* Erikson (1959) describes the main task of middle to later adulthood as developing generativity rather than stagnating. Generativity refers to engaging in socially valued occupations or contributing productively to society as well as establishing and guiding the next generation, while stagnation means ceasing to be a productive member of society. Most of the tasks and quasi-normative challenges of this period are not age-dependent and can occur at any time during adulthood. Some examples include settling down with a long-term partner, raising a family, relinquishing control of adolescent children and caring for ageing parents. Major life shifts occur during this stage and as previously discussed, when a person's resources are limited and the challenges of such shifts place many demands on those resources, feelings of anxiety and insecurity occur and the person can feel overwhelmed. Such life shifts include: the beginning, and for many also the end, of long-term relationships; the birth and leaving home of children; career shifts through



job loss, promotion or career change; unemployment; travel and migration; illness and recovery; reversal of roles with ageing parents; and bereavement.

Most people reach a physical and cognitive peak in their twenties meaning that middle to later adulthood is a time in which the body is ageing and changing. For people whose identity is very much embedded within their physical characteristics, acceptance of such senescence can be extremely emotionally challenging. Of particular concern for women may be the impending physical changes relating to fertility. Particular 'crisis' points can occur, often recognised as the 'age 30 crisis' and the 'mid-life crisis', which tends to refer to a crisis experienced at approximately age 40 to 50. These crises are characterised by a significant self-doubt leading to a 'life review': a reassessment of earlier life choices and goals in which people question where their life is going and whether this meets their hopes and values. This review may lead a person to commit to major life changes such as starting a family, changing careers, adopting a new social lifestyle, returning to work after raising children, or divorce. When a person feels dissatisfied with their current direction in life or regret over goals that have not been achieved, they are likely to feel dysthymic. If they are unable either to come to accept the direction their life has taken, or to make changes in line with their valued directions, this may lead to depression and feelings of inadequacy, failure and being trapped.

For most people, middle to later adulthood is a time of significant responsibility and many of the life events and shifts that often occur during this time can lead to stress and to overwhelming distress where a person's coping resources are limited. In this case they may feel inadequate about being unable to take on 'normal' responsibilities, or trapped amid responsibilities with which they cannot cope. Such feelings may lead to adoption of or return to self-harm as a method of coping. Life review and 'crisis' can also lead to emotional difficulties that may be precursors to use of suicidal or self-harming behaviour as a way of coping. Motives for self-harm in adults include relieving tension; providing distraction from painful feelings; self-punishment; decreasing dissociative symptoms; blocking upsetting memories; and communicating distress to others (Briere & Gil, 1998).

*Older adulthood, approximately age 65 and over.* In older adulthood most people are faced with maturational challenges such as declining physical and cognitive abilities, significant changes to their appearance and menopause in women. Retirement, being a grandparent, illness, disability and bereavement are also commonly experienced. Ageism is rife, at least in Western societies, where older adults are a stigmatised and low-status group. People carry negative assumptions about old age throughout their whole lives, never having been taught (as they are with racism, for example) that such prejudice is wrong (Berger, 2008). Therefore when people reach old age themselves, they may develop negative beliefs about their self-

worth and social identity. As for every age group, limited availability of resources to help meet the challenges of older adulthood can lead to overwhelming and intolerable distress, which may be expressed or managed via self-harm. The resources of older adults may be depleted by loss of social support through bereavement and by physical and cognitive changes, making coping increasingly difficult.

Erikson's (1959) view of older adulthood is that this is a review and closing stage with the main task of developing a feeling of integrity as opposed to despair regarding wasted opportunities, regrets and the prospect of death. Integrity refers to a feeling of contentment and fulfilment at having lived a valued and productive life; coming to terms with life allows for coming to terms with the end of life. Being unable to develop such a feeling of peace with oneself and the world leads to despair, depression and hopelessness, which could in turn lead to self-harm or suicide as a way to cope or escape. In a recent study (Dennis et al., 2007) the most commonly endorsed motives for self-harm in older adults were to gain relief from an unbearable state of mind; to escape from an intolerable situation; to make other people understand how desperate the person was feeling; to influence others; to seek help; and to make other people feel sorry. Figure 2 below summarises the biopsychosocial vulnerability factors, potential motivations and functions, and life stages challenges that may lead a person to use self-harm.

Figure 2. Biopsychosocial vulnerability factors, potential motivations and life stage triggers for self-harm.

<b>Biopsychosocial vulnerability to use of self-harm (applies to all ages)</b>
<p>Biological: genetic make-up; prenatal environment; neurobiological development; predisposition to mental health problems; physical health problems; disability.</p> <p>Psychological: high levels of distressing emotions; difficulty coping with distressing emotions; lack of perceived control over behaviour; impulsivity; self-harm-related thoughts; mental health problems, particularly depression; lack of or inability to access coping resources; maladaptive cognitive styles; established patterns of using self-harm to cope; positive attitudes towards self-harm; positive psychological effects of self-harm such as affect regulation; experiential avoidance tendency.</p> <p>Social: poor early care experiences; disordered attachment; social isolation; bullying and harassment; abuse; trauma; bereavement and loss; interpersonal or family conflict; low socioeconomic status and poverty; low level of education; positive normative attitudes towards self-harm; social learning about self-harm; positive social effects and reinforcement of self-harm.</p>



**Models and potential motivations for and functions of self-harm (apply to all ages)**

Environmental (learned and reinforced behaviour); systemic or interpersonal influence; affect regulation; enacting the death drive (antisuicide); sexual symbolism; communicating and externalising pain; ending or creating dissociation; reinforcing interpersonal boundaries; identity creation; self-punishment; sensation-seeking; escape from intolerable emotional distress; 'cry of pain'; escape from feeling defeated, hopeless and trapped with no support; information processing biases activating suicide schemas; possession of the desire and ability to conduct self-harm or die by suicide; reinforced by helpful effects of self-harm in the past.



**Potential triggers for self-harm and challenges at different life stages**

**Adolescence (approximately age 12 to 18):** Psychodynamic models often link self-harm in adolescence to particular challenges relating to difficulty with differentiation or individuation from the love object and loss of sense of self. A lot of physical, cognitive, social and emotional change and development occurs at this time of life and such changes may lead to distress. Further challenges which may lead to distress in adolescence include striving for independence and identity formation; body image concerns; social belonging concerns; experimentation with roles and behaviours; conflict with authority; developing romantic relationships; and making occupational choices. Young people may discover self-harm through experimentation or learn about it through social modelling, particularly among females and within subcultures where self-harm is more accepted. Possession of biopsychosocial vulnerability factors makes use of self-harm more likely, as in all age groups. This age group is particularly likely to be impulsive in use of self-harm and to be unaware of the potential lethality of self-harm methods.

**Early adulthood (approximately age 18 to 30):** Challenges that may lead to distress in early adulthood include increasing independence and self-reliance; the need to make important occupation, lifestyle and family choices; taking on an adult role in society; relationship formation and developing intimacy rather than becoming isolated; and normative pressures to conform to societal expectations. This is a peak age for development of mental health problems which may be related to self-harm. Such difficulties may become enduring and a pattern of coping through repeated use of self-harm may develop.

**Middle to later adulthood (approximately age 30 to 65):** The task of developing generativity versus stagnation in middle to later adulthood can lead to distress as people face challenges related to occupation and being a valued, productive member of society. Long-term

relationships and family pressures such as raising children and caring for ageing parents place significant responsibility on individuals and they may feel overwhelmed, trapped, defeated and unable to cope. For those unable to take on such challenges, for example because of substance abuse or mental health problems, this may lead to distressing feelings of inadequacy. Further common challenges faced in this age range are physical and cognitive changes; career shifts; and bereavement. People may also enter a period of life review and crisis. Difficulty accepting or changing the directions taken in life can again lead to overwhelming distress. Self-harm may already be an established way of coping with distress, or it may be something that people attempt for the first time when faced with seemingly insurmountable challenges. The decreasing self-harm to suicide ratio with increasing age points to increasing suicidal intent..

**Older adulthood (approximately age 65 and over):** Particular challenges common in older adulthood include physical and cognitive decline and senescence; appearance changes; retirement; taking on a grandparent role and experience of illness. Societal ageism can lead to negative self-beliefs and if a person is unable to come to terms with the approaching end of life, this can lead to despair, depression and hopelessness. Physical disability and bereavement make social isolation a possibility and this is a significant risk factor for self-harm. The ratio of self-harm episodes to suicides is lowest in this age group, indicating the greatest level of suicidal intent and suicide risk.

The age ranges and life-span developmental stages discussed here are not rigid or universally applicable. Similarly, the challenges faced by individuals and the resources available for coping are idiosyncratic and personal. People do not all face the same challenges at the same times, if at all, and they do not all react in the same ways. A degree of generalisation is necessary, however, in order to consider potential reasons for self-harm in different age groups. The discussion above of the challenges faced at different ages reveals some differences between the age groups in the potential precursors of self-harm and supports the idea that people of different ages may self-harm for different reasons. Adolescents may feel overwhelmed by distress related to forming their own identity. Young adults may feel unable to cope independently or to form close relationships. Middle-aged adults may feel valueless in society or overwhelmed by responsibility. Older adults may experience the negative societal pressure of ageism or despair related to the approaching end of life. For all age groups, feeling overwhelmed by such challenges and not having enough resources available to allow adaptive coping may lead to use of self-harm and suicidal behaviour as attempts to either escape from or express overwhelming emotion. I will now go on to present some information about the

epidemiology and scale of self-harm with particular reference to instances in the literature where self-harm has been studied in different age groups.

### *Epidemiology of Self-Harm*

This section discusses the scale of self-harm in the UK and presents information regarding the link to suicide; rates of self-harm; methods and characteristics of self-harm; and assessment, treatment and aftercare. The majority of incidents of self-harm that lead to contact with health services are seen in hospital EDs (Crawford & Wessely, 1998). In treating people who self-harm, services respond differentially to individuals based on their level of need and risk. Standards for service provision and management of self-harm in the ED differ for different age groups due to perceived risk differences. There are specific recommendations for the care of children and adolescents and for older people (National Institute of Health and Clinical Excellence [NICE], 2004) and both these groups have been found to be more likely than working-age adults to receive a psychosocial assessment (Marriott, Horrocks, House & Owens, 2003; Kapur et al., 2008). Where information is available in the literature I have identified age-related differences in the characteristics and management of self-harm. The patterns of clinical and management characteristics of self-harm across the lifespan have not yet been investigated, however.

*Self-harm and suicide.* Self-harm is a major health problem in most countries. Rates for self-harm in the UK started to increase dramatically in the 1960s (Hawton et al., 2007). This increase continued up to 2000, but self-harm rates in England have shown a decrease in the period between 2000 and 2007 (Bergen, Hawton, Waters, Cooper & Kapur, 2010a). This decline is in keeping with national trends in suicide following the introduction of the National Suicide Prevention Strategy in 2002 (Department of Health [DoH], 2002). Self-harm is one of the commonest reasons for acute medical admission in this country and in 2000-2001 it was estimated that approximately 220,000 ED attendances were made annually due to self-harm by 150,000 people (Hawton et al., 2007). Self-harm is known to be a substantial risk factor for future suicide with as many as 1.8% of self-harm patients in the UK dying by suicide within a year of hospital presentation (Owens, Horrocks & House, 2002), compared to the current annual incidence rates for suicide of approximately 0.005% for females and 0.018% for males (Office for National Statistics [ONS], 2010a). Various UK reviews and studies have found rates of suicide in self-harm patients of approximately 3% over six years (Sinclair, Hawton & Gray, 2010); more than 5% after nine years (Owens et al., 2002); and as many as 8.5% over a 22 year period (Jenkins, Hale, Papanastassiou, Crawford & Tyrer 2002). Hawton and Fagg (1988) reported that 10% or more will eventually die by suicide and two Scandinavian studies

(Runeson, Tidemalm, Dahlin, Lichtenstein & Langstrom, 2010; Suominen et al., 2004) found suicide rates of 12% and 13% after follow-up periods of 21-31 years and 37 years, respectively.

In a follow-up study of 11,583 self-harm presentations at ED with a median follow-up time of 10.8 years, Hawton, Zahl and Weatherall (2003) found that the risk of suicide in the first year after self-harm was 66 times the annual risk of suicide in the general population with a 95% Confidence Interval (CI) of 52 to 82. This risk persists over many years and increases markedly with age at the time of self-harm; for males aged over 55 the risk in the first year after self-harm was 131 times the general population risk (95% CI = 68 to 252) and for females it was 158 times (95% CI = 85 to 294). Cooper et al. (2005) reported results from a four-year cohort study of 7,698 self-harm attendances at the ED which found that the number of suicides was 29 times higher than expected for males and 50 times higher for females. The risk of suicide was highest in the first six months. The higher suicide rate generally in males means that their overall risk of suicide is markedly higher, but the contribution to suicide risk from a history of self-harm is greater for females.

Between 40% and 60% of people who die by suicide have a history of self-harm, with a quarter having attended hospital for self-harm in the year before death (Owens & House, 1994; Foster, Gillespie & McClelland, 1997). The final ED attendance for self-harm is often shortly before suicide (Gairin, House & Owens, 2003). In the year following presentation at hospital, 16% or more of people will repeat self-harm, rising to 20%-25% over the next few years (Owens et al., 2002). Self-harm is clearly an important risk factor for future suicide and national policies recognise the need to target self-harm as part of suicide prevention strategies (DoH, 2002).

*Rates of self-harm.* Hawton et al. (2007) documented rates of self-harm in the EDs of three UK cities between March 2000 and August 2001. Annual rates per 100,000 with 95% CIs for males were 285 (249 to 321) in Oxford, 460 (433 to 487) in Manchester and 291 (275 to 307) in Leeds. For females the rates were 342 (305 to 379) in Oxford, 587 (557 to 617) in Manchester and 374 (356 to 392) in Leeds. For both Manchester and Leeds the rates of self-harm were significantly higher in females than males. Rates were also significantly higher in Manchester than in Oxford and Leeds, reflecting differences in the socio-economic characteristics of the respective populations. Social deprivation is strongly associated with self-harm rates and Manchester has much more social deprivation with a greater proportion of the population living within the most deprived areas. Rates of self-harm were found to differ across the lifespan. The highest rates for females were found in the 15-24 years age group and for males in the 25-34 years group. The lowest rates of self-harm were found in the over 55 years group. A limitation of this study is variation in methods of data collection between the

centres, which could have had an impact on the rates of self-harm found. Similar definitions of self-harm were used in each centre, however, and data were collected for large numbers of patients. A further factor which may have had an influence on rates of self-harm is that the study data were collected from predominantly urban populations.

Bergen et al. (2010) provided an update to Hawton et al. (2007), documenting rates of self-harm between January 2000 and December 2007 in Oxford, Manchester and Derby. Annual rates per 100,000 with 95% CIs for males were 310 (294 to 325) in Oxford, 371 (361 to 381) in Manchester and 373 (359 to 387) in Derby. For females the rates were 412 (395 to 429) in Oxford, 544 (533 to 556) in Manchester and 510 (494 to 527) in Derby. Over all three centres both males and females showed a significant 14% decrease in rates of self-harm during the study period. Rates of suicide also decreased over this time period by 18% for males and 25% for females (The NHS Information Centre for Health and Social Care, as cited in Bergen et al., 2010). Leeds data were not used in this study, but it is reasonable to expect that the trend for decreasing rates of self-harm over this time period will generalise to the situation in Leeds.

Hawton and Harriss (2008a) explored variations in rates of self-harm across the lifespan according to gender and found that the ratio of males to females varied dramatically across different age groups. They found that general statements about the gender ratio of self-harm obscure important changes across the lifespan. It can be anticipated that an analysis of other features of self-harm will reveal similar lifespan differences.

In young people it is recognised that most episodes of self-harm do not come to the attention of medical services, meaning that the actual prevalence of self-harm in young people is much greater than that estimated by studies monitoring hospital attendance. Hawton, Rodham, Evans & Weatherall (2002) reported the prevalence of self-harm in the previous year in a UK community self-report study of adolescents as 3.2% for males and 11.2% for females. In a similar international study Madge et al. (2008) reported a prevalence in the previous year of 2.6% for males and 8.9% for females. Hawton et al. (2007) reported annual rates of self-harm based on hospital attendance. The highest reported annual rate in their study was for females aged 15-24 years in Manchester, at 1052 per 100,000, or just 1.1%. This study did not report rates for people under 15 years, however, so a direct comparison with the previous two studies cannot be made. It is unclear to what extent self-harm without hospital attendance occurs in other age groups but it could be expected that true rates of the occurrence of self-harm for all age groups are considerably higher than those reported in the study of hospital episodes by Hawton et al. (2007). Klonsky, Oltmanns and Turkheimer (2003), for example, reported that approximately 4% of a non-clinical population of male and female US military recruits had a history of self-harm.

Hawton and Harriss (2008b) explored self-harm and suicide rates for different age groups from 10 years upwards and found that self-harm rates were highest in the 15-19 years group while suicide rates were highest in the 30-34 years group. The self-harm to suicide rate ratio was nearly 500:1 in the 10-14 years group, reflecting the low suicide rate in this age group. Suicide rates increase in the late teens and the rate ratio in the 15-19 years group was approximately 150:1 despite the high self-harm rate in this age group. The rate ratio declined with increasing age to approximately 6:1 in the 80+ age group demonstrating that with increasing age, self-harm indicates increasing risk. There were substantial gender differences in the magnitude of the rate ratios, with males showing lower ratios due to lower self-harm rates and higher suicide rates. The general pattern with increasing age of a lowering of the number of self-harm occurrences relative to each suicide was, however, comparable for males and females. Self-harm data for this study were collected from the Oxford self-harm monitoring project over a period of ten years between 1995 and 2004. It is possible that monitoring in different hospitals may have produced some differences in rate ratios, but the overall patterns are likely to be reasonably representative.

*Methods and characteristics of self-harm.* In their large multi-centre study of self-harm attendance at EDs, Hawton et al. (2007) found that across all age groups 80.8% of episodes of self-harm involved self-poisoning only, 15% involved self-injury only and 4.2% of episodes involved combined methods. For adults aged 55 and over, Marriott et al. (2003) reported broadly similar proportions of 86%, 12% and 2% for self-poisoning, self-injury and combined methods, respectively. Hawton and Harriss (2006) reported comparable rates in people aged 60 and over of 88.6% using self-poisoning and the remaining 11.4% using self-injury or combined methods. In young people aged 15 to 24 self-poisoning makes up approximately 90% of cases seen in hospital (Hawton et al., 2003).

A community-based study (Hawton & Rodham, 2006) found that most self-harm in young people involves cutting, though most episodes do not result in hospital attendance. Young, van Beinum, Sweeting and West (2007) also reported a greater proportion of self-cutting than self-poisoning in a community sample of 18 to 20 year olds. Fortune (2006) examined methods of self-harm in young people presenting to an outpatient psychiatric clinic in New Zealand and found cutting to be the most common method, though switching of methods was common and those who self-harmed by cutting could not be distinguished from those who used other methods. The small sample size, clinical setting, and non-UK sample mean that this study cannot be considered representative of the picture of self-harm in the UK, however the concept that people who use different methods of self-harm do not make up distinct populations is useful. In a UK study Horrocks, Price, House and Owens (2003) also



found considerable overlap in methods of self-harm and switching of methods, indicating that people attending hospital following self-poisoning and self-injury do not form mutually exclusive groups.

Hawton and Harriss (2007) reported the characteristics of self-harm in a cohort of 15 to 24 year olds who presented to the ED in Oxford during the 20 year period between January 1978 and December 1997. In this sample 26.3% had self-harmed previously, 22.2% had previous contact with mental health services, 9.4% were in current contact with mental health services and 36.1% had used alcohol around the time of self-harm. The same authors also reported the characteristics of self-harm in people aged 60 years and over for the same time period (Hawton & Harriss, 2006). For this age group 20.9% had a history of self-harm, 35.5% had previous mental health contact, 10.2% were in current contact with mental health services and 21.2% had drunk alcohol around the time of self-harm. There are some differences apparent between the two age groups used in these papers, though the authors have not compared the groups directly. The database used in the present study will allow for direct comparison of these age groups on the characteristics reported above. The 'young' and 'old' age groups will also be compared to working age adults.

In their review of the worldwide literature on self-harm in older adults Chan, Draper and Banerjee (2007) reported that self-poisoning was the most common method used, though there was considerable variation between the studies reviewed, with proportions undertaking poisoning ranging from 55% to 89%. Many of the studies reviewed had small sample sizes and highly selected populations from a variety of settings. There was also considerable variation in the lower age limits used to define older adults and these often appeared to be selected merely to maximise numbers of cases. The definitions of self-harm employed are also likely to have varied between studies, for example with regard to the issue of ascribing suicidal intent. Cultural differences in the profile of self-harm in different countries mean that the findings of this review may not be explicitly relatable to self-harm in older adults in the UK.

Lilley et al. (2008) found that self-injury by methods other than cutting, which tend to be more severe methods, occurs more frequently in older age groups. Across all age groups self-injury, especially cutting, was closely associated with previous self-harm, and the likelihood of repetition was high. Switching of methods was common, more so for cutting, injuries other than cutting, and combined methods than for poisoning. This study used data from the Oxford, Manchester and Leeds self-harm monitoring project for the 18 months between March 2000 and August 2001. Some data were missing due to different data collection procedures in each centre but the results can be considered broadly representative of self-harm presentations to EDs in urban areas in the UK.

Self-harm by cutting appears to occur much more often in community settings than is indicated by the proportion of people attending the ED following self-injury. A possible explanation is that self-injury, particularly through cutting, may be easier to treat at home than is self-poisoning. It is often thought that self-cutting indicates lower levels of risk, distress and suicidal intent, impacting on the attitudes of staff (Friedman et al., 2006) and potentially on the assessment and treatment offered. It has been shown that people who self-harm by cutting (Cooper et al., 2005) or by cutting combined with poisoning (Owens, Wood, Greenwood, Hughes & Dennis, 2005) are at increased risk of subsequent suicide. The fact that people who self-harm by cutting do not constitute a distinguishable group (Fortune, 2006), and that switching of methods often occurs (Lilley et al., 2008), means that decisions about assessment, treatment and risk should not be made on the basis of method of self-harm.

Hjelmeland and Groholt (2005) compared adult and adolescent self-harm patients and found that adults conducted more medically serious acts of self-harm, though the effect size of the difference was small. They also found that adults more often had psychiatric or substance abuse problems while adolescents showed a higher degree of impulsivity in their self-harm, suggesting a lower threshold for self-harm in adolescents. No significant differences were found between the groups in terms of suicidal intent, depression or hopelessness and the circumstances leading to self-harm were similar for both groups. Differences in motives for self-harm were reported; adults were more likely than adolescents to endorse wanting to get away from unbearable thoughts or situations, wanting others to know how desperate they felt, and wanting to receive help as motives for their self-harm. This study was conducted in Norway between 1990 and 1994 and therefore may not be directly applicable to the current situation in the UK. Chan et al. (2007) noted that characteristics of self-harm vary markedly between countries, indicating the importance of social and cultural factors in the occurrence, reporting, characteristics and management of self-harm.

*Psychosocial assessment in the ED.* Guidelines for the treatment of self-harm in EDs (NICE, 2004) specify that at triage all patients should receive an initial assessment of physical and mental state conducted in a respectful and understanding way and taking account of emotional distress. An initial psychosocial assessment should be completed to determine levels of distress, mental capacity, presence of mental illness and willingness to stay for further assessment. Before discharge all patients should receive a comprehensive psychosocial assessment conducted by specialist mental health staff or specifically trained general staff. This assessment covers the environmental, psychological and motivational factors specific to the act of self-harm, particularly suicidal intent and hopelessness, as well as a full assessment of social and mental health needs and risks including identification of the main clinical and

demographic features associated with increased risk of further self-harm and suicide (Owens, 2006). Appropriate treatment and follow-up arrangements should be made based on this assessment.

Assessment is likely to improve access to aftercare and it may be therapeutic in its own right, with two studies reporting an association between assessment and reduced risk of repetition of self-harm (Kapur et al., 2008; Bergen, Hawton, Waters, Cooper & Kapur, 2010b). The NICE guideline (2004) states that 'all staff that come into contact with people who self-harm need dedicated training to improve both their understanding of self-harm and the treatment and care they provide' (p.51). In addition, staff conducting comprehensive psychosocial assessments, whether they are mental health specialists or not, 'should be properly trained and supervised to undertake assessment of needs and risk specifically for people who self-harm' (p.65). Mental health services and EDs are urged to work together to develop training programmes for the early management and psychosocial assessment of self-harm. It has been found that ED staff often hold some negative attitudes towards people who self-harm (Friedman et al., 2005) and training has been shown to improve staff knowledge, coping and attitudes as well as the quality of assessments (Holdsworth, Belshaw & Murray, 2001; Crawford, Turnbull & Wessely, 1998).

*Assessment and hospital services.* The particular features of self-harm in different age groups - its prevalence and impulsivity in young people and its severity and increased link to future suicide in older adults - indicate specific risk factors. NICE guidelines specify additional recommendations for the care of these age groups after self-harm. The guidelines for children and young people, defined as those aged under 16 years, state that they should be triaged and assessed by appropriately trained children's nurses and doctors in a separate children's area of the ED, admitted overnight to a paediatric or adolescent ward and fully assessed prior to discharge or initiation of further treatment. Confidentiality, consent, capacity, supervision and child protection are important considerations and expert consultation from Child and Adolescent Mental Health Services (CAMHS) should be available. Older adults are defined as those over 65 years of age. Their treatment should be the same as that of younger adults but, in recognition of the greater risk of further self-harm and suicide, particular attention should be paid to indicators of risk such as depression. Additional factors for consideration include cognitive impairment, physical health and the home situation. It is recommended that admission be considered to allow time for a full assessment of risk and need (NICE, 2004).

Further risk factors for future suicide include high suicidal intent, hopelessness, medically serious self-harm, attempts to avoid discovery, repeated self-harm, past psychiatric care, current mental health problems, substance misuse and poor physical health (Skegg,

2005; Owens et al., 2005). Such risk factors can occur in all age groups and it is important that these factors are assessed in order for appropriate treatment and follow-up arrangements to be made.

All patients attending ED because of self-harm should receive a full psychosocial assessment before discharge but, in practice, rates of assessment vary greatly between hospitals. Bennewith, Gunnell, Peters, Hawton and House (2004) conducted an audit of hospital management of self-harm in 32 hospitals in England. They found a median rate of psychosocial assessment of 55% (range 36% to 82%) and there were wide variations in service structure. The audit was conducted prospectively over eight weeks in 2000-2001. Knowledge within the hospitals that an audit was underway may have affected management of self-harm; a retrospective examination of records may have found even lower rates of assessment. Kapur et al. (2008) reported an overall rate of assessment of 60% from the self-harm monitoring study in Oxford, Manchester and Leeds between March 2000 and August 2001. The proportion varied between hospitals from 42% to 71%. The sample size in this study was over twice that of Bennewith et al. (2004) but was limited to only six hospitals, so may be less generalisable to the UK as a whole. Bergen et al. (2010) reported updated assessment rates from the monitoring study of 72.1% in Oxford, 59.2% in Derby and 41.3% in Manchester (with a further 26.4% in Manchester being assessed by non-specialist ED staff). This study had a very large sample size but was again limited to six hospitals.

In a recent study in Leeds exploring assessment and management in the ED of young people aged 12-16 who have self-harmed (Lilley, Nolan, Fortune & Owens, submitted for publication), 76% received a specialist psychosocial assessment before leaving hospital, 6% were discharged in line with a pre-arranged treatment plan and 18% were not assessed. Being admitted to hospital was understandably associated with a greater likelihood of assessment. Males, those who had self-injured rather than self-poisoned and those with a history of self-harm were more likely to leave without assessment and there was no evidence that those who were not assessed were in any less need of support. This study had a substantial sample size even though the age range under consideration was narrow. There was some limitation to the completeness of the data, however, meaning valid sample sizes differed for different variables and there may have been some biases in the distribution of missing data.

Marriott et al. (2003) found that 95% of adults aged over 65 received a specialist psychosocial assessment compared to only 67% of those aged between 55 and 64, and 62% of a control group aged 15-54. Older adults were more likely to be admitted and less likely to self-discharge, but even when these factors were taken into account the difference in rates of assessment persisted.

Lilley et al. (2008) reported that people across all age groups who self-harmed by cutting were less likely to receive a psychosocial assessment, a finding that was evident even after adjustment for the confounding effect of hospital admission. Bennewith, Peters, Hawton, House and Gunnell (2005) examined the reasons for non-assessment in their eight-week audit and found that 57% of non-assessed patients self-discharged while the rest were discharged by hospital staff without an assessment. Those aged over 45 and with no history of self-harm were less likely to be discharged. Younger patients, males, those who had used alcohol or illegal drugs and those who attended outside of office hours were more likely to self-discharge. Hickey, Hawton, Fagg and Weitzel (2001) reported that non-assessed patients were more likely to have a past history of self-harm, to be in the 20-34 years age group, to have attended outside office hours and to have displayed challenging behaviour in the ED.

Attendance outside of office hours, use of alcohol or illegal drugs and difficult behaviour in the ED, such as aggression or non-cooperation with examination and treatment, are clearly understandable as contributing factors to non-assessment. Assessment services are less likely to be available outside office hours, attendances during these times are more likely to involve drugs or alcohol and this is likely to contribute to difficult behaviour (Bennewith et al., 2005). Use of drugs or alcohol was found to be related to an increased likelihood of self-discharge but not of discharge by hospital staff. The findings of these studies indicate that, although assessment rates are higher for young people and older adults, guidelines for the assessment of all self-harm patients in ED are not being adhered to and people at high risk of further self-harm and suicide - particularly younger people, males and those who have self-harmed by cutting - are leaving hospital without receiving a detailed assessment.

Two recent studies (Russell & Owens, 2010; Murphy, Kapur, Webb & Cooper, 2011) have explored differences in the assessments carried out by nurses and psychiatrists in Bradford and Manchester. Both studies found that psychiatrists are more likely than nurses to admit people to hospital following self-harm. McAllister (2011) commented that this finding may be related to differences in levels of expertise between experienced mental health nurses and junior psychiatrists, or to the fact that psychiatrists are more able to arrange admission. Both professions were found to agree on factors associated with high risk; the positive predictive value for repetition of both professions' assessments was similar; and in terms of outcome, repetition was equally common among those assessed by each discipline. These studies suggest that aftercare arrangements may differ according to the professional discipline of the person conducting the assessment, but that this does not have a significant effect on outcome as measured by repetition of self-harm. Large sample sizes and good design are

strengths of these studies, though both were conducted in a single town and therefore may not be fully representative of the picture in the rest of the UK.

*Treatment and follow-up after ED attendance.* Lilley et al. (2008) found that across all ages and methods of self-harm 53% of ED attendances across Leeds, Manchester and Oxford resulted in admission to hospital and those who were admitted were more likely to receive an assessment. Figures for admission and assessment were much lower for people who had cut themselves and these people were also more likely to self-discharge before treatment was completed and to repeat self-harm. Crowder, Van der Putt, Ashby and Blewett (2004) found that 8% of adult self-harm patients self-discharged or left hospital without receiving an assessment, half of them from ED and half from inpatient wards. People who had self-poisoned and who had no identified history of self-harm or contact with local psychiatric services were more likely to self-discharge. While these factors may not be particularly indicative of higher risk for this group, patients who self-discharge have been found to be at higher risk of repeating self-harm (Crawford & Wessely, 1998). Other studies have reported somewhat higher proportions of patients self-discharging before assessment: Marriott et al. (2003) reported 45/266 (17%); Lilley et al. (2008) reported the highest rate of self-discharge as 15% for self-harm by cutting and the lowest as 7% for self-injury by methods other than cutting; and Bennewith et al. (2005) reported variations between hospitals from 8% to 39%. The study reported by Crowder et al. (2004) was conducted in a single hospital with a clear care pathway for the assessment and management of self-harm in the ED, which is likely to have contributed to the low rate of self-discharge found in this study. The relatively small sample size in this study is a further limitation.

NICE guidelines (NICE, 2004) for young people who self-harm recommend that all those attending the ED should be admitted to the general hospital in addition to being assessed. Lilley et al. (submitted for publication) found that 78% of young people were admitted, 9% were discharged directly from the ED either following assessment or in line with a pre-agreed plan, 11% left the ED and 6% left an inpatient ward without assessment. Most of those who left without assessment self-discharged or were discharged by staff; appropriate follow-up was arranged for 57% of this group. Those who did not receive an assessment or adequate follow-up arrangements therefore accounted for 8% of the total sample. The management of the remaining 92% appears to have been appropriate.

Marriott et al. (2003) found that older adults were significantly more likely to be admitted to a hospital ward; 59% of adults aged over 55 were admitted compared with 46% of younger patients. Higher admission rates alone do not account for the higher assessment rates

in this age group. Older patients were also less likely to self-discharge from the ED, more likely to be offered psychiatric follow-up and more likely to attend follow-up appointments.

*Patient opinions.* NICE guidelines recognise that ‘the experience of care for people who self-harm is often unacceptable’ (p.50). Studies exploring the experiences of patients who have self-harmed and their perceptions of services indicate that people often have negative experiences. Taylor, Hawton, Fortune & Kapur (2009) conducted a systematic review of people’s attitudes towards clinical services and found that long waiting times in the ED, superficial assessments, lack of arrangements for aftercare and long waits for follow-up appointments were some of the negative aspects of the care that people had received. Whether these experiences differ for different age groups is not known.

Haw, Hawton, Whitehead, Houston and Townsend (2003) explored satisfaction with assessment and treatment for 135 patients seen by a hospital self-harm service in Oxford between February and December 1997. A total of 106 people answered questions about the assessment they had received in hospital at follow-up interviews which took place 12 to 20 months after the initial episode of self-harm. The majority of people were positive about the care they had received, though approximately 15% could not recall the assessor’s attitude towards them. A further outpatient appointment with the self-harm team was offered to 24% (33/106) of the assessed patients, 39% (13/33) of whom declined or did not attend. Of those who attended aftercare appointments, the majority found the service they received to be acceptable. This study is limited by the small numbers of participants and the fact that people who were psychiatric inpatients or who were considered to have cut themselves as part of a pattern of ‘self-mutilating’ behaviour were excluded from the study. The aftercare offered was aimed at those who were not in contact with mental health services and did not have a psychiatric diagnosis. Nevertheless, the results indicate that assessment and aftercare was acceptable for this group of patients who would otherwise be likely to receive little or no further input from services following self-harm.

The studies discussed in the above review of the characteristics and management of self-harm have various limitations which mean that their results may not be reliable or generalisable. There is great variability in the methods used to identify cases; the study inclusion and exclusion criteria; the age ranges studied; the ages used to define younger and older populations; the definitions of self-harm used; and the populations from which study participants are drawn. Some studies had small or geographically limited sample sizes and some may not reflect current trends in self-harm in the UK due to having been conducted either some time ago or in other countries.

Community samples have different characteristics to those presenting to hospital services meaning that indications for practice from community samples may not necessarily be indicative of practice recommendations for hospital services. Many hospital samples are based only on people who have been admitted; some are restricted only to those who have subsequently been referred to mental health services. The present sample was collected directly from the ED with no such filters in place. Consequently the sample is close in number to the total hospital study population. The variability in current studies means that a clear picture cannot be formed of the characteristics of self-harm and its management across different age groups. This provides justification for the analysis of multiple characteristics of self-harm across the lifespan in a single large dataset from the UK.

### *Psychological Interventions for Self-Harm*

A detailed review of the literature on psychological interventions for self-harm is beyond the scope of this review. A comprehensive review by the US Preventive Services Task Force (2004) and an earlier Cochrane review (Hawton et al., 1999) both found no conclusive evidence about which interventions might reduce fatal and non-fatal repetition of self-harm. The studies reviewed were limited by lack of power, poor descriptions of standard care and inconsistent age ranges. An updated Cochrane review is awaiting publication and this may provide clearer evidence for the effectiveness of psychological interventions in treating self-harm. Recent clinical trials point to benefits from cognitive therapy (Brown et al., 2005), cognitive behavioural therapy with a problem-solving component (Slee, Arensman, Garnefski & Spinhoven, 2008) and psychodynamic interpersonal therapy (Guthrie et al., 2001) in reducing repetition of self-harm; they also showed beneficial effects on mood, hopelessness and problems experienced (Lilley & Owens, 2009).

Further research is still required in this area and future intervention studies will require adequate identification and assessment of all potential participants as well as clear justifications for any inclusion and exclusion criteria based on age. Differences in self-harm across the age range will introduce bias in intervention studies unless age is considered and controlled for in the study design. The present study will provide information about the clinical and hospital management characteristics of self-harm in different age groups which can be used to inform the development of intervention studies.

### *Summary, Aims and Hypotheses*

The literature related to self-harm reveals a substantial problem with considerable human costs in relation to the link to emotional distress and future suicide, as well as economic costs related to hospital treatment and repetition of self-harm. Psychological theory



suggests that there are likely to be differences in the reasons that people self-harm at various ages, which may lead to differences in the type of self-harm they undertake and the treatment they receive. The literature is not clear regarding differences in self-harm across the age range. Such clarity is necessary for the design and interpretation of intervention studies and this provides justification for the analysis across the age range of a large UK self-harm dataset.

The general aim of this study is to explore age-related differences in the clinical characteristics and hospital management of self-harm and to determine whether differences in service provision correspond to identified differences in severity and risk. A further aim is to identify any changes in the characteristics of self-harm around particular age points, examining whether any characteristics appear to change together and considering possible reasons for such changes.

Summary of aims:

- Describe changes in characteristics of self-harm across different age groups.
- Describe characteristics of hospital service provision for self-harm across different age groups.
- Determine the appropriateness of service provision for different age groups with respect to the clinical characteristics of self-harm in those age groups.
- Identify and explore age-related points of change in self-harm.

Based on the review of the literature, the following hypotheses were formed:

- Characteristics of self-harm will differ in different age groups.
  - Working-age adults and older adults may conduct more medically serious self-harm than do young people.
  - Attendances for self-injury other than by cutting may increase with increasing age.
  - The relative proportions of people using each method of self-harm may differ in different age groups.
- Service provision (in terms of psychosocial assessment and arrangements for aftercare) will differ in different age groups and will probably be best for children and adolescents and worst for working age adults.
- The best and worst service provision will not be closely related to risk or severity of self-harm.
- Rates of repetition and switching of method may differ in different age groups.

## CHAPTER 2: METHOD

In this section I will outline how the data for the study were collected and describe the ethical approvals in place, the information available for analysis, the data manipulation that was required and the methods of analysis.

*Data collection.* This is a prospective cohort analytic study. The data for this study were collected from the two EDs in Leeds as part of a multi-centre self-harm monitoring project that was shared with Manchester and Oxford as part of the National Suicide Prevention Strategy (Department of Health, 2002). Only Leeds data have been used for this study. As part of the national monitoring project the data collection was thorough and the database is of very high quality in terms of recruitment, though there are significant limitations regarding coverage of some variables. The data cover 11,243 consecutive ED attendances for self-harm made by 6292 individuals between 1 October 2004 and 30 September 2007. The methods used for data collection are described in detail by Horrocks et al. (2004), Hawton et al. (2006) and Hawton et al. (2007).

All data collection took place soon after each individual episode of attendance at hospital due to self-harm, generally days to a few weeks later. Attendance was defined as any occasion where the person stayed long enough for their details to be taken by the ED's administrative staff and an ED record card to be produced (Horrocks, House & Owens, 2004). Data collection involved rigorous identification of self-harm attendances followed by extraction of information from computer systems and paper records in the ED and secondary mental health services. EDs were chosen as the setting for monitoring of self-harm because this is where most episodes of self-harm that come to medical attention are seen (Crawford & Wessely, 1998).

*Ethical aspects.* The data collection project had the following ethical and Research and Development (R&D) approvals in place:

- Ethical approval from Leeds West Research Ethics Committee (REC). Ref. 04/Q1205.
- R&D approval from:
  - Leeds Primary Care Trust (PCT) via Bradford South & West PCT. Ref. 833/Approval.
  - Leeds Partnerships Foundation Trust. Ref. 00851.
  - Leeds Teaching Hospitals Trust. Ref. LP04/6407.
- Section 60 Approval from the then Patient Information Advisory Group (PIAG) to collect patient data without individual consent. Ref. 2-07(d)/2004. Now approval under Section 251 of the NHS Act (2006), approved by the Ethics and Confidentiality Committee of the National Information Governance Board (NIGB).

- Approval for collection of mortality data relating to individuals in the self-harm database. Office for National Statistics ref. MR1136.

The team of data collectors all had Honorary Contracts with the Trusts from which they were collecting data. Leeds West REC previously confirmed that use of the self-harm data in postgraduate research was acceptable without amendments to the ethics application.

All identifying information in the original database was securely encrypted and linked to study data only by individual identification codes. The copy of the database that was provided to me had all identifiable information removed.

Since the study did not involve any contact with NHS patients or other participants and ethical approval for use of the data was already in place, no ethics or R&D applications were needed.

*Information available for analysis.* The variables for which data was collected can be divided into four groups or themes: characteristics of the individual; features of the episode of self-harm; service delivery or management aspects of attendance and follow up; and repetition outcomes.

In terms of individual characteristics, or information about the person, sociodemographic details such as gender and employment status were recorded as well as clinical characteristics such as whether people had self-harmed previously and whether they had past or current contact with mental health services. Features of the episode of self-harm include the method used, which drugs were taken in self-poisoning or details of the self-injury, date and time of attendance, and whether alcohol was used. Information regarding service delivery at attendance includes aspects of physical care in hospital, admission, psychosocial assessment and self-discharge. Outcome information after the episode covers arrangement of follow-up appointments. Repetition outcomes include the number and timing of repeat episodes and information about whether the same or different methods of self-harm were used. A list of the variables available for analysis follows:

**Information about the person:**

- age on attendance;
- gender;
- ethnicity;
- employment status;
- previous self-harm (yes/no);
- previous self-harm within the past 12 months (yes/no);
- previous mental health service contact (yes/no);

- current mental health service contact (yes/no); and
- current mental health inpatient status (yes/no).

**Information about the episode of self-harm:**

- time of attendance;
- time of self-harm;
- date of attendance;
- day of the week of attendance;
- time the person left the ED;
- date the person left the ED;
- method of self-harm (poisoning/cutting/injury other than cutting/combined methods);
- drugs/substances taken in poisoning;
- method of self-injury;
- site of cut;
- instrument used for cutting;
- number of cuts;
- consciousness level;
- mode of arrival at hospital; and
- alcohol used around time of self-harm (yes/no).

**Information about hospital management:**

- hospital attended (e.g. Leeds General Infirmary/St James's University Hospital);
- triage category allocated (how urgently treatment is needed);
- level of consciousness on arrival;
- medical treatment in the ED (an indicator of severity) for self-poisoning and self-injury;
- outcome from the ED (e.g. admitted, discharged);
- admission to general hospital (yes/no);
- self-discharged from hospital (yes/no);
- received psychosocial assessment (yes/no);
- mental health follow-up arranged (yes/no); and
- type of mental health follow-up arranged.

**Information about repetition:**

- repetition of self-harm carried out (yes/no);
- time to repetition;
- number of repetitions; and
- switched method at repetition (yes/no).

The principal research question for this study was **'How do hospital services respond to age-related differences in the clinical characteristics of episodes of non-fatal self-harm?'**

Examination of each of the themes across different age groups was needed in order to answer the research question by exploring the age-related differences in both self-harm and the hospital management.

*Analysis.* The data were analysed using Predictive Analytics Software (PASW) versions 17 and 18. PASW is an alternative name for the Statistical Package for Social Sciences (SPSS). Basic descriptive statistics were used to explore proportions of missing data. I conducted initial explorations of the data using the 'information about the person' variables in order to familiarise myself with the database and to develop analysis methods. These variables are mostly binary (yes/no) and therefore were some of the simplest with which to begin working. I will provide an example of my general analysis techniques using the gender variable.

*Decisions about age bands.* An initial task was to determine the most appropriate age bands to use. I produced a series of analyses of the 'information about the person' variables using various age bands; five-year bands, ten-year bands and service-defined age bands, that is children and adolescents (up to and including age 17), working age adults (age 18 to 64) and older adults (age 65 and over). The appendix includes examples of charts produced using the three methods of dividing the age range. After comparing the graphical output produced I decided to use the following age bands: age 12 (youngest) to 17 representing young people; approximately ten-year bands for adults, namely 18-29, 30-39, 40-49 and 50-59; and age 60 and above representing older people. These age bands provided enough distinction for patterns and trends in the data to be visible without being either buried in the detail of narrower age bands or swamped and hidden by use of wider age bands.

The split at 18 years was chosen to follow service convention since this is the age at which people would enter adult rather than child and adolescent services. The ten-year age bands for adults provided acceptable confidence intervals as well as clarity in demonstrating patterns in the results. Rather than following service convention for defining older people as 65 and above, I chose 60 and above for two reasons: first because on examination of narrower age bands several patterns in the data appeared to show a shift between the late 50s and early 60s bands, with the latter appearing to fit more closely to the older age bands; and secondly to obtain more precise confidence intervals in the older group due to the comparatively low numbers in that group. Six age bands were therefore chosen, 12-17, 18-29, 30-39, 40-49, 50-59 and 60+, and these age bands were used in all the further analyses in order to look for differences according to age.

I analysed all episodes of self-harm in the database, rather than analysing based on persons in the database. This approach provides results grounded in the actual profile of self-harm as seen in the ED, rather than more population-based results which would lose a lot of the detail in the database. A disadvantage of using this approach is that it does not account for the non-individual nature of data points. This would be particularly relevant for statistical modelling, but is not a major concern with the analyses I have conducted.

*Example of analysis of a variable.* In order to look for differences in the variables across the different age groups I computed odds ratios (ORs) for each age group against the rest of the data. An example of the basic crosstabulation for gender in the 12-17 years age group against the rest of the sample is shown in table 1 below. The OR for this comparison is 3.65 with a 95% CI of 3.10 to 4.30. This indicates that the odds of being female in the 12-17 years group are approximately three and a half times the odds of being female in the rest of the sample, in other words this age group has many more females than would be expected if the groups did not differ. Similar crosstabulations were produced for each age group against the rest of the sample.

Table 1. Example of crosstabulation for gender in the 12-17 years age group vs. the rest of the sample.

			Age 12-17 vs. all others		Total
			12-17	18+	
Gender	Male	Count	189	4875	5064
		% within Gender	3.7%	96.3%	100.0%
		% within Age 12-17	19.8%	47.4%	45.1%
	Female	Count	765	5402	6167
		% within Gender	12.4%	87.6%	100.0%
		% within Age 12-17	80.2%	52.6%	54.9%
Total		Count	954	10277	11231
		% within Gender	8.5%	91.5%	100.0%
		% within Age 12-17	100.0%	100.0%	100.0%

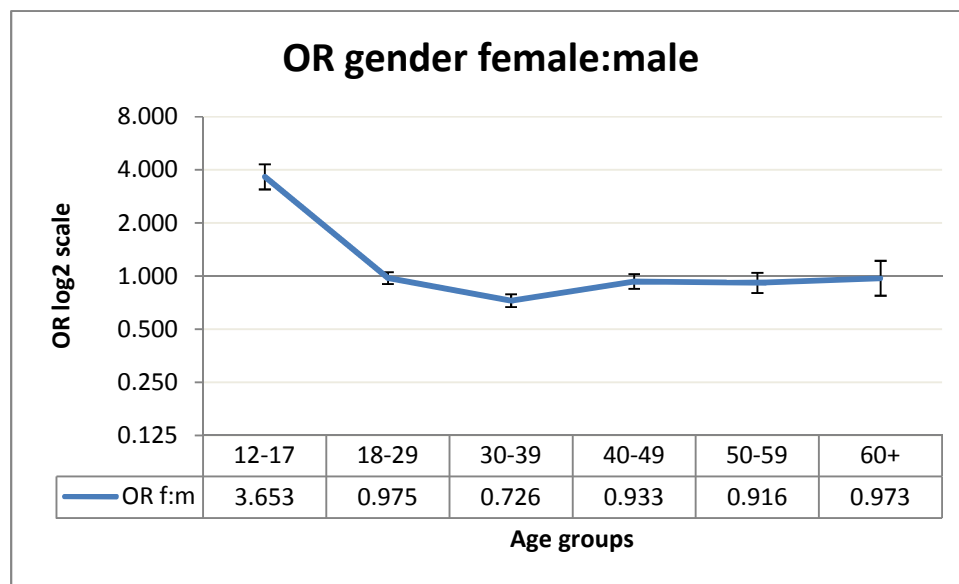
I then plotted the ORs for each age group along with their associated CIs to produce a visual representation of the data in order for patterns, trends and distinctions in the data to be clearly visualised. Table 2 and figure 3 (both p.47) show the results for gender. All OR charts are plotted with a log to base two (log<sub>2</sub>) scale on the y axis and to the same scale to aid comparisons between charts. Log<sub>2</sub> scales provide an easily interpretable scale since each

positive increment on the scale represents a doubling of the odds ratio. Conversely each negative increment on the scale represents a halving of the OR. Error bars were also plotted to show 95% CIs. An example of a chart with a linear scale in comparison to a log2 scale is provided in the appendix.

Table 2. Odds ratios for gender by age group.

Age	OR gender – f:m	95% CI
12-17	3.653	3.101 to 4.303
18-29	0.975	0.902 to 1.054
30-39	0.726	0.667 to 0.789
40-49	0.933	0.848 to 1.027
50-59	0.916	0.803 to 1.045
60+	0.973	0.775 to 1.222

Figure 3. Chart showing odds ratios for gender by age group. Error bars are 95% CIs.



Explorations of the data were carried out in this way for all variables relating to the individual, the episode of self-harm and the hospital management. Where interactions between variables were anticipated, stratified analyses were used and Mantel-Haenszel common odds ratios were calculated. This is analogous to a two-way analysis of variance (ANOVA) for measurement data. Where a linear trend was visible in the OR charts I conducted linear-by-linear chi squared analyses for trend. I used one-way ANOVA to compare mean number of repeat episodes of self-harm across the age groups.

The variables regarding repetition were explored using Kaplan-Meier (KM) survival analysis and KM curves. This type of survival analysis takes account of censoring, which occurs

when individuals reach the end of the observation period without occurrence of the specified outcome event. In this study the outcome event was repetition of self-harm and individuals' time to repetition was recorded. Any person who attended the ED for self-harm more than once in the study observation period was identified as having repeated self-harm. This part of the study was longitudinal with data being collected over a three year period, therefore individuals who entered later in the study would have a shorter 'follow-up' period in which a repetition of self-harm could be recorded prior to the end of the study. The KM analysis uses both time to outcome (days until repetition of self-harm) and time to censoring (days between ED attendance for self-harm and end of study) to produce survival function curves and survival statistics. In these ways it corrects arithmetically for the differences in duration of follow-up.

A multiple events analysis was used which considers all episodes of self-harm, rather than just focusing on repetition following index episodes (a person's first episode of self-harm during the study period). Timings from one episode to the next were used where a person repeated self-harm more than once, rather than only using the timing from the index episode to first repetition. This type of analysis was used because index episodes were arbitrary; they were the first episode of self-harm resulting in ED attendance for an individual during the study period. Often this will not be that person's actual first episode of self-harm. The person may have attended the ED for self-harm prior to the study period meaning that what is classed as their index episode is actually a repetition. In terms of the clinical utility of the results, EDs are interested in the likelihood of repetition of self-harm at the point that a person presents to the ED. Whether or not this is their first episode of self-harm is often not apparent in the busy ED setting with its particular style of short-term record keeping.

*Data manipulation.* The data were rigorously checked and cleaned as part of the data collection procedures. For my analysis the majority of variables required some amount of manipulation to transform them into a format appropriate for analysis, such as a binary format for OR comparisons which require a two-by-two table arrangement. This manipulation was particularly complicated where information had been collected from several sources and where there were multiple individual variables for a single concept and multiple possible values for a variable. The 'substances taken in overdose' variable provides an example.

Often when people self-harm by poisoning they will ingest more than one type of substance. There were four variables in the database recording the type of substance ingested in self-poisoning, so up to four substances per person could be recorded and coded. Each of these variables recorded which of 24 different types of substance had been ingested. In order to analyse these variables effectively I amalgamated several of the substances into groups. The following list illustrates the groups and their constituents:



1. Non-steroidal anti-inflammatory drugs (NSAIDs): NSAIDs over the counter; NSAIDs prescription only.
2. Other analgesics: pure paracetamol; paracetamol but no aspirin; aspirin but no paracetamol; both aspirin and paracetamol; pure aspirin; Co-proxamol.
3. Sedatives: benzodiazepines; barbiturates; minor tranquilisers and sedatives.
4. Antidepressants: tricyclics; selective serotonin reuptake inhibitors; monoamine oxidase inhibitors; mood stabilisers; other antidepressants.
5. Antipsychotics: typical antipsychotics; atypical antipsychotics.
6. Opiates.
7. Antiepileptic drugs.
8. Recreational drugs (excluding opiates).
9. Non-ingestibles.
10. Other.

For each individual I now had four variables, each with 10 possible values. In order to be able to compare ORs across the age groups I required binary variables so I amalgamated the four variables to produce a binary variable for each group of substances. This was done using rules; for the NSAIDs variable, for example, the rule was 'if any of the four 'substances taken' variables contains a '1' (indicating that the person took NSAIDs) label it as yes; if none of the four 'substances taken' variables contains a '1' (the person did not take NSAIDs) label it as no'.

Similar manipulation was required for other groups of variables. The 'method of self-injury' variables were converted from two variables with 13 possible values to 13 binary variables, as well as to a single binary variable looking at whether the method used was violent (such as hanging or jumping) or not (for example wound interference or swallowing objects). The 'type of mental health follow-up arranged' variables were converted from eight variables with 16 possible values to 15 binary variables. The 'assessed by' variable was converted from a single variable with 11 possible values to 11 binary variables. The 'mode of arrival' variable was converted from one variable with seven possible values to seven binary variables. The 'site of cut' variable was converted from one variable with eight possible values to eight binary variables. The 'treatment in self-poisoning' and 'treatment in self-injury' variables were converted from four variables with 22 possible values to 22 binary variables.

Some manipulation was also needed for the survival analyses as these require variables to be set up in specific ways, particularly with regard to how censoring is denoted. The original database was maintained and new variables were cross-checked in order to prevent errors.

*Missing data.* The data for some variables were not collected throughout the whole study, or were collected sporadically. There may have been bias in the recording of some data such as ethnicity. Where more than 25% of the data for a variable was missing I performed an expectation-maximisation (EM) missing values analysis against age and Little's missing completely at random (MCAR) test. These tests examine whether the data were missing in a random fashion or whether different age groups had different proportions of missing data, since this would introduce bias. Where the missing data were not random, I analysed the existing data as it stood and also completed a multiple imputation of values which I then analysed. I then compared these two analyses to see whether the patterns remained the same. Where more than 40% of the data for a variable were missing I did not attempt any analysis of this variable.

*Summary.* This prospective cohort analytic study used an existing database of attendances at the ED due to self-harm. The data collection was rigorous and the data are recent and of high quality. The aims of the study were to explore age-related differences in the clinical characteristics and hospital management of self-harm and to determine whether differences in service provision corresponded to identified differences in severity and risk. A further aim was to identify any changes in the characteristics of self-harm around particular age points, examining whether any characteristics appear to change together and considering possible reasons for such changes.

Information was available about the individuals who presented to the ED after self-harm; the features of the episode of self-harm; the physical and mental health input provided to individuals at the ED plus the aftercare offered; and the occurrence and timing of repetition of self-harm. Significant data manipulation was required prior to analysis. The data were analysed through comparison of ORs across various age bands, stratified analyses and survival analyses. The next section will discuss the results of these analyses.

## CHAPTER 3: RESULTS

This chapter presents the results from this study examining the clinical characteristics and hospital management of self-harm across the age range. I will first present some data regarding rates of self-harm in this sample. I will then use the following sections to organise the results: information about the person; information about the episode of self-harm; information about hospital management and aftercare; and information about repetition of self-harm. Due to the large amount of data analysed, only the more pertinent findings will be represented graphically. Where appropriate I will present proportions and 95% CIs for the whole sample or for each age group, along with OR analyses to illustrate differences across the age range. Table 3 below reports the number of episodes of self-harm in each age group.

Table 3. Number of episodes comprising each age group.

Age group	12-17	18-29	30-39	40-49	50-59	60+	Age missing	Total
Number of episodes	954	3925	2980	2089	977	306	12	11243
Percentage	8.5	34.9	26.5	18.6	8.7	2.7	0.1	100

### *Incidence Rates of Self-Harm*

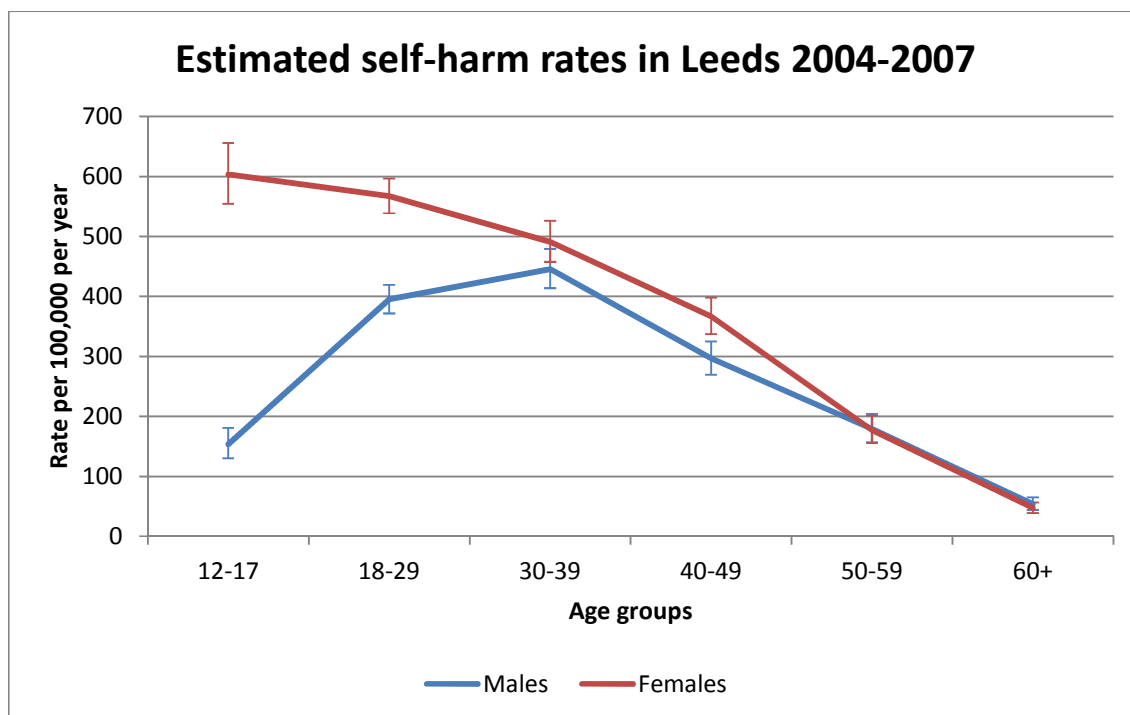
Table 4 (p.52) details the annual incidence of index episodes of self-harm. The term index episode refers to a person's first episode of self-harm during the study period. Population data for Leeds were retrieved from the Office for National Statistics (ONS, 2010b; 2010c; 2010d). I used the mean of mid-year population estimates for 2005, 2006 and 2007. Since the dataset covers October 2004 to September 2007 and the population of Leeds was increasing year-on-year, it is possible that these population estimates may give a slight over-estimation of the population of Leeds during the study period. This would lead to a slight underestimation of the true rate of self-harm during this period. Quinary (five-year) age bands were available so I pro-rated population estimates for my 12-17 and 18-29 age groups from the available 10-14 and 15-19 age groups.

Table 4. Estimated rates of self-harm in Leeds per 100,000 of the population per year 2004-2007.

	Estimated Leeds population	N (index episodes)	Rate per 100,000 per year	95% CI
12-17	60280	677	374	347 to 403
18-29	171820	2474	480	462 to 499
30-39	105233	1478	468	445 to 492
40-49	99600	993	332	312 to 354
50-59	82167	440	178	163 to 196
60+	144433	218	50	44 to 57
Whole sample	761767	6280	275	268 to 282

Figure 4 (p.53) illustrates the pattern of rates of self-harm across the age range for males and females. The highest rate of self-harm for males was in the 30-39 group and for females was in the 12-17 group. The lowest rates for both genders were in the 60+ group. These results are in keeping with Hawton et al. (2007) who found the highest rate for males in the 25-34 group, for females in the 15-24 group and the lowest rates for both genders in the over 55 years group. There are clear changes in rates of self-harm across the age range as well as clearly different patterns in those changes for males and females. This gender difference will be explored further in the 'information about the person' section which follows. The overall rates for males and females in this sample are lower than those found by Hawton et al. (2007) for self-harm in Leeds in 2000-2001. A decrease in rates of self-harm does fit with recent findings of reducing rates of self-harm between 2000 and 2007 in Oxford, Manchester and Derby, along with a decrease in suicide rates in England during this time period (Bergen et al., 2010). Due to there being some lack of fit between the study period and the population statistics available, the rest of this study's results will not be reported in terms of rates per 100,000 of the study population but will instead remain grounded in the data by using only the information collected.

Figure 4. Estimated rates of self-harm in Leeds per 100,000 of the population per year for males and females across the age range.



*Section 1: Information about the Person*

Table 5 below summarises the variables available for analysis in this section.

Table 5. Summary of variables within the person information category.

Variable name	Options	Percentage of data missing
Gender	Male; Female	0.0
Previous self-harm history	Yes; No	11.8
Most recent self-harm	None; Within past 12 months Over 12 months ago	21.6
Previous mental health history	Yes; No	8.0
Current mental health contact	Yes; No	31.4
Current mental health inpatient	Yes; No	31.4
Ethnicity	Various	69.4
Employment status	Various	78.4

The variables concerning ethnicity and employment status clearly have too great a degree of missing data to be interpreted meaningfully. Ethnicity information in particular is likely to have been collected in a biased and haphazard way by ED staff due to fear of causing

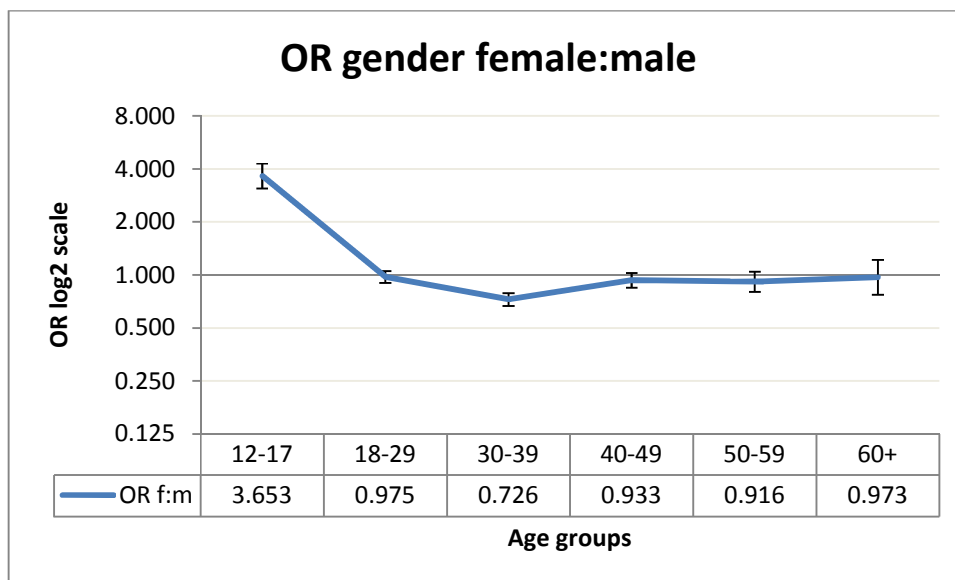
offence. The variables that I examined across the age groups are therefore gender, previous self-harm history, recent self-harm, previous mental health history, current mental health contact and current mental health inpatient status.

*Gender.* Table 6 reports the proportion of females for each age group. Figure 5 illustrates the ORs for each age group when compared to the rest of the sample. For this chart ORs > 1 indicate a greater proportion of females in that age group and ORs < 1 indicate a greater proportion of males.

Table 6. Proportions and 95% CIs for gender across the age groups.

	n (female)	N	Percentage female	95% CI
12-17	765	954	80.2	77.5% to 82.6%
18-29	2139	3925	54.5	52.9% to 56.0%
30-39	1462	2980	49.1	47.3% to 50.9%
40-49	1118	2089	53.5	51.4% to 55.6%
50-59	517	977	52.9	49.8% to 56.0%
60+	166	306	54.2	48.6% to 59.7%
Whole sample	6167	11231	54.9	54.0% to 55.8%

Figure 5. ORs across the age groups for gender. Error bars are 95% CIs.



Self-harm is often reported to be more common in females than in males. The overall female:male ratio for the sample is in keeping with this idea at 1.22 (95% CI = 1.17 to 1.26), however this overall ratio obscures important differences in the gender ratio in the different age groups. From the above chart it is clear that the gender ratio for self-harm is far from

consistent across the age groups. The 12-17 group has a much greater proportion of females than the rest of the sample and the 30-39 group has greater odds of being male. The remaining age groups have an approximately equal proportion of males and females.

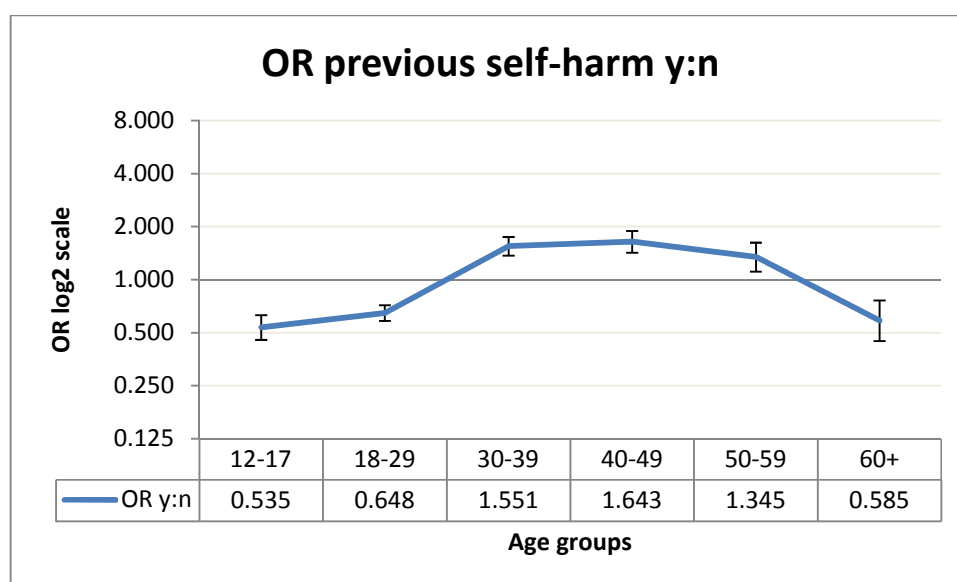
This result is broadly comparable to Hawton and Harriss's (2008) Oxford study which reported a greater proportion of females in younger age groups. In their study, however, the proportion of females remained higher until 50 years, after which the proportions of males and females became more equal. Some differences in Hawton and Harriss's study are: they used rate ratios per 100,000 people rather than ORs of episodes of self-harm, whereas I chose to move away from rates per 100,000 due to uncertainty in the determination of the size of the study population; their data covered 10 years of monitoring of self-harm ED attendances between 1995 and 2004, the ten years prior to the data in the current three-year sample; and they also included only the first episode of self-harm by an individual in any calendar year. The latter point is particularly relevant in considering differences between Hawton and Harriss's (2008) findings and the results reported here, since if one gender is more likely to repeat, an analysis which includes only the first episode of self-harm will tend to show fewer episodes by this gender because any repeat episodes will not be included. As previously mentioned, I chose to consider each episode of self-harm independent of whether it was a person's index episode or a repetition episode since index episodes were arbitrarily defined and I was interested in characteristics of self-harm at the point of care, rather than more general population statistics.

*Previous and recent self-harm history.* Table 7 and figure 6 (both p.56) demonstrate the pattern across the age range for previous self-harm. For figure 6 and those which follow in the same format, all results are represented so that ORs  $> 1$  indicate that that age group is more likely to have the characteristic in question and ORs  $< 1$  indicate that the age group is less likely to have that characteristic. The analysis for previous self-harm indicates that the two youngest age groups and the oldest age group are less likely to have a history of self-harm than the rest of the sample, while people aged 30 to 59 are more likely to have self-harmed before. This is a somewhat unexpected result; a history of self-harm could be expected to be increasingly likely in older age groups as people have more years of life in which they could potentially have self-harmed. These results indicate that a greater proportion of children and adolescents and older people are presenting to the ED after self-harming for the first time, whereas working age adults are more likely to have self-harmed before. This may have implications for assessment and aftercare, for example a person may be less likely to receive a psychosocial assessment and follow-up if they are known to self-harm repeatedly.

Table 7. Proportions and 95% CIs across the age groups for number of episodes where the person has previous self-harm.

	n (previous self-harm)	N total	Percentage previous self-harm	95% CI
12-17	557	790	70.5	67.2% to 73.6%
18-29	2610	3423	76.2	74.8% to 77.6%
30-39	2245	2627	85.5	84.1% to 86.8%
40-49	1642	1900	86.4	84.8% to 87.9%
50-59	752	888	84.7	82.2% to 86.9%
60+	198	277	71.5	65.9% to 76.5%
Whole sample	8004	9905	80.8	80.0% to 81.6%

Figure 6. ORs across the age groups for previous self-harm history. Error bars are 95% CIs.



Recent self-harm was derived from the previous self-harm variable and was defined as attendance at the ED for self-harm within the previous 12 months. This analysis is not displayed for brevity but follows the same pattern as that for previous self-harm, indicating that recent self-harm is a factor of the overall previous self-harm history, that is if any previous self-harm is more likely, then recent self-harm is also more likely.

*Previous mental health history.* Previous mental health history includes any recorded mental health problem, contact with psychiatric or mental health services and psychiatric admission. The patterns across the age range are illustrated in table 8 and figure 7 (both p.57). The two youngest groups and the oldest group are less likely than the other age groups to have a previous mental health history while those aged 30 to 59 are more likely to have had contact. The younger age groups could be expected to be less likely to have previously been in

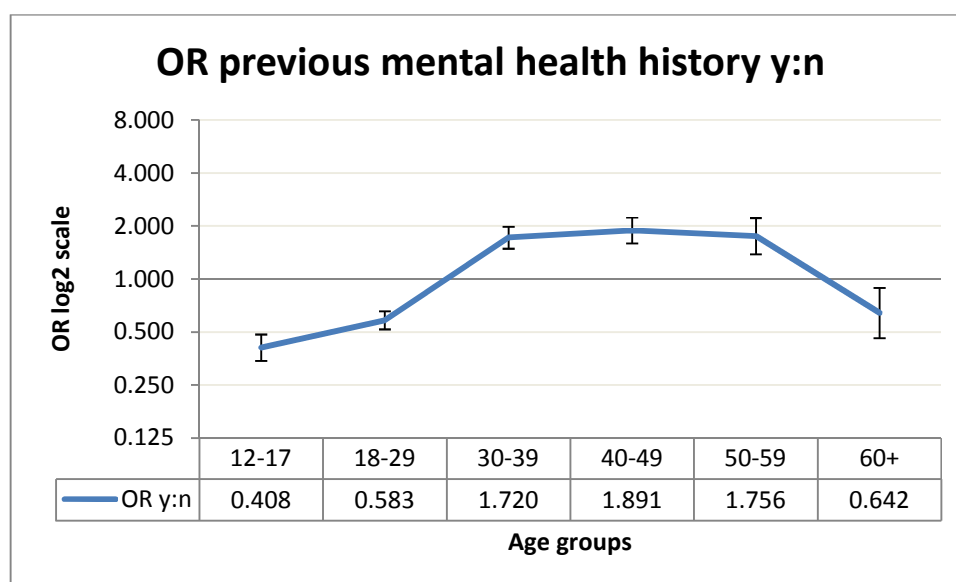


contact with mental health services or diagnosed with a mental health problem but again the lower OR in the oldest age group is unexpected since increasing proportions of people with a mental health history could be expected with increasing age. This analysis follows the same pattern across the age range as the previous self-harm variable. It makes sense that the groups with a higher proportion of people who have self-harmed before would also have a higher proportion of people with previous mental health contact.

Table 8. Proportions and 95% CIs across the age groups for number of episodes where the person has previous mental health history.

	n (previous history)	N total	Percentage previous history	95% CI
12-17	429	655	65.5	61.8% to 69.0%
18-29	1851	2468	75.0	73.3% to 76.7%
30-39	1727	1998	86.4	84.9% to 97.9%
40-49	1263	1439	87.8	86.0% to 89.4%
50-59	588	671	87.6	84.9% to 89.9%
60+	137	187	73.3	66.5% to 79.1%
Whole sample	5995	7418	80.8	79.9% to 81.7%

Figure 7. ORs across the age groups for previous mental health history. Error bars are 95% CIs.



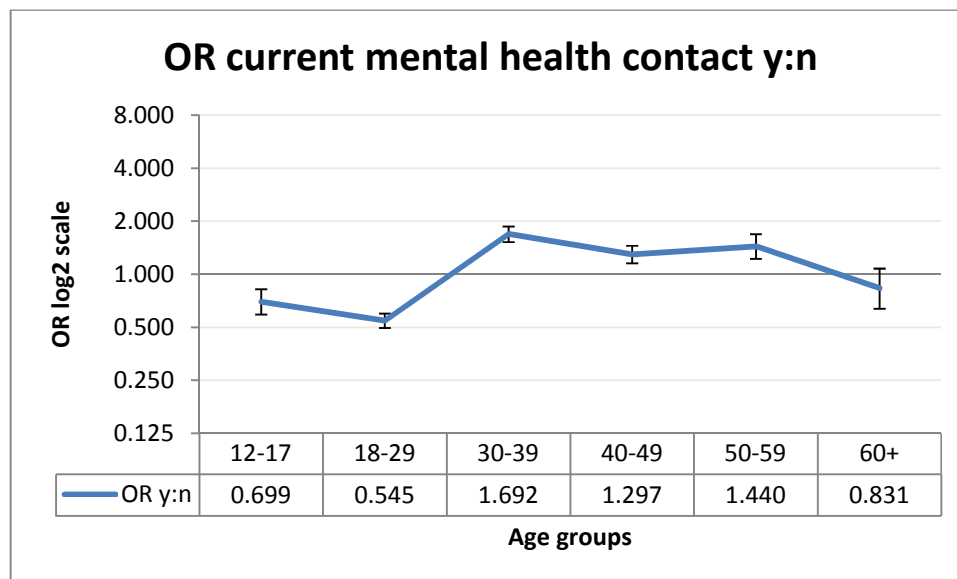
*Current mental health contact.* The analysis for current mental health contact follows the same pattern as that for previous self-harm and previous mental health contact, which is a result that could be expected; those with a history of self-harm or contact with mental health services are more likely to currently be in contact with services. Table 9 and figure 8 (both

p.58) illustrate the pattern across the age range. This variable does have almost a third of the data missing, which may explain why the pattern in this variable is less pronounced than in the previous two variables. Missing values analysis suggested that the data for current mental health contact can safely be regarded as randomly missing. Little's MCAR test produced chi squared = 5.062(2), p = .08).

Table 9. Proportions and 95% CIs across the age groups for number of episodes where the person has current contact with mental health services.

	n (current contact)	N total	Percentage current contact	95% CI
12-17	271	626	43.3	39.5% to 47.2%
18-29	1121	2690	41.7	39.8% to 43.5%
30-39	1248	2046	60.0	57.9% to 62.1%
40-49	822	1449	56.7	54.2% to 59.3%
50-59	397	665	59.7	55.9% to 63.4%
60+	109	232	47.0	40.7% to 53.4%
Whole sample	3968	7708	51.5	50.4% to 52.6%

Figure 8. ORs across the age groups for current mental health contact. Error bars are 95% CIs.



*Current mental health inpatient status.* Current mental health inpatient status was derived from the same variable as the overall current mental health contact data. The ORs do not show clear differences according to age and large CIs reflect the small numbers of inpatients within the sample. Only the 50-59 years group differed from the rest of the sample in being less likely to be inpatients at the time of presentation to the ED.

*Summary.* These analyses of the sample across the age groups have produced some unexpected results. The pattern for previous self-harm and previous mental health contact could be expected to show increasing odds with increasing age, simply because people have more years of opportunity to have either self-harmed or been in contact with mental health services. The variable for current mental health contact could be expected to follow the same pattern as the previous variables since people with a mental health or self-harm history may be more likely to have current contact with mental health services. The analyses indicate that for the younger age groups this pattern may apply; they are less likely to have self-harmed previously and less likely to have previous or current mental health contact. The oldest age group, however, does not fit this predicted pattern, in which they could be expected to have the highest proportions of previous self-harm and previous or current mental health contact. This group in fact has lower odds for each of these variables; they are more likely than the rest of the sample to be first-time attenders who are not known to mental health services. It is possible that this reflects differing motivations for self-harm in older adults. Comparison with other variables, particularly variables indicating severity of self-harm, may indicate potential explanations for this finding. The next section will explore features of the episode of self-harm including indicators of severity.

### *Section 2: Information about the Episode of Self-Harm*

Many of the features of the episode of self-harm can be indicators of severity and risk. Someone arriving by ambulance, for example, may have conducted more medically serious self-harm than someone who arrives on foot. This section explores the variables related to features of each individual episode of self-harm and links to the following hypotheses:

- Characteristics of self-harm will differ in different age groups.
  - Working-age adults and older adults may conduct more medically serious self-harm than do young people.
  - Attendances for self-injury other than by cutting may increase with increasing age.
  - The relative proportions of people using each method of self-harm may differ in different age groups.

In this section and the next section on hospital management the information is organised to follow a logical sequence based on a person's journey through the ED. This section covers the mode of arrival at the ED and the clinical features of how the episode of self-harm was conducted such as the drugs taken or methods of injury used. Table 10 (p.60) summarises the variables in this section.

Table 10. Summary of variables within the episode of self-harm category.

Variable name	Options	Percentage of data missing
Arrival mode	Ambulance; Car; Walking; Police; Police and ambulance; Public transport; Other	17.8
Method of self-harm	Self-poisoning; Self-injury; Both/multiple methods; Self-cutting (split from self-injury); Self-poisoning plus self-injury (other than cutting); Self-poisoning plus self-cutting	0.0
Drugs taken in self-poisoning	NSAIDs; Other analgesics; Sedatives (both including and excluding antidepressants and opiates); Antidepressants; Opiates; Antipsychotics; Recreational drugs; Other drugs; Non-ingestibles	0.0
Combination of drugs taken	Yes; No; Four or more	0.0
Method of self-injury	Hanging; Jumping; Stabbing; Burning; Laceration (cutting); Drowning; Carbon monoxide (CO) inhalation; Traffic; Swallowing object; Wound interference; Hit object; Head banging; Other	0.0
Self-cutting site	Head; Neck; Torso; Wrist; Forearm; Rest of arm; Leg; Other	1.0
Number of cuts made	One; More than one	4.0
Number of sites cut	One: Two; Three or more	0.0
Instrument used for cutting	Razor; Knife; Broken glass; Other	23.4
Alcohol use	Yes; No	33.8

*Mode of arrival at the ED.* Table 11 presents the overall proportions for the whole sample for mode of arrival at the ED.

Table 11. Proportions and 95% CIs for mode of arrival at the ED.

	n (mode)	N total	Percentage	95% CI
Ambulance	6525	10385	62.8	61.9% to 63.8%
Car	1010	10385	9.7	9.2% to 10.3%
Walked	472	10385	4.5	4.2% to 5.0%
Police	374	10385	3.6	3.3% to 4.0%
Police and ambulance	248	10385	2.4	2.1% to 2.7%
Public transport	298	10385	2.9	2.6% to 3.2%
Other/not specified	305	10385	2.9	2.6% to 3.3%

Figure 9. ORs across the age groups for arrival at ED by ambulance. Error bars are 95% CIs.

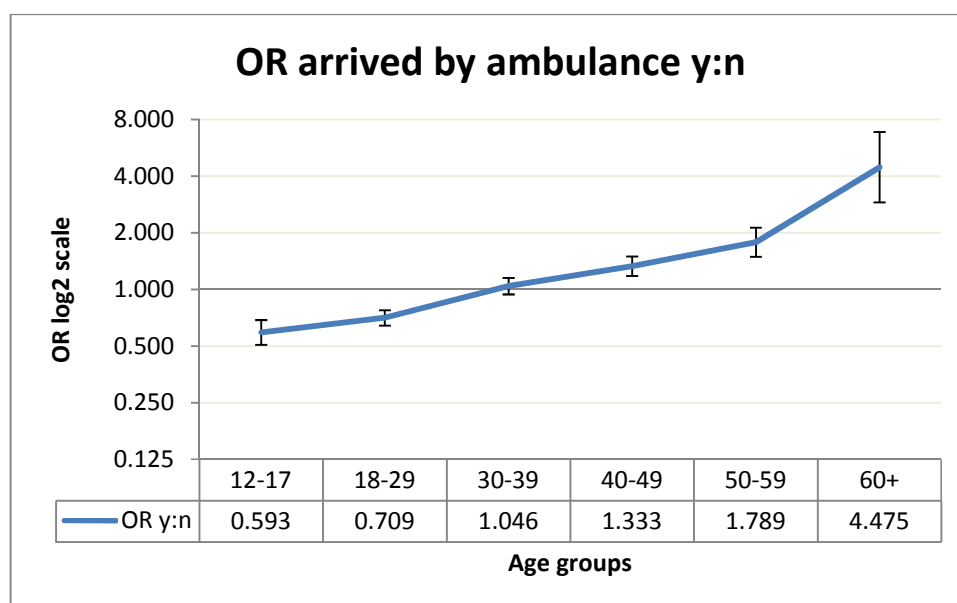


Figure 10. ORs across the age groups for arrival at ED by car. Error bars are 95% CIs.

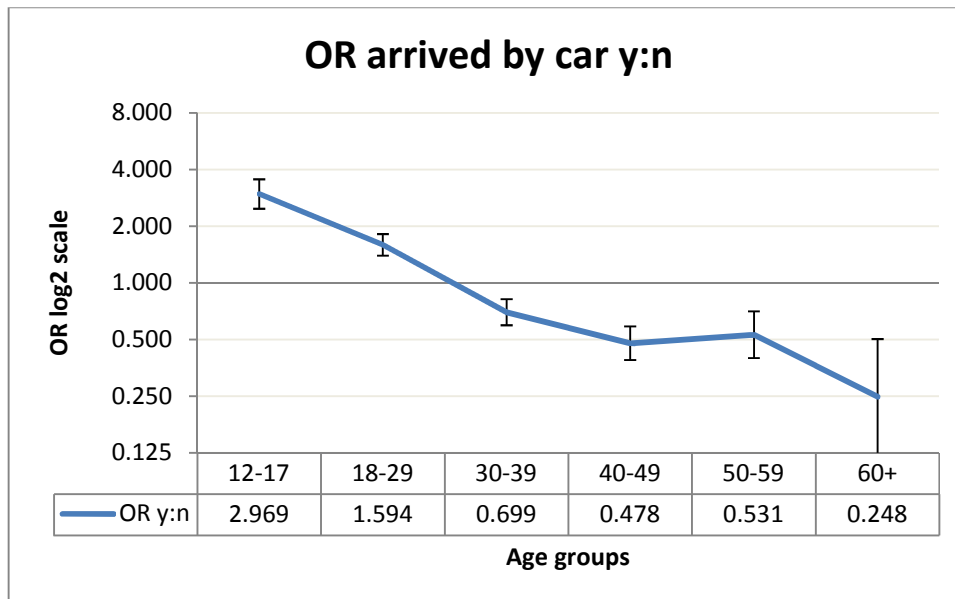


Figure 9 (p.61) and figure 10 above show a clear pattern across the age range of an increasing likelihood with increasing age of arriving by ambulance and a decreasing likelihood of arriving by car. This indicates increasing severity or medical seriousness of self-harm with increasing age. For arriving by ambulance, chi squared for trend (linear-by-linear association) = 184.3(1),  $p < .01$ . For arriving by car, chi squared for trend = 207.2(1),  $p < .01$ . These results show statistically significant linear trends in the data.

The other recorded modes of arrival (walking, police, police and ambulance, public transport, other) did not show clear patterns across the age range, therefore the OR charts will not be reported, however there were some differences for particular age groups in their modes of arrival, as illustrated in table 12 (p.63). This table and the others that follow in this format summarise the pattern of ORs across the age groups for the variable in question. I have not reported numerical details of the ORs except where they are particularly pertinent to interpretation. The analysis of mode of arrival at the ED suggests increasing medical severity of self-harm with increasing age.

Table 12. Patterns across the age range for likelihood of arriving at the ED by each mode of transport.

	12-17	18-29	30-39	40-49	50-59	60+
Ambulance	-	-	=	+	+	+
Car	+	+	-	-	-	-
Walked	-	=	+	=	=	n.d.
Police	=	+	=	=	=	-
Police and ambulance	=	=	=	=	=	-
Public transport	=	+	=	-	-	=

+ Significantly more likely than the other age groups to arrive by this mode (CIs > 1).

- Significantly less likely than the other groups to arrive by this mode (CIs < 1).

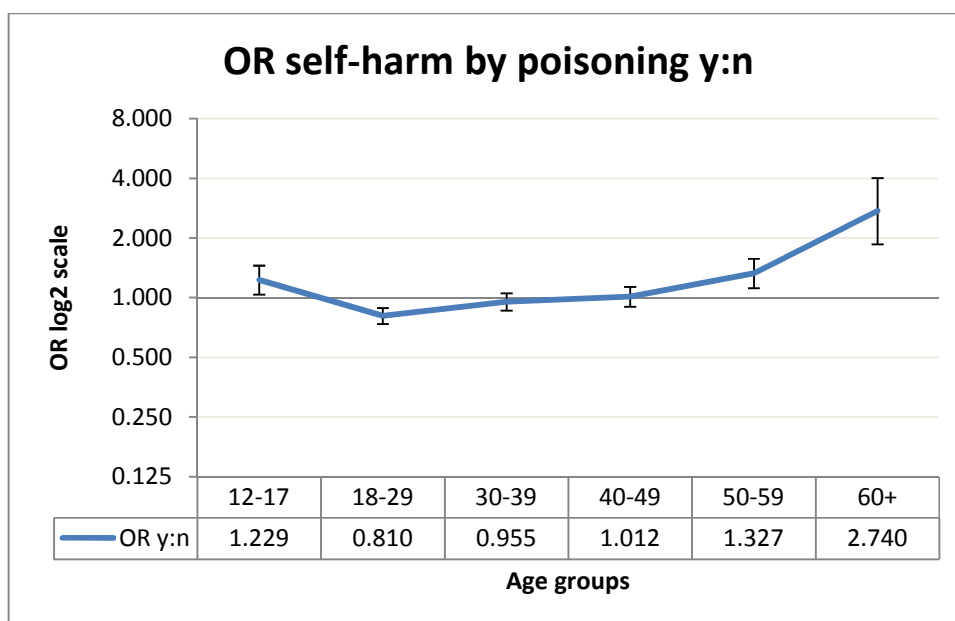
= No more or less likely than the other groups to arrive by this mode (CIs cross 1).

n.d. No data for this group. No individual in this group arrived by this mode.

*Method of self-harm: Overall proportions.* In the sample 78.1% of attendances (8774/11241 - method not recorded for two episodes) involved self-poisoning and 27.9% (3137/11241) involved self-injury. A total of 8104 attendances were for self-poisoning only (72.1%), 2467 were for self-injury only (21.9%) and 670 were for both methods together (6.0%). Self-cutting was involved in 2383 episodes and makes up 21.1% of all attendances and 75.9% of self-injury attendances.

*Methods across the age groups.* Figure 11 (p.64) shows that the 12-17, 50-59 and 60+ groups are more likely than the other groups to self-harm by poisoning. Conversely they are less likely than the other groups to self-harm by injury methods. An OR chart of self-harm by injury produces a mirror image of the pattern in figure 11. The 18-29 group shows the opposite pattern, being more likely than the other groups to self-harm by injury and less likely than the other groups to use self-poisoning. The 30-39 and 40-49 groups are no more likely than the other groups to use one method or the other. The pattern for self-cutting follows the same shape as that for self-injury. These analyses confirm the hypothesis that the relative proportions of people using each method of self-harm will differ in the different age groups. No one age group was more likely than the rest to use both methods together. The 60+ group was less likely than the other groups to use both methods. It is worth noting that the sample includes a much higher proportion of self-poisoning than would be seen in a community sample because the data is sourced from hospital attendances.

Figure 11. ORs across the age groups for use of self-poisoning. Error bars are 95% CIs.



*Drugs taken in self-poisoning.* Table 13 reports the overall proportions of the study sample who took each type of substance in self-poisoning. Paracetamol, aspirin, and codeine-containing compound medications are the most common substances in the ‘other analgesics’ category. No individual took antiepileptic drugs in self-poisoning.

Table 13. Proportions taking each substance in self-poisoning episodes.

	N (taken)	N total	Percentage	95% CI
NSAIDs	1278	8755	14.6	13.9% to 15.4%
Other analgesics	4551	8755	52.0	50.9% to 53.0%
Sedatives	1537	8755	17.6	16.8% to 18.4%
Antidepressants	2229	8755	25.5	24.6% to 26.4%
Opiates	727	8755	8.3	7.7% to 8.9%
Antipsychotics	768	8755	8.8	8.2% to 9.4%
Recreational drugs	153	8755	1.7	1.5% to 2.0%
Other/not specified	1583	8755	18.1	17.3% to 18.9%
Non-ingestibles	109	8755	1.2	1.0% to 1.5%

For conciseness I have not set out the OR charts for the drugs taken in self-poisoning. These can be found in the appendix. There are clear patterns in the types of drugs taken by different age groups as illustrated in table 14 (p.65). Younger groups are more likely to take substances such as NSAIDs and other analgesics which can be easily accessed over the counter (OTC). Prescribed drugs such as sedatives and antidepressants are more likely to be taken by



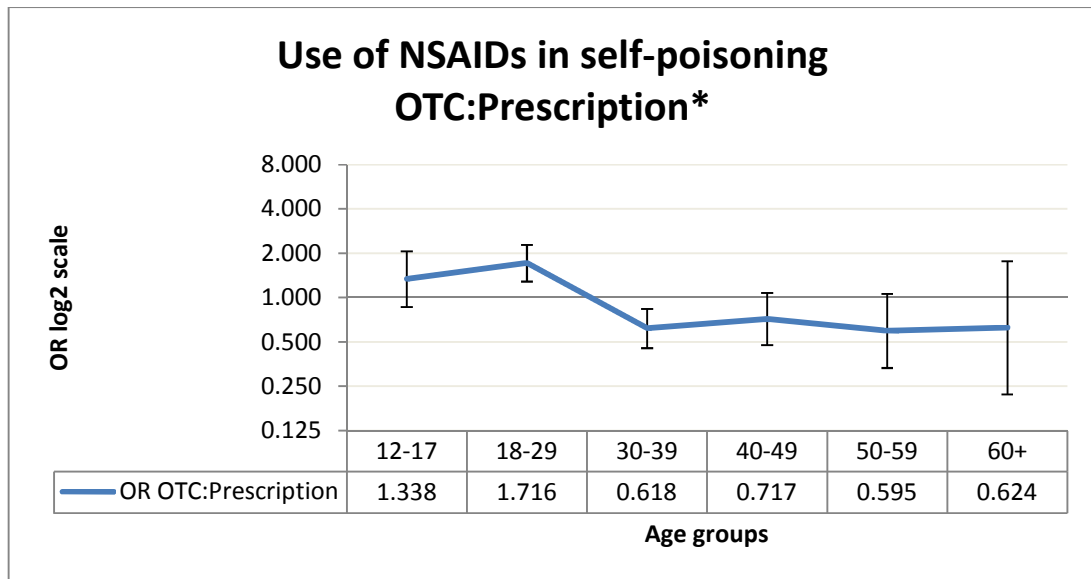
the older age groups, reflecting prescribing habits and the increased likelihood of having such drugs available at home. This idea is supported by analysis of likelihood of taking prescription and OTC NSAIDs, see figure 12 (p.66), which reveals a pattern in which the 12-17 and 18-29 groups are more likely to take OTC NSAIDs and the older groups tend towards being more likely to take prescription NSAIDs, chi squared for trend = 15.6(1),  $p < .01$ . Antipsychotics are most likely to be used in self-poisoning by the 30-39 group, reflecting a peak age for antipsychotic prescribing.

Table 14. Patterns across the age range of likelihood of having taken substances in self-poisoning.

	12-17	18-29	30-39	40-49	50-59	60+
NSAIDs	+	+	-	-	-	-
Other analgesics	+	+	-	-	-	=
Sedatives	-	-	+	+	+	+
Antidepressants	-	-	+	+	=	+
Opiates	-	=	=	+	=	=
Antipsychotics	-	-	+	=	=	-
Recreational drugs	=	+	=	-	-	n.d.
Other/not specified	+	=	=	=	+	=
Non-ingestibles	=	+	=	-	=	=

- + Significantly more likely than the other age groups to have taken this substance in self-poisoning.
- Significantly less likely than the other age groups to have taken this substance in self-poisoning.
- = No more or less likely than the other age groups to have taken this substance in self-poisoning.
- n.d. No data for this age group. No individual in this age group took this substance in self-poisoning.

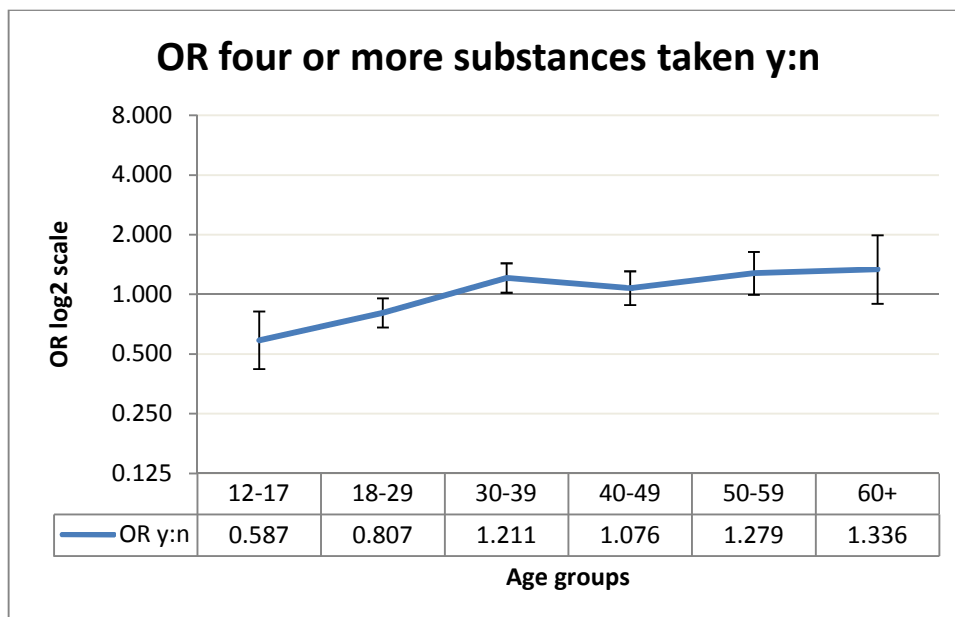
Figure 12. ORs across the age groups for use of NSAIDs in self-poisoning episodes. Error bars are 95% CIs.



\* This figure depicts the ORs for the ratio of OTC to prescription NSAIDs, therefore ORs and CIs > 1 indicate that a group is more likely to take OTC than prescription NSAIDs. ORs and CIs < 1 indicate that a group is more likely to take prescription than OTC NSAIDs.

*Number of substances taken.* The 12-17 group were less likely than the other age groups to take more than one substance (OR = 0.76, 95% CI = 0.65 to 0.89). No group was more likely to take a combination of substances but there was a general trend for the older age groups to be more likely to take four or more substances as illustrated in figure 13 below. Chi squared for trend = 13.8(1),  $p < .01$ .

Figure 13. ORs across the age groups for four or more drugs taken. Error bars are 95% CIs.



*Methods used in self-injury.* Table 15 reports the overall proportions of the sample using each method of self-injury.

Table 15. Proportions using each method of self-injury.

	n (used)	N total	Percentage	95% CI
Hanging	166	3135	5.3	4.6% to 6.1%
Jumping	90	3135	2.9	2.3% to 3.5%
Stabbing	84	3135	2.7	2.2% to 3.3%
Burning	57	3135	1.8	1.4% to 2.3%
Cutting	2345	3135	74.8	73.3% to 76.3%
Drowning	20	3135	0.6	0.4% to 1.0%
CO	28	3135	0.9	0.6% to 1.3%
Traffic	55	3135	1.8	1.4% to 2.3%
Swallowing object	67	3135	2.1	1.7% to 2.7%
Wound interference	60	3135	1.9	1.5% to 2.5%
Hit object	91	3135	2.9	2.4% to 3.6%
Head banging	99	3135	3.2	2.6% to 3.8%
Other/not specified	201	3135	6.4	5.6% to 7.3%

Similarly to the above analyses for drugs taken in self-poisoning, I will not report here the OR charts for the method used in self-injury episodes. These can be found in the appendix. Table 16 below details the likelihood of use of specific injury methods for each age group.

Table 16. Patterns across the age range for likelihood of using specific methods of self-injury.

	12-17	18-29	30-39	40-49	50-59	60+
Hanging	=	=	=	=	+	=
Stabbing	n.d.	=	+	-	=	+
Cutting	=	+	-	=	=	-
Drowning	=	=	=	=	=	+
CO	n.d.	=	=	=	+	=
Swallowing object	=	=	-	=	=	n.d.
Wound interference	=	=	+	=	=	n.d.
Hit object	+	=	=	-	=	n.d.
Other/not specified	=	-	+	=	=	=

+ Significantly more likely than the other age groups to have used this method in self-injury.

- Significantly less likely than the other age groups to have used this method in self-injury.

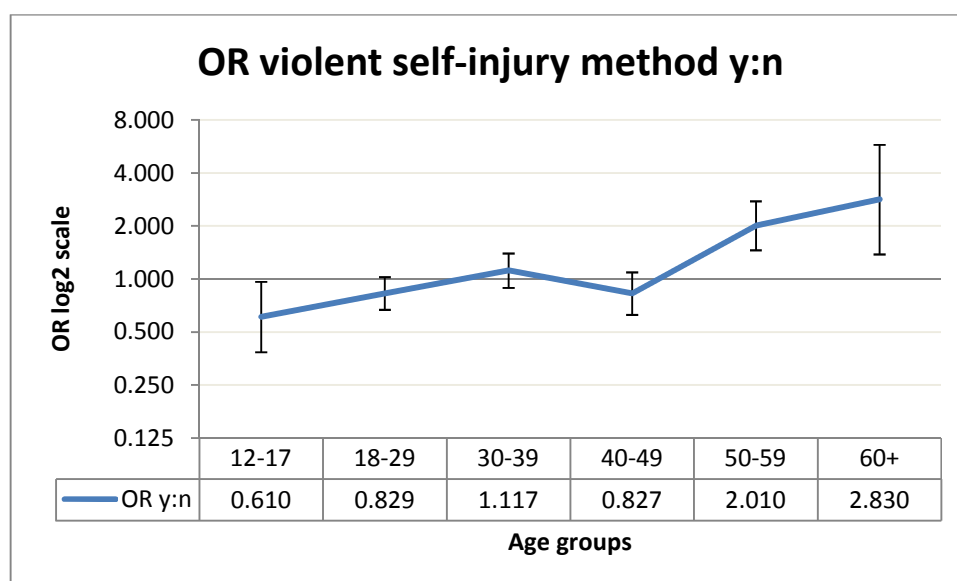
= No more or less likely than the other age groups to have used this method in self-injury.

n.d. No data for this age group. No individual in this age group used this method in self-injury.

Differences across the age range are less obvious in the self-injury methods analysis due to lower numbers of episodes. Jumping, burning, traffic, and head banging as injury methods showed no differences across the age groups, with low numbers and large CIs. There did, however, appear to be trends in the OR charts towards greater likelihood of using methods more akin to 'suicide attempts' such as hanging and jumping in the older age groups. Conversely the younger age groups tended towards a greater likelihood of using methods such as wound interference and hitting objects which may be considered to reflect lower suicidal intent.

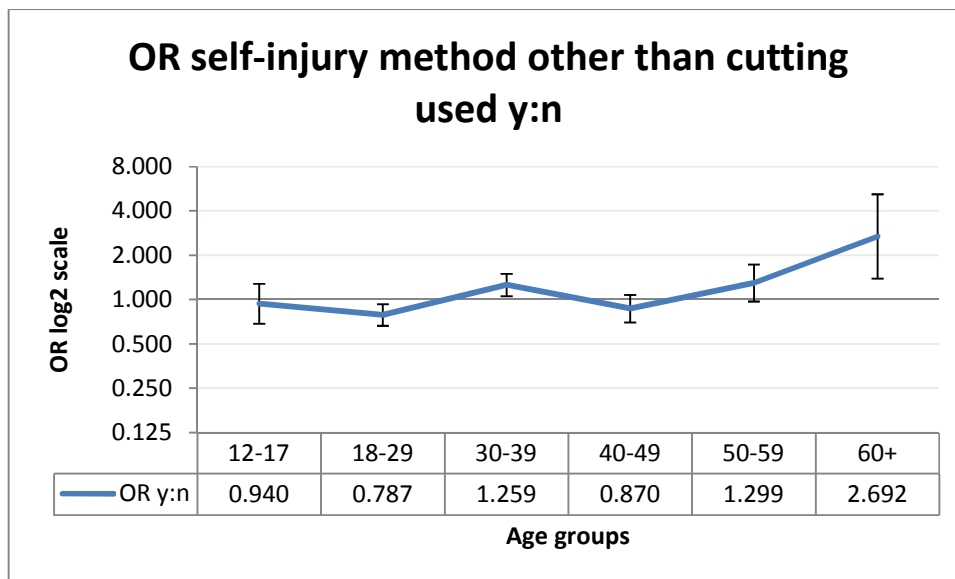
I produced a composite of the more violent injury methods which consisted of hanging, jumping, stabbing, burning, drowning, CO inhalation and traffic-related injury and this showed a clear increase in use of such methods with increasing age; see figure 14 below. Chi squared for trend = 17.8(1),  $p < .01$ . Overall, 428 out of the 3135 self-injury episodes involved violent methods (13.7%).

Figure 14. ORs across the age groups for use of violent self-injury methods. Error bars are 95% CIs.



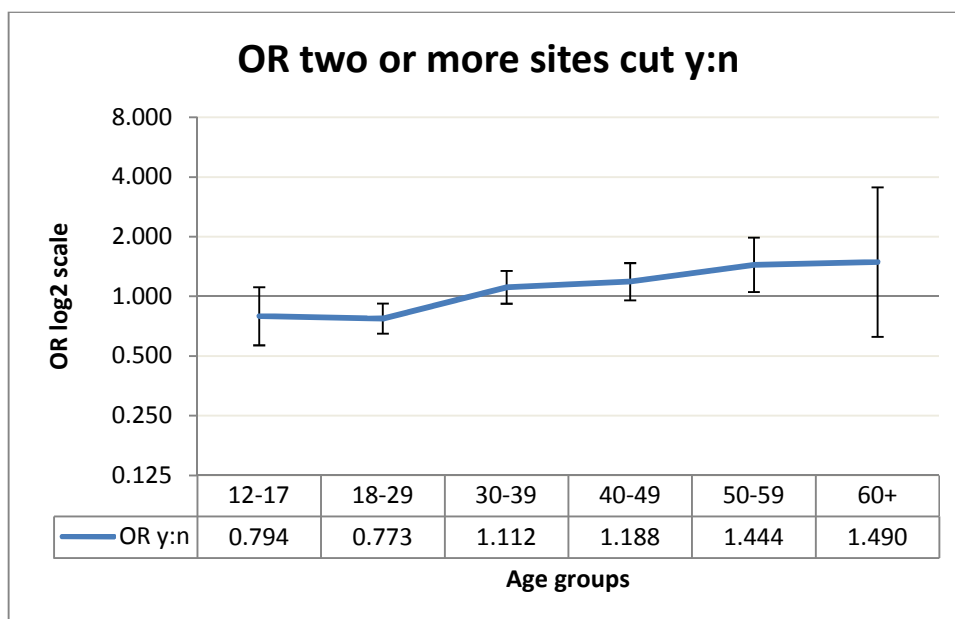
The 60+ group were more likely than the other age groups to have used a self-injury method other than cutting. The hypothesised trend for decreasing use of self-cutting with increasing age is illustrated in figure 15 (p.69). Chi squared for trend = 7.3(1),  $p < .01$ . The trend does not appear to be particularly robust for the three younger age groups, however.

Figure 15. ORs across the age groups for using a self-injury method other than cutting. Error bars are 95% CIs.



*Self-cutting.* Within self-cutting episodes no age group was more or less likely than any other to have made multiple cuts rather than a single cut. Over the whole sample 1609/2391 episodes involved multiple cuts (67.3%). Multiple cuts could be at a single site on the body or at more than one site. In terms of the number of sites cut, there was a general trend for the older age groups to be more likely to have cut two or more sites as shown in figure 16 below. Chi squared for trend = 14.0(1),  $p < .01$ . Few episodes involved three or more sites being cut therefore this analysis had large CIs and did not show any differences across the age range.

Figure 16. OR across the age groups for two or more sites cut. Error bars are 95% CIs.



Regarding the sites cut, no clear patterns were apparent. The 12-17 group were more likely than the other groups to cut the forearm (OR = 1.78, 95% CI = 1.29 to 2.45) and less likely than the other age groups to cut the torso (OR = 0.31, 95% CI = 0.10 to 0.97) or wrist (OR = 0.64, 95% CI = 0.45 to 0.90). The 18-29 group were more likely than the other age groups to cut the leg (OR = 1.76, 95% CI = 1.24 to 2.49) and upper arm (OR = 2.77, 95% CI = 1.57 to 4.88) and less likely than the other age groups to cut the head (OR = 0.29, 95% CI = 0.16 to 0.52). The 30-39 group were more likely than the other age groups to cut the head (OR = 3.51, 95% CI = 2.23 to 5.51) and torso (OR = 1.74, 95% CI = 1.20 to 2.55) and less likely than the other age groups to cut the forearm (OR = 0.82, 95% CI = 0.68 to 0.99). The 40-49 group were less likely than the other age groups to cut the torso (OR = 0.47, 95% CI = 0.26 to 0.86) and upper arm (OR = 0.36, 95% CI = 0.13 to 0.99). The 50-59 and 60+ groups were no more or less likely than the other age groups to cut any particular site.

With regard to the instrument used in self-cutting, the likelihood of use of a knife did not differ across the age groups. The younger adult groups (18-29 and 30-39) were more likely to use a razor (ORs = 1.28 and 1.27, 95% CIs = 1.06 to 1.55 and 1.03 to 1.57, respectively) and less likely to use broken glass (ORs = 0.63 and 0.65, 95% CIs = 0.48 to 0.82 and 0.47 to 0.90 respectively). The 40-49 and 50-59 groups showed the opposite pattern, being more likely to use broken glass (ORs = 1.56 and 2.91, 95% CIs = 1.15 to 2.12 and 1.97 to 4.31, respectively) and less likely to use a razor (ORs = 0.75 and 0.52, 95% CIs = 0.59 to 0.97 and 0.35 to 0.78, respectively).

*Alcohol use.* Where alcohol use was recorded, across the whole sample 5192/7439 episodes had used alcohol around the time of self-harm (69.8%). Table 17 details the proportions using alcohol in each age group.

Table 17. Proportions and 95% CIs for alcohol use across the age groups

	n (used alcohol)	N total	Percentage used alcohol	95% CI
12-17	181	533	34.0	30.1% to 38.1%
18-29	1706	2603	65.5	63.7% to 67.3%
30-39	1482	1976	75.0	73.0% to 76.9%
40-49	1169	1463	79.9	77.8% to 81.9%
50-59	528	681	77.5	74.2% to 80.5%
60+	126	183	68.9	61.8% to 75.1%
Whole sample	5132	7439	69.8	68.7% to 70.8%

Alcohol use was not recorded in approximately one third of episodes. These data were not missing at random; Little’s MCAR produced chi squared = 18.4(2),  $p < .01$ . Imputation of the missing values did not change the overall interpretation of the analysis, see figures 17 and 18 below. The 12-17 and 18-29 groups are less likely to have used alcohol around the time of self-harm and the 40-49 group have the highest odds of alcohol use.

Figure 17. ORs across the age groups for alcohol use around the time of self-harm as recorded in the database. Error bars are 95% CIs.

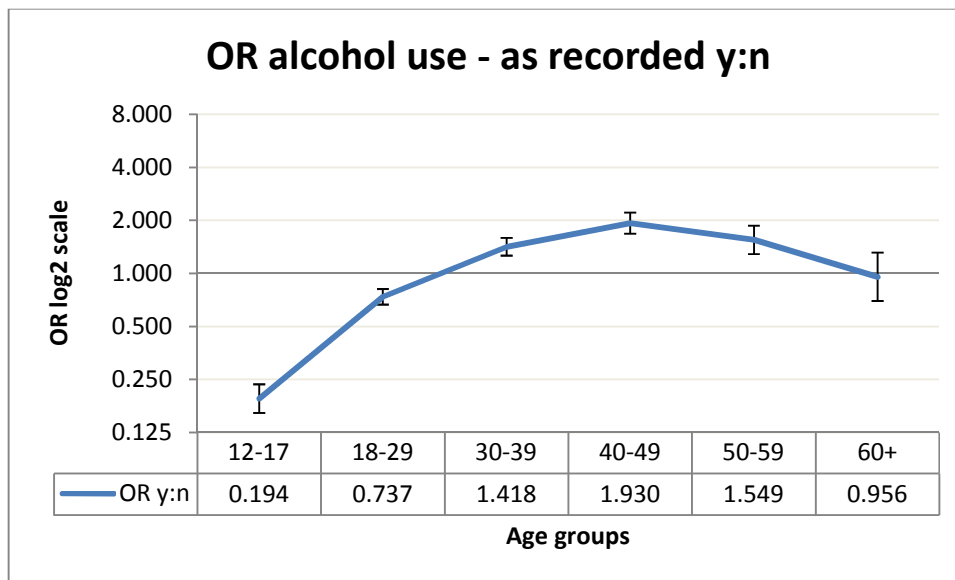
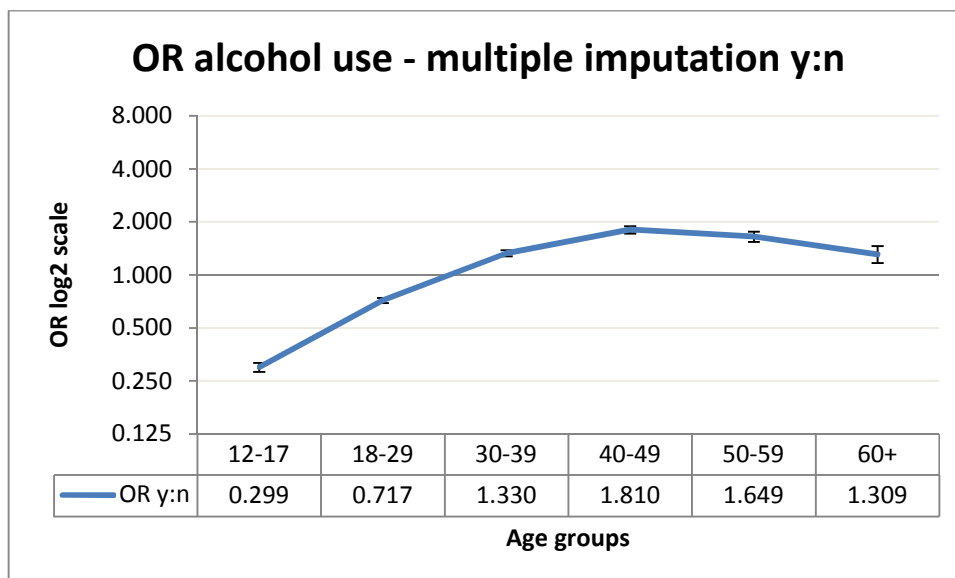


Figure 18. ORs across the age groups for alcohol use around the time of self-harm using multiple imputation. Error bars are 95% CIs.



*Summary.* This section explores the features of the episode of self-harm at the time of presentation to the ED. The results support the hypothesis that characteristics of self-harm will differ in different age groups. The hypothesis that the relative proportions of people using

each method of self-harm may differ in different age groups is also supported. The youngest and the two oldest age groups were more likely to self-harm by poisoning while the young adult (18-29) group were more likely than the other groups to use self-injury methods. There were also differences between the age groups in the specific substances taken in self-poisoning and the types of self-injury methods used. The hypothesis that attendances for self-injury other than by cutting may increase with increasing age is supported by a significant linear trend, however only the 60+ age group were significantly more likely to use such methods when compared to the rest of the sample. The clinical significance of this result is uncertain in the younger age groups.

The hypothesis that working-age adults and older adults may conduct more medically serious self-harm than do young people is supported by the mode of arrival at the ED being more likely to be by ambulance with increasing age; a trend for increasing likelihood of taking four or more drugs with increasing age; a trend for an increasing likelihood of having cut multiple sites with increasing age; and a clear increase in use of more violent 'suicide attempt' types of self-injury methods with increasing age. The next section explores characteristics of the hospital management of self-harm at the ED and will provide further information about the medical seriousness of self-harm episodes.

### *Section 3: Hospital Management of Self-Harm*

This section explores the management of the episode of self-harm at the ED. Details such as the individual's level of alertness on arrival and how quickly he or she needs to be seen can provide information about severity of self-harm, as can the type of treatment provided. This section follows an individual's journey through the ED process from triage and assessment, through treatment, to discharge and arrangements for mental health follow-up. Table 18 (p.73) summarises the variables available for analysis in this section. The analyses in this section also link back to another two of my original hypotheses: first that service provision will differ in different age groups and will probably be best for children and adolescents and worst for working age adults; and secondly that the best and worst service provision will not be closely related to risk or severity of self-harm.



Table 18. Summary of variables within the hospital management category.

Variable name	Options	Percentage of data missing
Triage assessment	Within 240 minutes; Within 120 minutes; Within 60 minutes; Within 10 minutes; Immediate	23.4
Alertness rating	Alert; Mildly drowsy; Very drowsy; Unconscious	1.2
Medical treatment for self-poisoning	None/observation only; Declined treatment; Charcoal; Ipecac; Washout; Parvolex; Naloxone; Resuscitation; Other	11.0
Level of medical treatment for self-poisoning	None; Declined treatment; Basic; Significant	11.3
Medical treatment for self-injury	None/tetanus shot only; Declined treatment; First aid; Medical intervention; Specialist referral; Resuscitation; Other	12.3
Level of medical treatment for self-injury	None; Declined treatment; Basic; Significant	10.7
Received psychosocial assessment	Yes; No	7.5
Psychosocial assessment completed by whom	Consultant/Specialist Registrar (SpR)/Staff Grade; Permanent self-harm team member; Child and Adolescent Mental Health Services worker; Old age liaison psychiatry nurse; Crisis Resolution Team (CRT); Other then CRT; Senior House Officer (SHO); Other/don't know who; Declined assessment	8.1
Outcome on leaving ED	Admitted to general hospital (clinical decisions unit or general ward); Admitted or returned to inpatient psychiatric care; Discharged following psychosocial assessment; Discharged without psychosocial assessment; Enforced removal; Self-discharged/left; Other/not specified	0.4
Aftercare arrangements	Discharged from ward, no psychosocial assessment; Self-discharged/left, no psychosocial	8.8

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assessment; Inpatient psychiatric care;  
 Outpatient psychiatric care; CRT; Self-harm  
 team/ED Community Psychiatric Nurse (CPN)  
 follow-up; Addiction services; Patient advised to  
 contact one of the previous services after  
 discharge; Declined aftercare; Discharge to  
 General Practitioner (GP) care; Information,  
 telephone numbers or advice given; Police  
 custody, prison or police welfare check;  
 Discharged to the care of a family member; No  
 aftercare required

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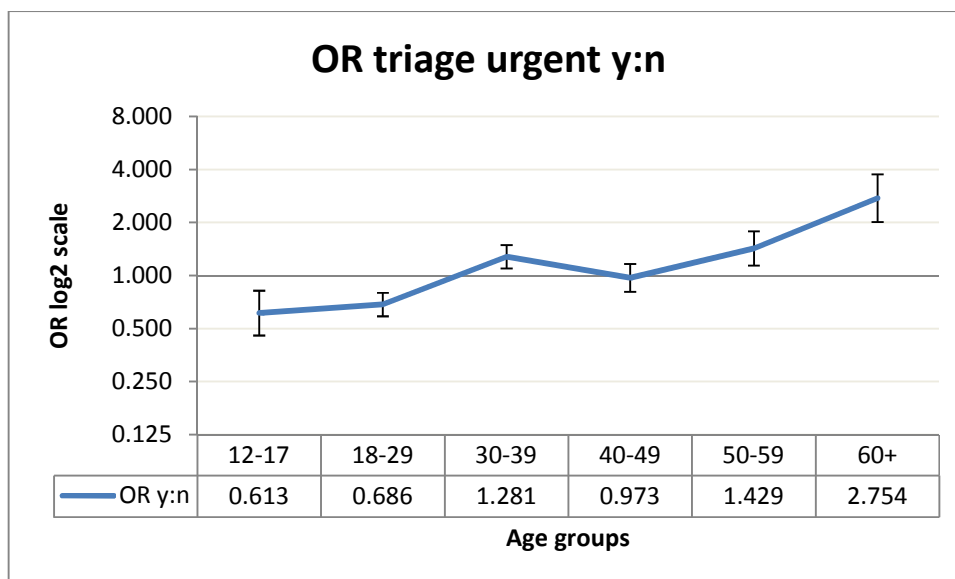
*Triage.* On arrival at the ED every person receives a triage assessment where their condition and history are briefly assessed and the maximum waiting time for treatment is decided. In order to analyse the triage data I classed any waiting time of 10 minutes or less as urgent. Table 19 reports the proportions classed as urgent in each age group.

Table 19. Proportions and 95% CIs for number of episodes triaged as urgent in each age group.

	n (urgent)	N total	Percentage urgent	95% CI
12-17	51	751	6.8	5.2% to 8.8%
18-29	250	3066	8.2	7.2% to 9.2%
30-39	273	2267	12.0	10.8% to 13.4%
40-49	157	1558	10.1	8.7% to 11.7%
50-59	100	732	13.7	11.4% to 16.3%
60+	54	232	23.3	18.3% to 29.1%
Whole sample	885	8606	10.3	9.7% to 10.9%

Figure 19 (p.75) illustrates the pattern of ORs across the age range for urgent triage. There is a pattern of increasing likelihood of being classified as urgent at triage with increasing age. Chi squared for trend = 55.8(1),  $p < .01$ .

Figure 19. ORs across the age groups for being classified as urgent at triage. Error bars are 95% CIs.

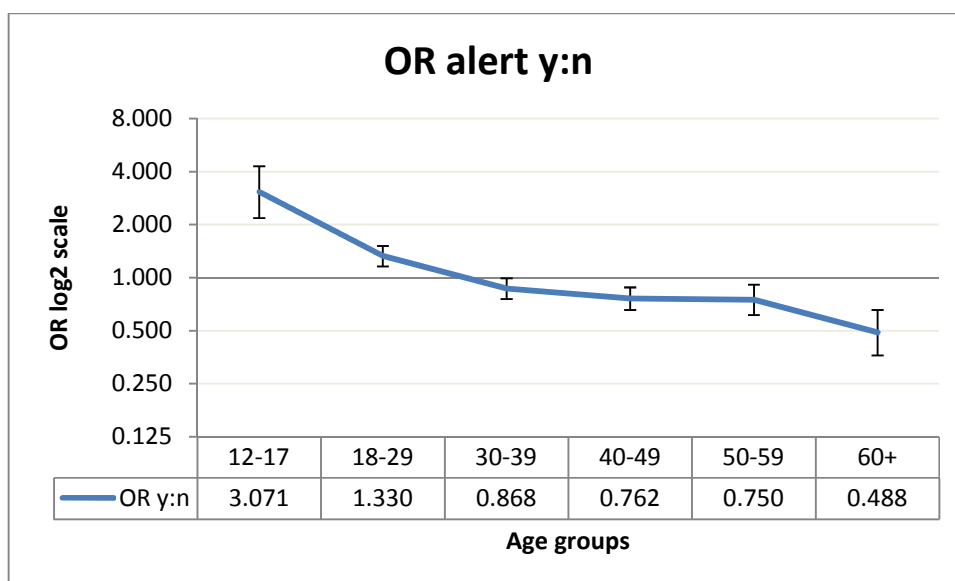


*Alertness.* The analysis for likelihood of being ‘alert’ on arrival at the ED rather than ‘mildly drowsy’, ‘very drowsy’ or ‘unconscious’ shows that with increasing age the odds of being alert reduce. Table 20 below and figure 20 (p.76) show this pattern clearly. Both this and the triage analysis indicate that increasing age is associated with increasing medical risk after self-harm.

Table 20. Proportions and 95% CIs for number of episodes in which the individual was alert at presentation to the ED.

	n (alert)	N total	Percentage alert	95% CI
12-17	910	946	96.2	94.8% to 97.2%
18-29	3551	3885	91.4	90.5% to 92.2%
30-39	2604	2933	88.8	87.6% to 89.9%
40-49	1807	2063	87.6	86.1% to 88.9%
50-59	845	970	87.1	84.9% to 89.1%
60+	246	302	81.5	76.7% to 85.4%
Whole sample	9963	11099	89.8	89.2% to 90.3%

Figure 20. ORs across the age groups for alert on arrival at ED. Error bars are 95% CIs.



*Medical treatment for self-poisoning.* The treatment received for self-poisoning was ranked according to level of intervention needed from ‘none/observation only’, through ‘basic’ to ‘significant’. There were no important differences across the age groups in the likelihood of requiring significant treatment. I therefore amalgamated ‘basic’ and ‘significant’ treatment in order to see whether any age groups were more likely to require any treatment at all for self-poisoning. This analysis showed that the 12-17 group were less likely than the other age groups to require treatment (OR = 0.72, 95% CI = 0.59 to 0.88) and the 60+ group were substantially more likely than the other age groups to require treatment (OR = 1.91, 95% CI = 1.47 to 2.47). This result confirms the greater medical severity of self-poisoning with increasing age.

I also analysed the specific types of treatment for self-poisoning which were: gastric decontamination using activated charcoal to bind drugs and prevent uptake in the stomach and intestines; ipecacuanha (ipecac) syrup to induce vomiting; gastric lavage (stomach pumping/washout); Parvolex (N-acetylcysteine) to protect the liver in paracetamol overdose; naloxone used in opiate overdose; resuscitation; and other/not specified.

Activated charcoal, Parvolex and naloxone are recommended treatments in the NICE guidelines. The guidelines state that gastric lavage should not be used unless specifically recommended by TOXBASE, the online database of the National Poisons Information Service (NPIS), or after consultation with the NPIS. Emetics such as ipecac should not be used. The proportions of individuals receiving each treatment are detailed in table 21 (p.77). The majority of episodes required no treatment. In accordance with NICE guidelines, ipecac and

gastric lavage were used so infrequently that analysis across the age groups would be meaningless.

Table 21. Proportions and 95% CIs receiving each type of treatment for self-poisoning.

	n (used)	N total	Percentage	95% CI
None/observation only	5629	7796	72.2	71.2% to 73.2%
Activated charcoal	292	7796	3.7	3.3% to 4.2%
Ipecac	1	7796	0.0	0.0% to 0.1%
Gastric lavage	3	7796	0.0	0.0% to 0.1%
Parvolex	522	7796	3.3	2.9% to 3.7%
Naloxone	202	7796	2.6	2.3% to 3.0%
Resuscitation	19	7796	0.2	0.2% to 0.4%
Other/not specified	902	7796	11.6	10.9% to 12.3%
Declined	226	7796	2.9	2.6% to 3.3%

There were no differences across the age range for likelihood of being treated with Parvolex. For activated charcoal the 18-29 group had a higher odds of receiving this treatment (OR = 1.59, 95% CI = 1.26 to 2.01) and the 40-49 group had a lower odds (OR = 0.62, 95% CI = 0.44 to 0.88).

Stratified analyses, calculating Mantel-Haenszel common ORs, indicated that these differences were not due to these groups being more or less likely to take certain types of substances in self-poisoning. I will not report all the common ORs here but, as an example of the interpretation of the analysis, it may be hypothesised that 18-29 year olds are more likely to receive charcoal simply because they take more of certain types of substances in self-poisoning for which charcoal is the recommended treatment. If it was just that 18-29 year olds took more of these substances and therefore received more charcoal as treatment, then the CIs for the common ORs would cross a value of one. In this case it would mean that this group is not disproportionately more likely than the other age groups to be given charcoal, they simply took more of the substances for which charcoal is a treatment.

Members of 18-29 age group are more likely than the other age groups to take NSAIDs, other analgesics, recreational drugs and non-ingestibles. The common ORs for this age group were: NSAIDs common OR = 1.60 (95% CI = 1.26 to 2.03); other analgesics common OR = 1.57 (95% CI = 1.24 to 1.99); recreational drugs common OR = 1.61 (95% CI = 1.28 to 2.04); and non-ingestibles common OR = 1.59 (95% CI = 1.26 to 2.01). These common ORs and their associated CIs are all above one, meaning that this group are more likely than the other age groups to be treated with charcoal regardless of the substances taken. The 40-49 group shows

the opposite pattern, all the common ORs are below one, meaning members of this group are less likely to be treated with charcoal regardless of the profile of substances they took. In other words, even after adjusting for the effect of being more likely to take certain substances the 18-29 group were more likely than the other age groups to receive charcoal and the 40-49 group were less likely than the other age groups to receive charcoal.

Based on corresponding analyses the 30-39 group were more likely to be treated with resuscitation regardless of substances taken. Similarly there was a pattern of increasing likelihood of being treated with naloxone with increasing age. The 12-17 group were less likely to receive naloxone treatment than the other groups regardless of substances taken. The 50-59 and 60+ groups were more likely to receive naloxone regardless of substances taken. This treatment is used for opiate overdose. The 50-59 and 60+ groups were more likely than other groups to receive it both when they took opiates and when they did not take opiates. This may be related to the use of naloxone as a diagnostic agent where overdose with opiates is suspected. The decreased levels of alertness in the older age groups may lead to greater suspicion of opiate involvement and greater levels of naloxone use.

A further hypothesis generated by these results was that increasing need for treatment in self-poisoning along with increasing likelihood of urgent triage and decreasing alertness may be seen with increasing age due to there being a differential effect of ingested sedatives with increasing age; put another way, perhaps sedatives have more effect on older people. Stratified analyses and Mantel-Haenszel common ORs revealed that this hypothesis was not supported; the pattern remained when the effect of having taken sedatives was controlled for. Similarly it was hypothesised that alcohol and sedatives may interact differentially in people of different ages, leading to greater effects and lower alertness in older people. Stratified analyses adjusting for both alcohol and sedatives did not support this hypothesis; older people are less likely to be alert on arrival at the ED regardless of the effect of having taken sedatives and alcohol.

*Medical treatment for self-injury.* Table 22 (p.79) reports the proportions across the whole sample who received each type of treatment for self-injury. The majority of episodes required no treatment or first aid.

Table 22. Proportions and 95% CIs receiving each type of treatment for self-injury.

	n (used)	N total	Percentage	95% CI
None/tetanus only	1192	2744	43.4	41.6% to 45.3%
First aid	879	2744	32.0	30.3% to 33.8%
Medical intervention	297	2744	10.8	9.7% to 12.0%
Specialist referral	206	2744	7.5	6.6% to 8.6%
Resuscitation	8	2744	0.3	0.1% to 0.6%
Other/not specified	107	2744	3.9	3.2% to 4.7%
Declined	55	2744	2.0	1.5% to 2.6%

There were some differences across the age range. The 12-17 group were more likely to need no treatment/tetanus injection only (OR = 1.56, 95% CI = 1.17 to 2.08) and less likely to need significant treatment (OR = 0.59, 95% CI = 0.39 to 0.90). Significant treatment was defined as any treatment more intensive than first aid. The 18-29 group showed the opposite pattern, being less likely to need no treatment (OR = 0.84, 95% CI = 0.72 to 0.99) and more likely to need significant treatment (OR = 1.39, 95% CI = 1.15 to 1.68). The 30-39 group were more likely to need significant treatment (OR = 1.34, 95% CI = 1.09 to 1.64) and less likely to need basic treatment (OR = 0.76, 95% CI = 0.63 to 0.91). The 40-49 and 50-59 groups both showed the opposite pattern being more likely to need basic treatment (ORs = 1.31 and 1.44, 95% CIs = 1.07 to 1.60 and 1.09 to 1.91, respectively) and less likely to need significant treatment (ORs = 0.66 and 0.38, 95% CIs = 0.50 to 0.86 and 0.23 to 0.61, respectively). The CIs were too wide for any differences to be convincing in the 60+ group.

These results indicate less medically serious self-injury in the 12-17 group and more medically serious self-injury in the 18-29 and 30-39 groups. The 40-49 and 50-59 groups were more likely to need basic rather than significant treatment and firm conclusions could not be drawn for the 60+ group due to their low numbers. This is an important finding since the younger working age adults are presenting with more medical risk related to their self-injury but this is not generally recognised, with children and adolescents and older adults the most likely to receive intervention (see next section).

*Declining treatment.* For self-injury episodes no patterns across the age range were apparent with regard to likelihood of declining treatment. For self-poisoning episodes the 18-29 group were more likely to decline treatment (OR = 1.43, 95% CI = 1.09 to 1.87) and the 60+ group were less likely to decline (OR = 0.13, 95% CI = 0.02 to 0.94).

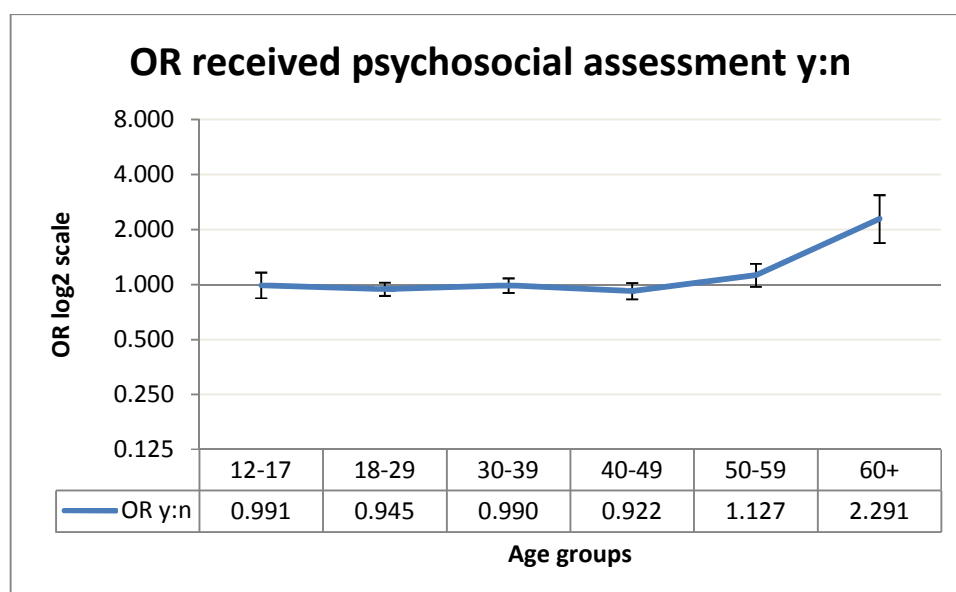
*Psychosocial assessment.* Overall 6885/10389 episodes received a psychosocial assessment (66.3%) of their risk and needs. This is comparable to rates of assessment reported

by Bennewith et al. (2004), Kapur et al. (2008) and Bergen et al. (2010). Table 23 details the proportions in each age group. No age groups were less likely than the others to receive a psychosocial assessment. The 60+ group were much more likely than the other age groups to receive an assessment (OR = 2.29, 95% CI = 1.70 to 3.10), see figure 21 below. No quality criteria were applied to the actual assessments, which could range from a brief assessment in the ED to a formal call to assess a patient who has been admitted to a medical or surgical ward. The self-harm service in Leeds did not use a structured interview or recording format, hence data about the content of the assessments was not available for analysis. The depth and detail of the assessments will have varied according to the expertise of the assessing clinician and the constraints of the setting; if a patient was asking to leave the ED, for example, this may have led to a quicker and shorter assessment.

Table 23. Proportions and 95% CIs for psychosocial assessment across the age groups.

	n (assessed)	N total	Percentage assessed	95% CI
12-17	458	693	66.1	62.5% to 69.5%
18-29	2441	3729	65.5	63.9% to 67.0%
30-39	1831	2770	66.1	64.3% to 67.8%
40-49	1294	1997	64.8	62.7% to 66.9%
50-59	627	913	68.7	65.6% to 71.6%
60+	234	287	81.5	76.6% to 85.6%
Whole sample	6885	10389	66.3	65.4% to 67.2%

Figure 21. ORs across the age groups for receiving a psychosocial assessment in the ED. Error bars are 95% CIs.





With regard to who conducted the assessment, across the whole sample this was most likely to be a Senior House Officer (SHO); next most likely was a permanent self-harm team member. The overall proportions are detailed in table 24 below. Psychosocial assessment was only recorded as completed if it was carried out by a mental health professional.

Table 24. Proportions and 95% CIs for profession/role conducting the psychosocial assessment.

	n (assessed by)	N total	Percentage	95% CI
Consultant/SpR/staff grade	232	10389	2.2	2.0% to 2.5%
Self-harm team member	2798	10389	26.9	26.1% to 27.8%
CAMHS worker	138	10389	1.3	1.1% to 1.6%
Old age liaison psychiatry nurse	18	10389	0.2	0.1% to 0.3%
Crisis Resolution Team (CRT)	213	10389	2.1	1.8% to 2.3%
Other then CRT	367	10389	3.5	3.2% to 3.9%
SHO	3049	10389	29.3	28.5% to 30.2%
Other/don't know who	70	10389	0.7	0.5% to 0.9%
Don't know if assessed	842	10389	8.1	7.6% to 8.6%
Declined assessment	355	10389	3.4	3.1% to 3.8%
Not assessed	3504	10389	33.7	32.8% to 34.6%

The 12-17 group were more likely than the other age groups to be assessed by a senior doctor (consultant/Specialist Registrar (SpR)/staff grade) (OR = 2.04, 95% CI = 1.37 to 3.04) or by a CAMHS worker (CAMHS workers would not ordinarily assess individuals in the other age groups). The 12-17 group were less likely than the other age groups to be assessed by a self-harm team member or the Crisis Resolution Team (CRT) since these are services aimed at working age adults. The 18-29 group were more likely than the other age groups to be assessed by a self-harm team member (OR = 1.15, 95% CI = 1.05 to 1.25) and less likely than the other age groups to be assessed by a senior doctor (OR = 0.65, 95% CI = 0.48 to 0.87). The 30-39 group were more likely than the other age groups to be assessed by the CRT (OR = 1.36, 95% CI = 1.02 to 1.81). The 40-49 group were less likely than other groups to be assessed by a senior doctor (OR = 0.57, 95% CI = 0.38 to 0.85). The 50-59 group were more likely than the other groups to be assessed by the CRT (OR = 1.80, 95% CI = 1.22 to 2.64). Of all the age groups, the 60+ group were by far the most likely to be assessed by a senior doctor (OR = 8.07, 95% CI = 5.60 to 11.68). The 60+ group were also more likely than the other age groups to be assessed by an SHO (OR = 1.49, 95% CI = 1.17 to 1.90) or old age liaison psychiatry nurse (these nurses would not generally assess individuals in the other age groups) and they were

correspondingly less likely than the other age groups to be assessed by a self-harm team member.

The 18-29 group were more likely to decline an assessment (OR = 1.77, 95% CI = 1.43 to 2.19), while the 40-49 and 50-59 groups were less likely to decline an assessment (ORs = 0.54 and 0.61, 95% CI = 0.39 to 0.75 and 0.39 to 0.97, respectively).

NICE guidelines state that psychosocial assessments should be carried out by staff who are appropriately trained and supervised to assess the needs and risks of people who have self-harmed. The self-harm team in particular can be assumed to meet this criterion and they are less likely to assess the youngest and oldest groups. These groups are instead more likely to be seen by a senior doctor, so it is difficult to draw conclusions about differences in the level of care received by different age groups at the point of psychosocial assessment.

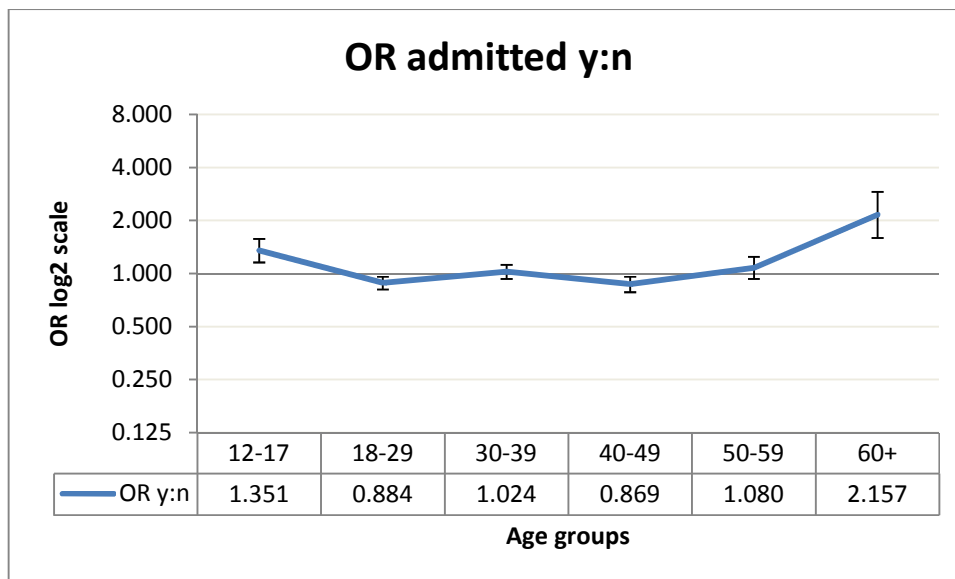
*Outcome on leaving the ED.* Table 25 presents the overall proportions of episodes resulting in each type of outcome on leaving the ED.

Table 25. Proportions and 95% CIs for outcome on leaving the ED.

	n (outcome)	N total	Percentage	95% CI
Admitted clinical decision unit	4269	11231	38.0	37.1% to 38.9%
Admitted general ward	3459	11231	30.8	30.0% to 31.7%
Admitted psychiatric care	236	11231	2.1	1.9% to 2.4%
Discharged after assessment	741	11231	6.6	6.2% to 7.1%
Discharged without assessment	869	11231	7.7	7.3% to 8.2%
Enforced removal	182	11231	1.6	1.4% to 1.9%
Self-discharged/left	1377	11231	12.3	11.7% to 12.9%
Other/not specified	57	11231	0.5	0.4% to 0.7%

Figure 22 (p.83) illustrates the pattern of admission to hospital from the ED. The 12-17 group and the 60+ group are more likely than the rest of the sample to be admitted and the 18-29 and 40-49 groups are slightly less likely to be admitted. This pattern remains the same when only admissions to the general hospital are considered, but when it comes to psychiatric admissions only the 60+ group are more likely than the other age groups to be admitted (OR = 2.15, 95% CI = 1.22 to 3.81). This pattern reflects NICE guidelines which state that children and young people who have self-harmed should normally be admitted overnight for assessment the following day and admission should be considered for people aged over 65 due to higher levels of risk associated with self-harm in this age group.

Figure 22. ORs across the age groups for admission to general or psychiatric hospital from the ED after self-harm. Error bars are 95% CIs.



For those people who were not admitted, the 12-17 group were more likely than the other groups to be discharged without a psychosocial assessment (OR = 1.38, 95% CI = 1.04 to 1.84). Lilley et al. (submitted for publication) examined the follow-up arrangements of the 12 to 16 year olds in this database and found that appropriate aftercare was arranged for 92% of this age group. The 30-39 group were less likely than the other age groups to be discharged without an assessment (OR = 0.63, 95% CI = 0.52 to 0.76) but more likely to self-discharge or leave (OR = 1.22, 95% CI = 1.05 to 1.43). The 40-49 group were more likely than the rest of the sample to be discharged without an assessment (OR = 1.27, 95% CI = 1.05 to 1.53). There were no differences across the age range for enforced removal by the police or security. Aside from their likelihood of admission, the 18-29, 50-59 and 60+ groups were no more or less likely than the other groups to have any particular type of outcome on leaving the ED.

Again it is difficult to draw conclusions about the quality of care at this point in the journey through the ED since outcomes are based on clinical need and patient choice. The higher likelihood of the 12-17 group being discharged from the ED without a psychosocial assessment is unexpected. Further analysis of the episodes where an individual aged 12-17 was discharged without assessment revealed that a far greater proportion of this subgroup than the 12-17 group as a whole had self-harmed by injury methods (64.5% in this subgroup compared to 24.3% for the whole 12-17 group). A much lower proportion of the subgroup had self-harmed by poisoning (42.1% compared to 81.1% for the whole 12-17 group). It is possible, therefore, that these episodes did not result in a psychosocial assessment due to the clinical characteristics of the episode. In particular self-cutting is less likely to result in assessment (Lilley et al., 2008) and this subgroup used self-cutting much more than the 12-17 group as a

whole (39.5% and 12.8%, respectively). Perhaps people in this age group were more likely to be discharged in line with a pre-agreed plan, an option that was not recorded in the present study.

*Aftercare arrangements.* Table 26 presents the overall proportions of episodes receiving each type of aftercare arrangement following attendance at the ED. An individual could receive more than one type of aftercare arrangement.

Table 26. Proportions and 95% CIs for aftercare arrangements at discharge.

	n (aftercare)	N total	Percentage	95% CI
Discharged from ward, no assessment	45	10324	0.4	0.3% to 0.6%
Self-discharged/left ward without assessment	795	10324	7.7	7.2% to 8.2%
Inpatient psychiatric care	663	10324	6.4	6.0% to 6.9%
Outpatient psychiatric care	3216	10324	31.2	30.3% to 32.1%
Crisis Resolution Team	604	10324	5.9	5.4% to 6.3%
Self-harm team/ED CPNs	1097	10324	10.6	10.0% to 11.2%
Addiction services	991	10324	9.6	9.0% to 10.2%
Advised to contact one of above services	240	10324	2.3	2.1% to 2.6%
Other services	1864	10324	18.1	17.3% to 18.8%
GP care	2429	10324	23.5	22.7% to 24.4%
Information, phone numbers or advice given	2516	10324	24.4	23.6% to 25.2%
Police custody, prison or police welfare check	121	10324	1.2	1.0% to 1.4%
Discharged to care of family member	121	10324	1.2	1.0% to 1.4%
No aftercare needed	155	10324	1.5	1.3% to 1.8%
Declined aftercare	438	10324	4.2	3.9% to 4.6%

Table 27 (p.85) illustrates the patterns across the age range for likelihood of being offered each type of aftercare. There were no differences across the age range for being discharged from a ward without a psychosocial assessment or for police custody, prison or police welfare check. Discharge to the care of a family member was most likely to apply to

children and young people. Stratified analyses revealed that the type of aftercare offered was not dependent on whether the person had received a psychosocial assessment.

Table 27. Patterns across the age range for likelihood of being offered each type of aftercare.

	12-17	18-29	30-39	40-49	50-59	60+
Self-discharged/left ward without assessment	-	-	=	=	=	+
Inpatient psychiatric care	-	-	=	=	=	+
Outpatient psychiatric care	+	-	=	=	+	+
Crisis Resolution Team	-	=	+	=	=	-
Self-harm team/ED CPNs	-	+	-	=	-	-
Addiction services	-	-	+	+	=	-
Advised to contact one of above services	-	=	=	=	=	=
Other services	+	=	-	-	-	-
GP care	-	+	-	=	=	-
Information, phone numbers or advice given	-	+	-	-	-	-
Discharged to care of family member	+	=	=	=	-	n.d.
No aftercare needed	=	+	-	=	=	=
Declined aftercare	-	=	=	=	=	+

+ Significantly more likely than the other age groups to have received this aftercare.

- Significantly less likely than the other age groups to have received this aftercare.

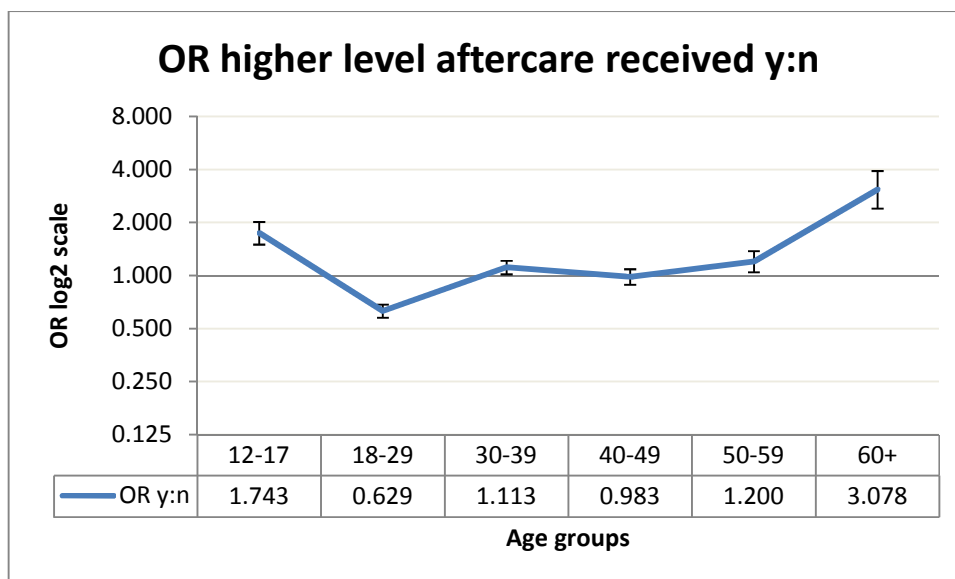
= No more or less likely than the other age groups to have received this aftercare.

n.d. No data for this age group. No individual in this age group received this aftercare.

It is difficult to draw conclusions about what is the 'best' and 'worst' aftercare since each individual should be assessed and the most appropriate aftercare to suit their needs should be offered. Some types of aftercare, however, are clearly higher- or lower-level interventions. In order to analyse the quality of aftercare provided I classified inpatient and outpatient psychiatric care as higher-level aftercare, followed by CRT, self-harm team follow-up and addiction services referral as moderate-level aftercare. I classified advice to contact a particular service, giving information, GP care and discharge from the ward without psychosocial assessment as lower-level aftercare.

Figure 23 (p.86) demonstrates the pattern of ORs across the age groups for receiving higher-level aftercare. This chart reveals the hypothesised pattern of better aftercare for children and young people and for older people, though this includes the 50-59 group as well as the 60+ group. The 18-29 group are the most likely to receive only lower-level aftercare (OR = 1.72, 95% CI = 1.56 to 1.90).

Figure 23. ORs across the age groups for receiving higher-level aftercare. Error bars are 95% CIs.



*Summary.* The analyses in this section regarding the hospital management of self-harm support the hypothesis that increasing medical severity of self-harm is associated with increasing age, as seen in the previous section. The likelihood of being triaged as an urgent case increases with age and the likelihood of being alert on arrival at the ED reduces. The youngest group were least likely and the oldest group were most likely to require physical treatment in the ED.

The hypotheses about service provision are supported in as far as there are differences apparent across the age range, but attempting to define the ‘best’ and ‘worst’ service provision is not useful since the most appropriate provision may not be the most intensive. With regard to psychosocial assessment, the oldest group were the most likely to be assessed but no group was particularly likely to have their assessment overlooked.

On leaving the ED the youngest and oldest groups are most likely to be admitted, usually to the general hospital, which could be viewed as receiving the ‘best’ level of care. This finding clearly supports the hypothesis that service provision is not closely linked to medical severity since severity increases with age and the 12-17 group carry out the least severe self-harm. The simplest measures of service provision and medical severity are probably admission to hospital and whether treatment is needed. The association between these two variables was not significant: chi squared = 0.64(1),  $p = .42$ .

The analyses of aftercare arrangements also indicate better service provision for the youngest and oldest groups in terms of greater likelihood of receiving more intensive interventions. Receiving only lower-level aftercare was not associated with whether treatment

was needed (chi squared = 1.36(1), p = .24). This result again supports the hypothesis that service provision is not closely linked to severity of self-harm.

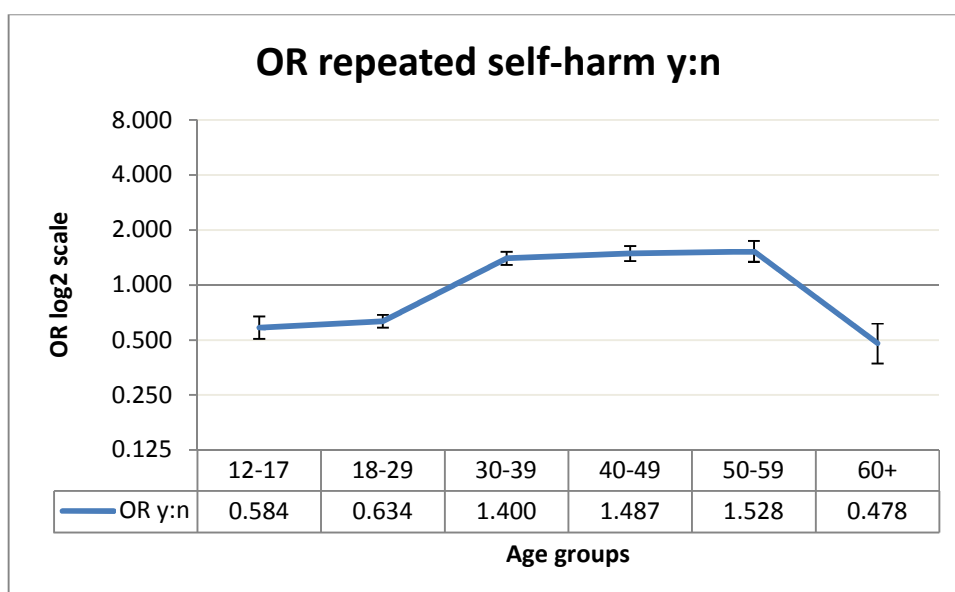
#### Section 4: Repetition of Self-Harm

This section will focus on repetition of self-harm and links to the hypothesis that rates of repetition and switching of method may differ in different age groups. Table 28 presents the proportion of people who repeated self-harm over the course of the data collection period for each age group and figure 24 illustrates the ORs across the age range. The 12-17, 18-29 and 60+ groups are less likely to repeat self-harm and the 30-39, 40-49 and 50-59 groups are more likely to repeat.

Table 28. Proportions and 95% CIs for repetition across the age groups.

	n = repeated	N total	Percentage repeated	95% CI
12-17	310	954	32.5	29.6% to 35.5%
18-29	1448	3925	36.9	35.4% to 38.4%
30-39	1497	2980	50.2	48.4% to 52.0%
40-49	1089	2089	52.1	50.0% to 54.3%
50-59	525	977	53.7	50.6% to 56.8%
60+	85	306	27.8	23.1% to 33.0%
Whole sample	4954	11231	44.1	43.2% to 45.0%

Figure 24. ORs across the age groups for repetition of self-harm. Error bars are 95% CIs.



Multiple events analysis was used to produce Kaplan-Meier survival curves. The x axis on the following charts indicates the number of days until repetition or until censorship at the end of the study for those who did not repeat. The y axis represents the proportion of the total who have not repeated, in other words the surviving proportion. The KM curve for the entire sample is illustrated in figure 25 below. From this curve it is clear that the majority of repetition occurs within the first 100 days and the rate of repetition is initially very high but reduces over time.

Figure 25. KM survival curve for the whole sample over the entire study period.

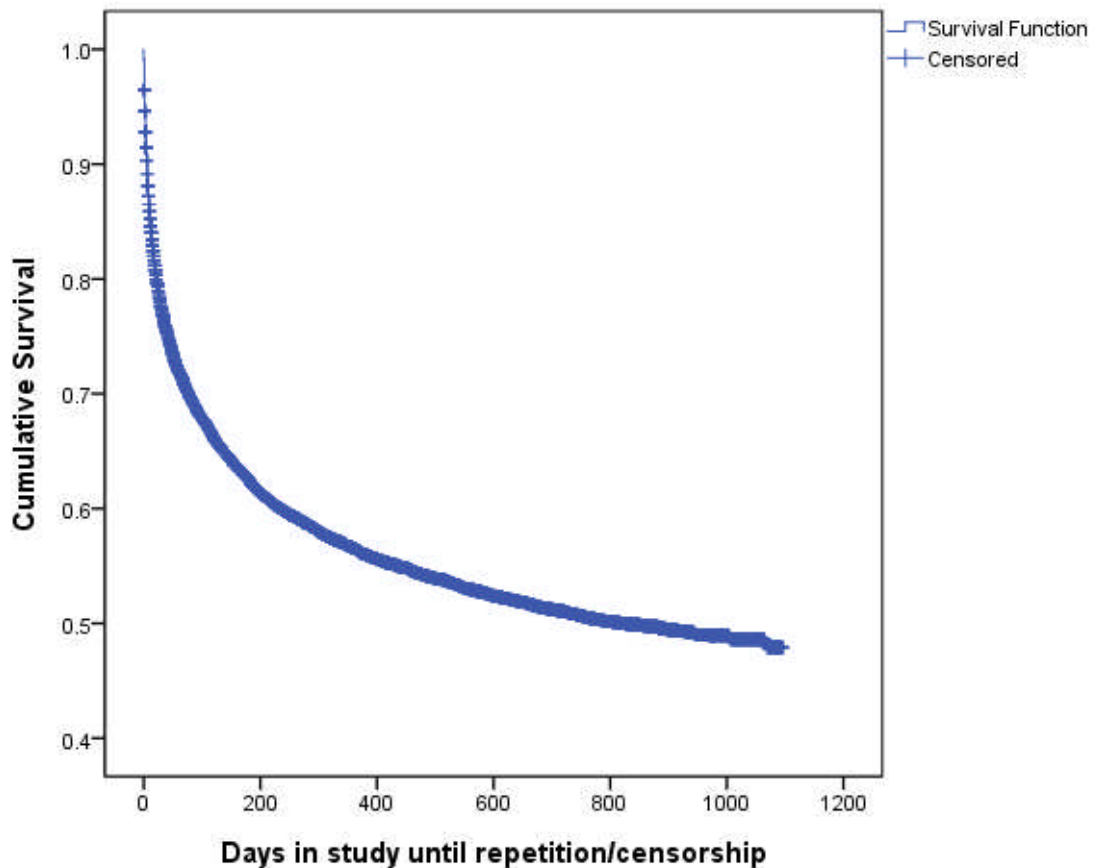


Figure 26 (p.89) illustrates the KM curves for each age group. All the curves follow the same pattern of a high initial rate of repetition which reduces from around 30 days (the curves begin to flatten out). The 30-39, 40-49 and 50-59 age groups have a higher initial rate of repetition (initial steepness of the curve) as well as a greater proportion of repeats (height of the right-hand end of the curve). The curves for these groups are essentially very similar to each other. The curve for the 18-29 group follows the same overall pattern but has a slower initial rate of repetition and lower proportion of repeats. The 60+ group has both the lowest rate of repetition and the lowest proportion of repeats, giving the shallowest curve, but again following the same pattern. The 12-17 group also has a high initial rate of repetition but rather



than gradually slowing, this rate becomes steady from around 90 days to around 900 days. This is indicated by the straight rather than arced slope. The final proportion of repeats for this group is close to the 18-29 group. The relations between the groups and patterns in the rates and proportions of repetition are evident within the first few days after presentation, as shown in figure 27 (p.90).

Figure 26. KM survival curves for each age group over the entire study period.

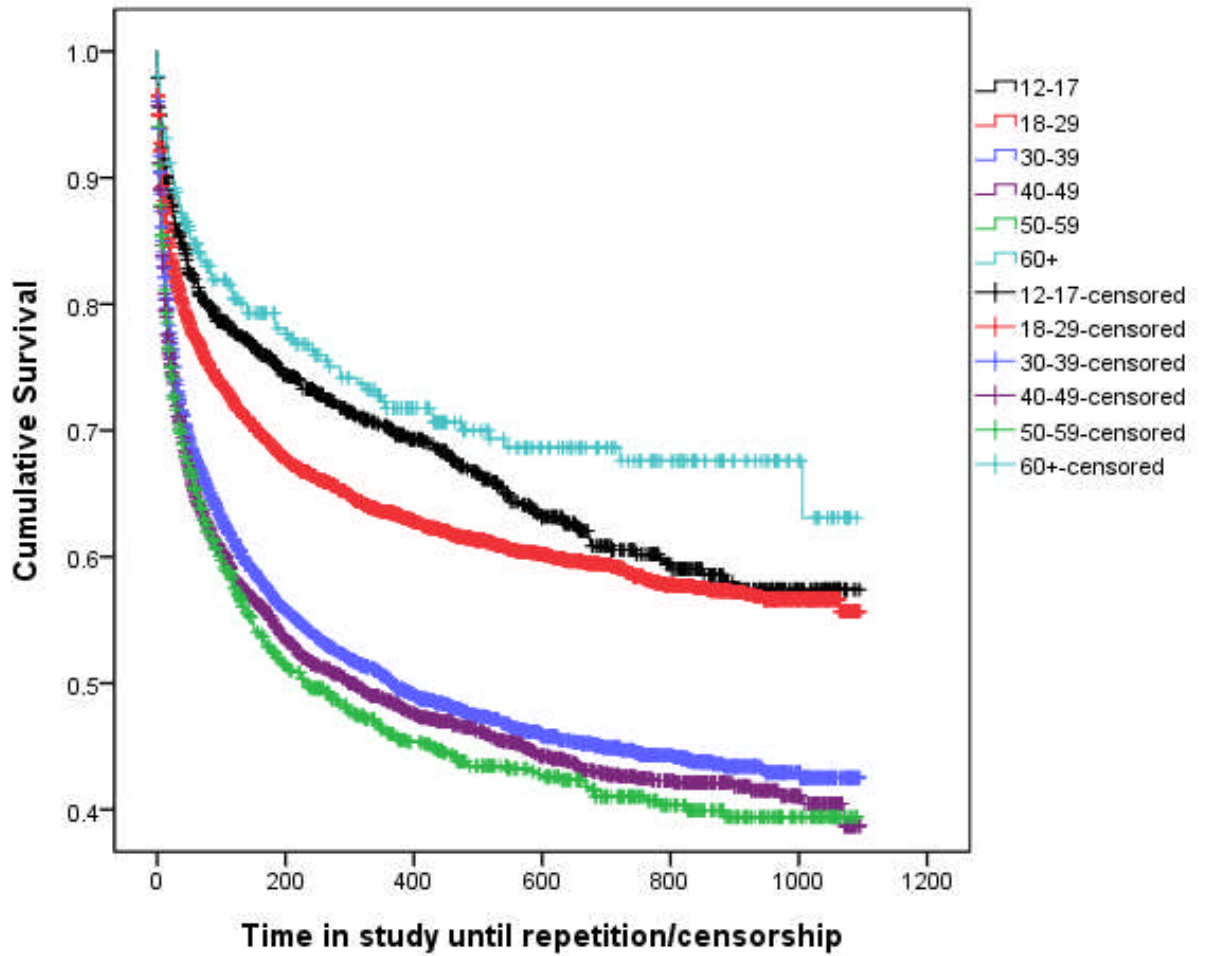
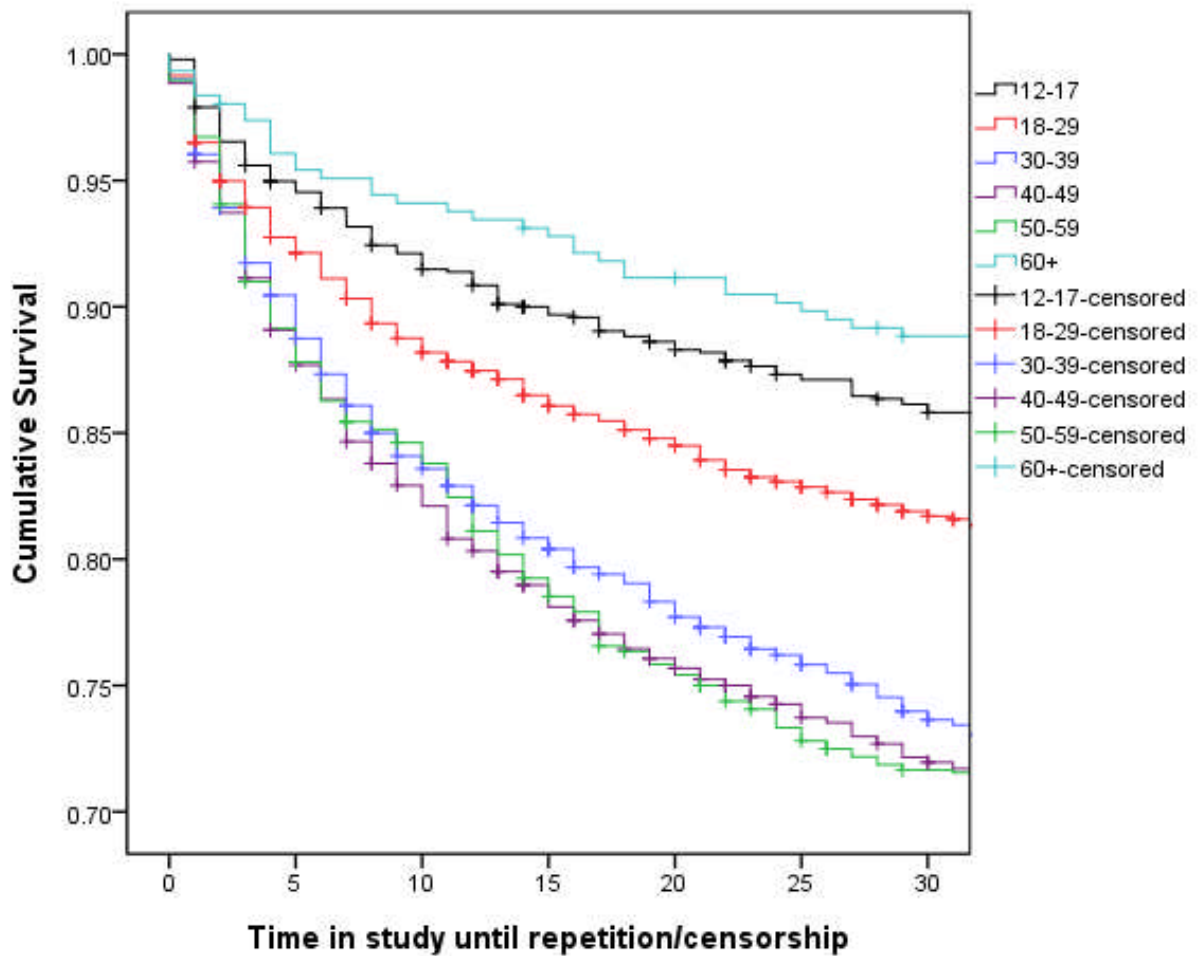


Figure 27. Thirty day KM survival curves for each age group.



Cox regression (proportional hazards regression analysis) was conducted to determine whether the age groups were significantly different from each other in their rates of repetition. Table 29 (p.91) details the results of this analysis. Positive values for the B coefficient indicate that the comparison group has a greater risk of repeating than the reference group. Negative B values indicate lesser risk in the comparison group than the reference group.  $\text{Exp}(B)$  refers to the exponential of the B coefficient. This provides the hazard ratio which gives the amount of increase or decrease in risk for the comparison group against the reference group. As an example the 18-29 group in comparison to the 12-17 group has a value for  $\text{exp}(B)$  of 1.177 with a 95% CI of 1.041 to 1.331. This is an increase in risk of repetition of 17.7% for the 18-29 group over the 12-17 group, with a 95% CI of 4.1% to 33.1%.

Table 29. Results of Cox regression for repetition according to six age groups.

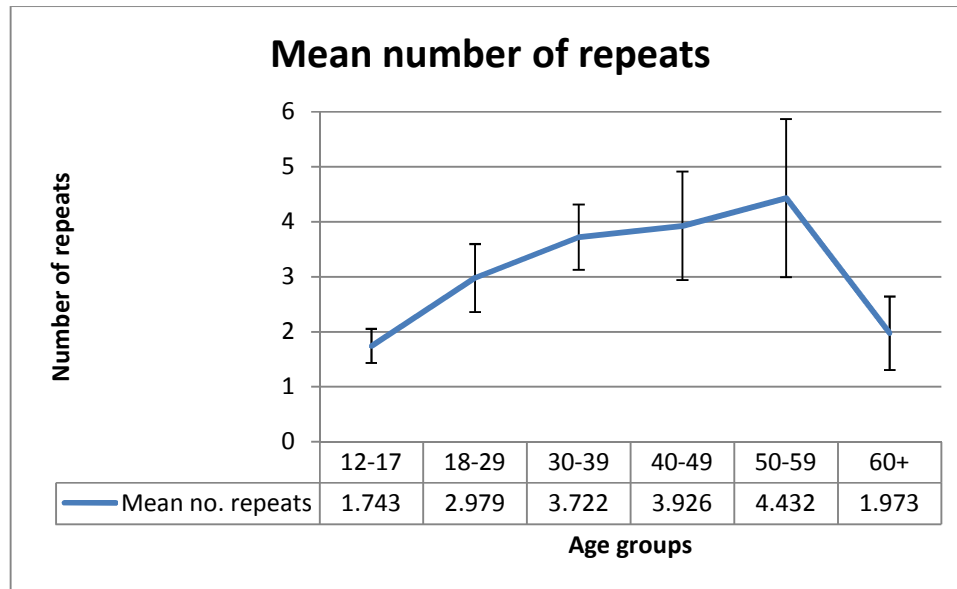
Reference group	Comparison group	B	p	Exp(B)	95% CI for exp(B)
12-17	18-29	0.163	< .01	1.177	1.041 to 1.331
	30-39	0.571	< .01	1.771	1.567 to 2.001
	40-49	0.634	< .01	1.885	1.661 to 2.138
	50-59	0.674	< .01	1.962	1.705 to 2.258
	60+	-0.195	.11	0.822	0.647 to 1.045
18-29	30-39	0.408	< .01	1.504	1.399 to 1.617
	40-49	0.470	< .01	1.601	1.480 to 1.732
	50-59	0.511	< .01	1.667	1.508 to 1.842
	60+	-0.359	< .01	0.699	0.561 to 0.869
30-39	40-49	0.062	.12	1.064	0.984 to 1.151
	50-59	0.103	.04	1.108	1.003 to 1.224
	60+	-0.767	< .01	0.464	0.373 to 0.578
40-49	50-59	0.040	.45	1.041	0.938 to 1.155
	60+	-0.829	< .01	0.436	0.350 to 0.544
50-59	60+	-0.870	< .01	0.419	0.333 to 0.527

These results show the same patterns as the KM curves above, but also provide a numerical value and level of statistical significance for differences between the curves for each age group. The 12-17 group are significantly less likely to repeat than the 18-29, 30-39, 40-49 and 50-59 groups and not significantly different from the 60+ group. The 18-29 group are significantly more likely to repeat than the 12-17 and 60+ groups, and significantly less likely to repeat than the 30-39, 40-49 and 50-59 groups. The 30-39 group are significantly more likely to repeat than the 12-17, 18-29 and 60+ groups, significantly less likely to repeat than the 50-59 group and not significantly different from the 40-49 group. The 40-49 group are significantly more likely to repeat than the 12-17, 18-29 and 60+ groups and not significantly different from the 30-39 and 50-59 groups. The 50-59 group are significantly more likely to repeat than the 12-17, 18-29, 30-39 and 60+ groups and not significantly different from the 40-49 group. The 60+ group are not significantly different from the 12-17 group and are significantly less likely to repeat than all the other groups. The groups can be ordered from least to most likely to repeat as follows: 60+, 12-17, 18-29, 30-39, 40-49, 50-59.

*Number of repetitions.* People who did not repeat were excluded from analyses of number of repetitions. These analyses were conducted based on people rather than episodes. The mean number of repetitions across the whole sample was 3.31 (standard deviation [SD] =

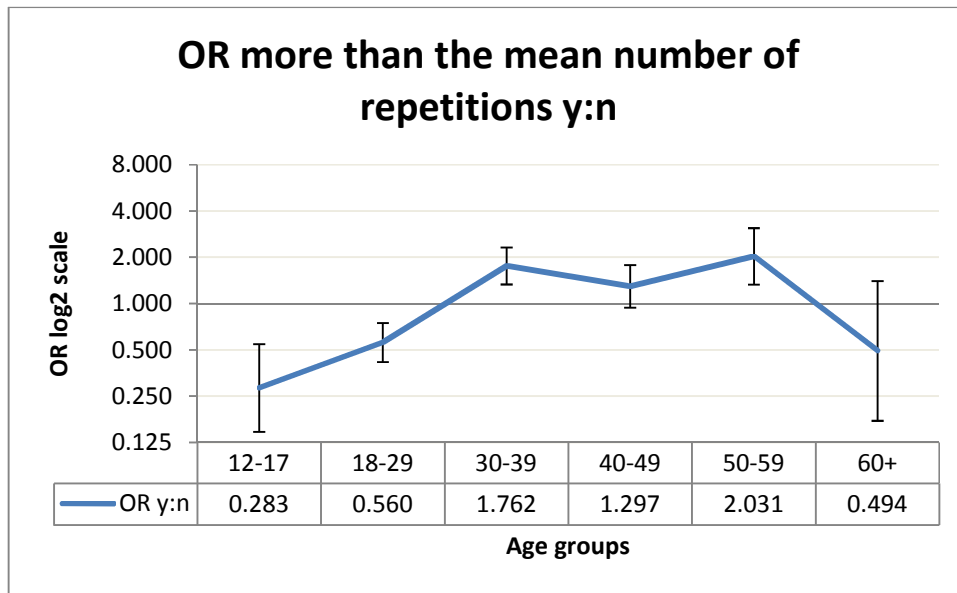
6.70, range = 1 to 123). Figure 28 shows the pattern of mean number of repeats across the age range. One-way ANOVA between each age group and the rest of the sample showed a significant difference for the 12-17 group ( $F = 8.8(1)$ ,  $p < .01$ ). The other age groups were not significantly different from the rest of the sample in terms of number of repeats.

Figure 28. Mean number of repetitions according to age group. Errors bars are SDs.



*Multiple repetitions.* Further analysis of the number of repeats divided according to whether individuals repeated less than four times or four or more times (more than the mean number of repetitions) is illustrated in figure 29 (p.93). Despite the lack of difference for all but the 12-17 group in mean number of repeats, this analysis revealed that both the 12-17 and 18-29 groups were less likely than the other age groups to repeat four or more times. The 30-39 and 50-59 groups were more likely to repeat four or more times.

Figure 29. ORs across the age groups for greater than mean number of repetitions. Error bars are 95% CIs.



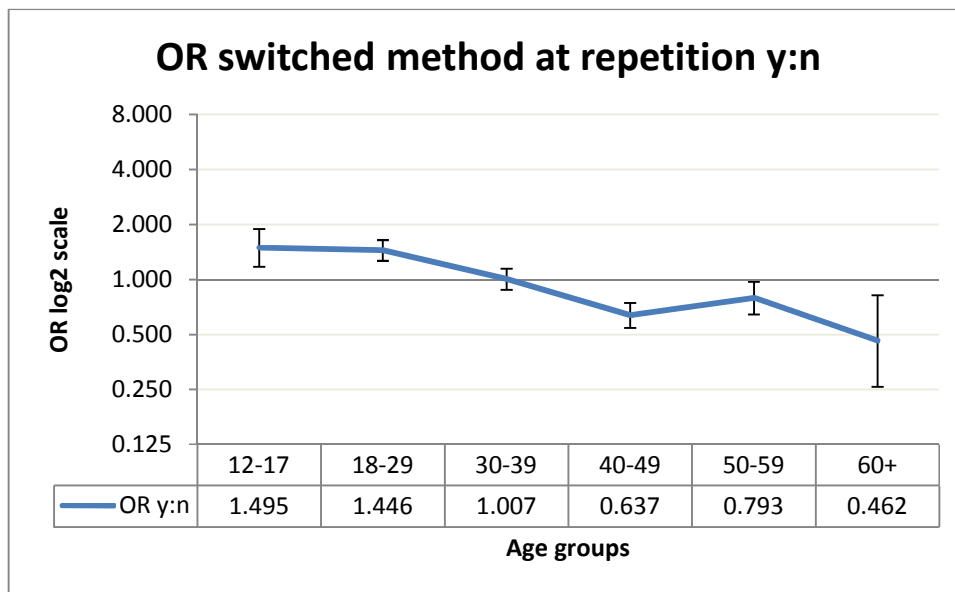
*Switching method.* Management and care decisions should not be based on the method of self-harm used in an individual episode since switching of methods at repetition is common (Lilley et al., 2008; Fortune, 2006). The overall proportion of the sample who switched methods at repetition was 29.7% (1471/4954). Table 30 details the proportions switching method at repetition in each age group.

Table 30. Proportions and 95% CIs for switching of method at repetition across the age groups.

	n (switched)	N total	Percentage switched	95% CI
12-17	118	310	38.1	32.8% to 43.6%
18-29	511	1448	35.3	32.9% to 37.8%
30-39	446	1497	29.8	27.5% to 32.2%
40-49	248	1089	22.8	20.4% to 25.4%
50-59	134	525	25.5	22.0% to 29.4%
60+	14	85	16.5	10.1% to 25.8%
Whole sample	1471	4954	29.7	28.4% to 31.0%

The 12-17 and 18-29 groups were more likely to use a different method at repetition. The 40-49, 50-59 and 60+ groups were less likely to do so. Figure 30 (p.94) illustrates the decline in likelihood of switching method with increasing age; chi squared for trend = 59.1(1),  $p < .01$ .

Figure 30. ORs across the age groups for switching of method at repetition. Error bars are 95% CIs.



*Summary.* Repetition of self-harm occurs frequently and often very soon after the initial attendance at the ED. Characteristics of repetition differ across the age range. The two younger age groups are less likely to repeat, they repeat at a slower rate, they are less likely to repeat multiple times and more likely to switch method at repetition. The older working age adult groups (ages 30-59) are more likely to repeat, have a higher rate of repetition and are generally more likely to repeat multiple times and less likely to switch method at repetition. The 60+ group have the lowest frequency and rates of repetition, do not differ from the other age groups in terms of number of repeats and are less likely to switch method. These findings point towards lower risk for the two younger age groups and greater risk for the older working age adult groups who undertake more repetition and repeat more quickly. The lowest risk of repetition being in the oldest group is a somewhat unexpected result since previous analyses indicate this group tends to conduct more serious self-harm, so might be expected to be more likely to repeat. However, previous analyses also indicate that this group and the youngest group receive 'better' service provision and it is possible that this provision has a positive impact in reducing repetition rates in these groups.

## CHAPTER 4: DISCUSSION

### *Summary of Results and Discussion in the Context of the Wider Literature*

*Rates of self-harm.* Estimated population rates for incidences of self-harm presenting to the ED ranged from 50 per 100,000 per year in the age group with the lowest rate (the 60+ group) to 480 per 100,000 per year in the group with the highest rate (the 18-29 group). The estimated rate of self-harm in the whole sample was 275 per 100,000 per year. This overall rate is somewhat lower than the rates reported for Leeds in 2000-2001 (Hawton et al., 2007) of 291 per 100,000 for males and 374 per 100,000 for females. It is likely that the method of estimating the Leeds population in the present study provided a slight underestimate of self-harm rates. The present study covers self-harm attendances between 2004 and 2007. Bergen et al. (2010) reported a 14% decrease in self-harm rates over the period between 2000 and 2007; Leeds was not included so a direct comparison cannot be made. A similar level of decrease (17%) is seen in Leeds if 2000-2001 and 2004-2007 data are compared. Both published literature and the present study describe a decrease in rates of self-harm leading to attendance at hospital between 2000 and 2007.

Rates of self-harm differed across the age groups and by gender. For females the highest rate was in the 12-17 group and rates decreased with increasing age. For males there was a sharp increase in rates from a fairly low rate in the 12-17 group to a peak in the 30-39 group, followed by decreasing rates with increasing age from 40 onwards (see figure 4, p.53). These results are in keeping with Hawton et al. (2007).

*Information about the person.* The gender ratio in self-harm attendances at the ED varies markedly across the age range (see figure 5, p.54). The 12-17 group has a greater proportion of females and the 30-39 group has a greater proportion of males. This finding is comparable to that of Hawton and Harriss (2008), though there are some differences, which may be accounted for by differences in analysis methods such as use of only the first (index) episodes as opposed to the present study's use of all ED attendances for self-harm.

Previous and recent self-harm history, previous mental health history and current mental health service contact all followed the same pattern of being less likely in the two younger age groups (12-17 and 18-29) and more likely in the other working age adult groups (30-39, 40-49 and 50-59). A pattern of increasing likelihood with increasing age could be expected for each of these variables since older people have more years of life in which to have had such experiences. An unexpected result was found for the 60+ group, however, in that they were less likely to have self-harmed previously or recently, less likely to have previous mental health contact, and they seemed less likely to be in current contact with

mental health services (see figures 6, 7 and 8, pp.56-58). This result indicates that there is something different about many people aged over 60 who attend the ED after self-harm. They do not have an established pattern of using self-harm in response to overwhelming emotion and have not been in contact with mental health services, but have for some reason been pushed to use self-harm for the first time in later life.

Hawton and Harriss (2006; 2007) reported proportions of young people (aged 15-24) and older people (aged 60+) with previous self-harm, and previous and current mental health contact. Table 31 compares Hawton and Harriss’s results with those from the present study. Proportions were calculated for a 15-24 years group in the present study in order to allow direct comparison.

Table 31. Comparison of proportions with certain characteristics between the present study and those of Hawton and Harriss (2006; 2007).

		Proportions with each characteristic		
		Previous self-harm	Previous mental health history	Current mental health contact
15-24 group	Hawton and Harriss (2007)	26.3%	22.2%	9.4%
	Present study: all episodes	74.0%	71.3%	38.3%
	index episodes only	59.0%	46.1%	24.4%
60+ group	Hawton and Harriss (2006)	23.7%	41.3%	15.3%
	Present study: all episodes	71.5%	73.3%	47.0%
	index episodes only	58.9%	53.8%	35.3%

The striking difference in proportions between the present study and those of Hawton and Harriss is in part due to the fact that those authors based their analysis on a cohort of individuals rather than on the actual episodes of self-harm presenting at the ED, as in the present study. Each person in Hawton and Harriss’s studies was entered into the study at their first ED attendance for self-harm during the study period (index episode) and this was the only time that their self-harm and mental health history was counted. Any further attendances by that person were marked as repetitions and their history was not counted again. Conversely, in the present study the details of each individual were taken and their history was counted at each attendance. Hawton and Harriss’s results therefore indicate only the proportion of people who were attending the ED for self-harm for the first time in the study period who had a self-harm or mental health history. This is an arbitrary proportion (based on the arbitrary



start date of the study), which is not wholly representative of the clinical situation. The results of the present study indicate the proportion of all people attending the ED for self-harm who had a self-harm or mental health history. This may be more clinically useful because it represents more closely the true picture of self-harm as seen in the ED.

The differences between Hawton and Harriss's (2006; 2007) studies and the present study do not result entirely from the analysis of individuals rather than episodes. This is demonstrated by analysis of index episodes in the present study, detailed in table 31 (p.96). The timing and location of the studies may also be a factor; Hawton and Harriss's data were collected in Oxford between 1978 and 1997 whereas the data in the present study were collected in Leeds between 2004 and 2007. Furthermore, Hawton and Harriss report that, despite identifying all self-harm attendances, information about previous self-harm and mental health contact was not collected unless the individual was assessed by the hospital psychiatric service. This may lead to bias in their results if, for example, people who were not assessed were more likely to have self-harmed before. In the present study this information was collected regardless of whether or not the person was assessed. Missing data were excluded from my analysis; if the missing data were biased towards no previous self-harm and no previous or current mental health contact this would have inflated the proportions found in the present study. Another possible factor is that the Oxford definition of 'previous psychiatric treatment' would not include 'mental health problem', which was included in the present study.

Hawton and Harriss (2006; 2007) did not compare proportions across the age groups to see whether any group was more or less likely than the others to have certain individual characteristics, therefore direct comparison with their results is not useful. This discussion does, however, illustrate one of the problems with the literature relating to self-harm, which is that meaningful comparison and integration of studies is very difficult. This further validates the utility of conducting the present analysis of self-harm across the age range, since this has not previously been carried out with a single large dataset; integration of the findings with published work is not, however, consistently feasible. Information about self-harm and mental health history has not previously been reported for a single dataset across the age range, hence the results from this part of the present study add to the existing literature.

*Information about the episode of self-harm.* The general hypothesis, that characteristics of self-harm would differ in different age groups, was strongly supported by analyses of the features of episodes of self-harm. The relative proportions of people using each method of self-harm differed in different age groups, as hypothesised. The 12-17, 50-59 and 60+ groups were more likely than the other groups to self-harm by poisoning; the 18-29

group were more likely than the other groups to use self-injury. Hawton et al. (2007), Marriott et al. (2003), Hawton and Harriss (2006) and Hawton et al. (2003) reported proportions over the entire age range or for just a single age group. The proportions found in the present study were comparable and provide, for the first time, a comparison of the methods used by people in different age groups.

The hypothesis that working-age adults and older adults would conduct more medically serious self-harm was supported by increasing likelihood with increasing age of arriving at the ED by ambulance; taking four or more drugs in self-poisoning; cutting multiple sites; and using violent 'suicide attempt' types of method. These results are in keeping with Hjelmeland and Groholt's (2005) finding that adults conducted acts of self-harm that were more medically serious and therefore support the existing literature.

The hypothesis that self-harm by injury methods other than cutting would increase with increasing age, as seen in Lilley et al. (2008), was also supported, with the finding of increasing likelihood of use of such methods with increasing age. Such injury methods tend to be more medically serious than cutting, again supporting the hypothesis of increasing severity of self-harm with increasing age and supporting the existing literature.

Alcohol use around the time of self-harm was less likely in the two younger age groups (12-17 and 18-29) and more likely in 30 to 59 year olds. Alcohol decreases inhibition of behaviour and increases impulsivity. For young people, impulsivity is thought to be a factor in the precipitation of self-harm episodes. The increased likelihood of use of alcohol in groups who are likely to be less impulsive supports the idea that episodes of self-harm may be triggered impulsively when alcohol has lowered a person's inhibitions and affected their cognitive abilities. Alcohol use in self-harm according to age has not previously been reported, hence this finding adds to the existing literature.

*Information about the hospital management of self-harm.* The analyses related to triage and alertness link back to features of the episode of self-harm. Self-harm episodes that are medically more severe are more likely to be triaged as urgent and the person is less likely to be alert. Again the hypothesis of increasing medical severity with increasing age is supported; there is a clear linear trend with increasing age for increasing likelihood of being triaged as urgent and decreasing likelihood of being alert on arrival at the ED. Information about triage and alertness in self-harm attendances at the ED has not previously been reported across the age range.

Further information about medical severity is provided by the analyses relating to the treatment required for self-harm. In self-poisoning episodes the youngest group were least

likely and the oldest group were most likely to require treatment. In self-injury episodes the youngest group were again least likely to require treatment. The younger adult groups (18-29 and 30-39) appear to conduct the most severe self-injury as they were most likely to require significant treatment for self-injury. These results suggest that the youngest group conduct the least medically severe self-harm overall while the oldest group conduct the most severe self-poisoning. Increasing severity with increasing age appears to hold true for self-poisoning but possibly not for self-injury. Treatment for self-harm according to age has not been reported previously, hence these results add to the existing literature as well as supporting the literature on the relation between age and severity of self-harm.

The overall proportion of episodes where a psychosocial assessment was conducted was comparable to proportions reported by Bennewith et al. (2004), Kapur et al. (2008) and Bergen et al. (2010). For young people aged 12 to 16 Lilley et al. (submitted for publication) found that 76% received an assessment, compared to 66.1% in the 12-17 group in the present study. The inclusion of 17 year olds, an age that is at the boundary between child and adult services, in the youngest age band may explain this difference, since some of these young people are likely to be streamed towards receiving standard care through adult services rather than the specialist care of child services. Marriott et al. (2003) found that 67% of people aged 55 to 64 and 95% of those aged 65 and over received an assessment. The result of the present study is in keeping with this at 81.5% for people aged 60 and over. The findings relating to psychosocial assessment generally support the existing literature, but in the present study the 60+ group were more likely than the other groups to receive an assessment, while no age group was more likely to have their assessment overlooked. This is rather surprising, when we might expect the youngest group to be the most likely to be assessed.

There were differences across the age range in terms of the discipline of the mental health professionals carrying out the assessments. It is difficult to quantify these in terms of being 'better' or 'worse' service provision, especially as Russell and Owens (2010) and Murphy et al. (2011) have reported no differences in outcome based on who conducted the assessment, and no measure of quality was applied to the assessments. The youngest and the oldest groups, however, are particularly likely to receive specialist attention and are the most likely to be admitted - in accordance with NICE guidelines (NICE, 2004) and the existing literature. Whether or not an assessment was conducted was not clearly associated with the aftercare arrangements made; this is a new finding not previously reported in the literature.

The 60+ group were the least likely to decline treatment overall and the 18-29 group were more likely than the other groups to decline both psychosocial assessment and treatment for self-poisoning. The 40-49 and 50-59 groups were least likely to decline

psychosocial assessment. Self-discharge from the ED was most likely in the 30-39 group. Self-discharge after admission to the general hospital was most likely in the 60+ group; this may be due to the greater overall likelihood of being admitted in this group. Rates of self-discharge between 7% and 39% have been reported (Crowder et al., 2004; Marriott et al., 2003; Lilley et al., 2008; Bennewith et al., 2005); the overall rates in the present study are comparable at 12.3% from the ED and 7.7% following admission to a ward, supporting the existing literature.

Aftercare arrangements were more likely to be 'higher-level' (inpatient or outpatient psychiatric care) for the youngest and the oldest groups, perhaps related to the seniority and specialist knowledge of the staff who carried out their assessment. The 18-29 age band, one of the groups most likely to require significant treatment for self-injury, were most likely to receive only 'lower-level' aftercare (such as provision of information, advice to contact a service or GP care). Whether treatment was needed or not was not associated with admission to hospital or receipt of only lower-level aftercare. The hypotheses that service provision differs across the age range and that the 'best' and 'worst' service provision are not closely linked to severity of self-harm are clearly supported by the results. The youngest group do appear to receive 'better' service and the working age adults receive the 'worst' service, as hypothesised. The service received by the oldest group appears to be the 'best' in terms of assessment, admission and aftercare arrangements. These are new findings which add to the existing literature.

*Repetition of self-harm.* The oldest group were least likely to repeat and had the slowest rate of repetition. The three older working age adult groups (30-39, 40-49 and 50-59) were the most likely to repeat and had the highest rates of repetition. As a corollary, the two youngest groups (12-17 and 18-29) lay somewhere between the working age and older adults in terms of repetition rates and likelihood of repetition. These results suggest greater risk with increasing age in children, adolescents and working age adults, but again there is something striking about the oldest group: they conduct the most medically severe self-harm, yet they are the least likely to repeat. This may be testament to the level and quality of care provided by older people's services; we saw above that they were the most likely to be assessed and that their assessment was likely to be conducted by experienced staff. This analysis of repetition across the age range provides new information and adds to the existing literature. For those who did repeat self-harm, switching of methods was common, as reported by Lilley et al. (2008) and Fortune (2006). The proportion of people switching method at repetition declined with increasing age.

### *Characteristics of Self-harm and Service Provision in Each Age Group*

This section briefly summarises each age group in terms of the characteristics that differentiate that group from the rest of the sample.

**12-17.** Of the whole sample, the children and adolescents group had the highest rate of self-harm for females and the highest proportion of females. This youngest group was less likely than the rest of the sample to have a history of self-harm or to have previous or current contact with mental health services. Several features point to lower severity of self-harm in this group. In comparison to the rest of the sample they were less likely to arrive by ambulance and more likely to arrive by car; less likely to take four or more substances in self-poisoning; less likely to use more violent methods of self-injury; more likely to be alert on arrival at the ED; less likely to be classified as urgent at triage; and less likely to need any medical treatment.

The level of service provision in the 12-17 group did not appear to reflect the lower severity of self-harm. This group was more likely than the rest of the sample to be assessed by a senior doctor or specialist worker, to be admitted to hospital, and to receive higher-level aftercare. The high quality of service provision in this age group is likely to be implicated in the finding that this group is less likely to repeat self-harm, with those who do repeat doing so significantly fewer times than those in the other age groups.

**18-29.** In comparison to the rest of the sample, the people in the youngest of the working age adults groups were less likely to have self-harmed before, or to have previous or current mental health service contact. They were more likely than the rest of the sample to use self-injury, particularly cutting, and less likely to cut more than one site or take four or more substances in self-poisoning. Similarly to the 12-17 group, the 18-29 group was more likely than the rest of the sample to be alert on arrival and less likely to be triaged as urgent. This group was more likely than the rest of the sample to receive standard treatment with activated charcoal, even after adjusting for the types of substances taken in self-poisoning. In self-injury episodes this group was more likely than the rest of the sample to require significant treatment, indicating greater medical severity of self-injury in this group.

The 18-29 group appeared to receive a particularly low standard of service provision, being less likely than the rest of the sample to be assessed by a senior doctor, less likely to be admitted and more likely to receive only lower-level aftercare. Repetition rates in the 18-29 group fell between those of the groups with the lowest rates (12-17 and 60+) and the groups with the highest rates (30-39, 40-49 and 50-59).

**30-39.** This group had the highest rate of self-harm for males and the highest proportion of males. Previous self-harm history and previous and current mental health

contact were more likely in this group when compared to rest of the sample. There were some indicators of increased severity of self-harm in this group - they were more likely than the rest of the sample to take four or more substances in self-poisoning; to use a self-injury method other than cutting; to be triaged as urgent; and to need significant treatment for self-injury.

The 30-39 group were more likely than the rest of the sample to be assessed by the Crisis Resolution Team, possibly indicating a greater level of psychosocial complexity at this stage in people's lives. Service provision and aftercare were comparable to the rest of the sample. This group, along with the two other older working age adult groups (40-49 and 50-59), had high rates of repetition.

**40-49.** This group was more likely than the rest of the sample to have self-harmed before, and to have previous and current mental health contact. They were also more likely than the rest of the sample to arrive at the ED by ambulance and less likely to arrive by car. This was the group most likely to have used alcohol around the time of self-harm. The 40-49 group was more likely to be triaged as urgent and less likely to be alert, when compared to the rest of the sample. On the other hand, they were less likely to be assessed by a specialist than were the rest of the sample. Service provision in terms of admission and aftercare reflected that of the sample as a whole. Like the 30-39 and 50-59 groups, repetition rates in the 40-49 group were high.

**50-59.** Compared to the rest of the sample, previous self-harm, previous mental health contact and current mental health contact were all more likely in this group. This older working age adult group was more likely to self-harm by poisoning than were the rest of the sample. Use of violent self-injury methods was more likely than among the rest of the sample, as was cutting more than one body-site. Both these findings indicate greater severity of self-injury in this group, and classification as urgent at triage was more likely and alertness on arrival less likely than in the rest of the sample. Assessment by the Crisis Resolution Team and higher-level aftercare were more likely in this group and they had the highest rate of repetition and mean number of repeats.

**60+.** The oldest group had the lowest rates of self-harm and was less likely than the rest of the sample to have self-harmed before or to have a mental health history. Across the whole sample they were the most likely to arrive by ambulance, least likely to arrive by car, most likely to self-harm by poisoning, and most likely to use violent self-injury methods: these characteristics all point towards greater severity of self-harm. Further such indications are evident in the findings that this group is also the most likely to be classified as urgent at triage, the least likely to be alert on arrival, and the most likely to need treatment for self-poisoning.

The 60+ group appears to receive the best service provision. This group is the most likely to receive a psychosocial assessment, by far the most likely to be assessed by a senior or specialist worker, the most likely to be admitted, and the most likely to receive higher-level aftercare. Such a high level of service provision might go some way to explain why they are the least likely to repeat

*Patterns and change points.* Increasing severity of self-harm with increasing age is indicated by the linear trends seen with increasing age in several characteristics of self-harm: showing lack of alertness on arrival; arriving at the ED by ambulance; taking four or more substances in self-poisoning; using violent self-injury methods; cutting more than one body-site; and being classified as urgent at triage.

The older working age adult groups (30-39, 40-49 and 50-59) appear to be rather similar to each other in terms of their characteristics of self-harm, the service provision they receive and their repetition of self-harm. The child and adolescent (12-17) and older adult (60+) groups each appear to be quite different from the older working age adults in many respects. The characteristics of the 18-29 group tend to lie somewhere between those of the 12-17 and the 30-39 groups. It seems that there is generally a linear shift in the characteristics of self-harm from a child and adolescent profile (higher rates in females, lower severity, lower proportions with a self-harm or mental health history, lower repetition), through a young working age adult profile (increasing proportions with history, increasing severity - particularly for injury methods, increasing repetition) to an older working age adult profile (higher proportions with history, higher severity, higher repetition). This linear trend continues to the oldest age group for characteristics indicative of severity, but not for a history of self-harm or mental health care or for repetition (the oldest group has lower proportions with a history - similar to the 12-17 group - and the lowest rates of repetition).

Each age group includes people who have self-harmed for the first time. The youngest group will have a great many of these people since self-harm is very rare before adolescence. As these young people grow older, a proportion will not repeat. Some, however, will go on to develop a pattern of using self-harm behaviour repeatedly throughout their lives, and some may return to occasional use of self-harm under extreme stress. The adult age groups therefore consist of a greater proportion of people for whom self-harm is an enduring pattern of behaviour. It appears that the working age adults in the present study could be considered to be essentially a 'grown up' version of the youngest group.

A clear shift in pattern occurs around age 60 and it appears that the older people undertaking self-harm in this study population are different from the working age adults in characteristics other than age. People in the oldest age group are less likely to be those for

whom self-harm is an established coping strategy; they are not a 'grown up' version of the working age adults. This supports the idea that various life stages and challenges may be associated with different reasons for self-harm and different profiles of the characteristics of self-harm in different age groups.

This difference between the working age and older adult groups may be due to cohort effects. People in the 60+ group were born before the 1950s, and brought up by people who were themselves born in what was a very different social era. The rest of the sample were born after approximately 1950 and this post-war point marks a considerable societal shift in the UK. It is reasonable to expect that this time point could be associated with shifts in the visibility, socially constructed meanings and characteristics of self-harm. In addition, the sharp increase in non-fatal self-harm (especially by medicines overdose) in the 1960s means that only the people in the oldest age group in the present study were unfamiliar with such behaviour as they grew into adulthood.

The current picture of self-harm across the age range may change over time as the individuals in the study grow older. The older adults of 2005 are not the same people as the older adults of 2025. The working age adults for whom self-harm is currently a persistent pattern of behaviour will become older adults. Will they continue to use self-harm repeatedly, meaning that the older adult group in the future will look more similar to the current working age adults, or will they become more like the current older adult group by reducing rates of repetition? Previous studies do not provide the comparisons across the age range which are needed in order to determine whether such changes have occurred previously. Future replication of comparisons of self-harm characteristics across the lifespan is required in order to determine whether this is a cohort effect.

Service provision for self-harm is not closely linked to medical severity; the youngest group conduct the least medically serious self-harm but receive some of the 'best' care. The oldest group also receive a high standard of care and repetition in both these groups is lower than that of the working age adults. The 'worst' service (poor provision of admission and aftercare, for example) is received by the working age adults. Risk is clearly no lower in this age range; repetition rates and medical severity of self-harm are high.

*Links to psychological theory.* Some of the psychodynamic models that have been proposed to explain the predisposing, precipitating and maintaining factors of self-harm offer developmental formulations that are particularly linked to self-injury in adolescents. The adolescent task of differentiating from the caregiver is proposed to precipitate self-harm when anger about this challenge is directed inwards towards the self, or the sense of self is weakened. Behavioural and cognitive models of self-harm and suicide are more applicable



across the entire lifespan than to a particular age range. The overarching concepts of self-harm as a way of coping with overwhelming distress, and greater likelihood of overwhelming distress where coping resources are limited are also applicable across the lifespan; unfortunately the present study does not provide information about the factors preceding self-harm episodes. The findings do indicate, however, different profiles in the characteristics of self-harm in different age groups.

Personal preference and applicability across the age range have led me to preferentially conceptualise self-harm from a cognitive behavioural perspective and using Erikson's (1959) stage theory and Hendry and Kloep's (2002) lifespan development model. The lower severity and lower risk of repetition in the youngest group fits well with the notion that adolescents (approximately age 12 to 18) may experiment with self-harm as part of a process of identity formation. The higher rate among females in this age group may be linked to social learning, internalisation rather than externalisation of distress, and positive subjective norms regarding self-harm among certain social groups. Suicidal intent may not be closely linked to severity in this age group due to high levels of impulsivity and limited understanding of the lethality of self-harm methods.

Early adulthood (approximately age 18 to 30) is associated with problems that are potentially more enduring, such as living independently, which may thereby lead to distress that is more long-term. Increased severity in this group may reflect lower impulsivity, less experimentation and greater suicidal intent. Some people in this age group are likely to fit more to the profile of the youngest group and some may be more similar to the older working age adults, hence the profile of this group fits between that of the age groups on either side.

Middle to later adulthood (approximately age 30 to 65) is generally associated with a significant increase in the numbers, types and levels of responsibility that a person is expected to take on. As well as life becoming more complicated, people have to acknowledge the ageing process; they may look back on their life so far and feel dissatisfied and trapped, leading to crisis. Severity of self-harm is higher in this group, possibly reflecting greater suicidal intent. Many people in this group repeat self-harm multiple times - indicating that, for them, self-harm is an established pattern of coping.

Older adulthood (approximately age 65 and over) is a time of maturational change and life review. Significant life events such as bereavement and illness are common and despair about the inevitability of one's own death can lead to overwhelming distress. The profile of self-harm in this age group does not appear to be simply a continuation of the working age adult profile. More of these older people are conducting self-harm for the first time, and it is more medically serious than in the younger groups. Self-harm in older adults is associated with

higher suicidal intent and is more likely to be a 'failed suicide' (Dennis, 2009). Low rates of repetition in this group suggest that service provision is appropriate and effective in meeting people's needs and helping them to cope in the future.

The findings of the present study are compatible with the proposed lifespan and psychological ideas about why people may self-harm at different ages and what that self-harm may look like. The original hypotheses of this study were drawn from review of the published literature. The results of the present study supported each hypothesis: characteristics of self-harm differ in the different age groups; working age adults and older adults conduct more medically serious self-harm than do young people; attendances for self-injury other than by cutting increase with increasing age; the relative proportions of people using each method of self-harm differ according to age group; service provision differs with age; children and adolescents receive some of the 'best' service and working age adults the 'worst'; quality of service provision is not closely linked with severity of self-harm or risk of repetition; and rates of repetition and switching of method differ according to age group.

The particular patterns of self-harm characteristics in each age group may not remain static over time; cohort effects mean that as the people in this sample get older, their characteristics may be transferred to older age groups. The results of this study do not indicate, for example, that the characteristics of self-harm in older people in the population have always been or will always be similar to the characteristics of the older people in this study. Rather, the results describe the characteristics of self-harm in older people at the present time. The large sample size and identification of all self-harm attendances in Leeds (a large city with urban, suburban and semi-rural areas with variety in its levels of social deprivation) mean that the findings are likely to be reasonably representative of the current picture of self-harm across the age range in the UK.

#### *Methodological Limitations*

The study's identification of self-harm episodes and collection of data were rigorous as a consequence of the study being part of the Department of Health funded multicentre self-harm monitoring project. Nevertheless, some variables showed significant proportions of missing data. These missing data may lead to some bias in the results from analyses of some variables. Little's missing completely at random (MCAR) test and multiple imputation of values were used where levels of missing data may be problematic, to protect against such bias.

The study was restricted to use of only the data collected for the self-harm monitoring project. Additional variables could have provided richer information and data that were more

specifically relevant to the aims of the study. Prospective collection of such data was, unfortunately, not feasible in the present study.

Some variables regarding the episode of self-harm - such as the time of day, and day of the week of attendance at the ED - were not analysed because I thought that they would be unlikely to provide useful information about self-harm across the age range. It is possible that some interesting results may have been produced by analysing these variables. The use of a very large sample means that some very small differences between the age groups can be found to be statistically significant, despite being of little clinical or practical relevance. In order to avoid spurious reporting of statistical significance as importance, I have not focused unduly on specific differences between the groups. Rather, I have described the overall profiles of the groups and patterns across the age range based on multiple sources of evidence, for example the multiple indicators of increasing severity with increasing age.

The potential effects of analysing what is essentially an inception cohort have been discussed previously. The characteristics of the age groups in the present study are applicable to those age groups at the current time and not necessarily historically or in the future. Comparison with analyses across the age range of historical data along with follow-up of the present cohort would indicate the magnitude of cohort effects over time.

The decision to analyse all episodes of self-harm rather than only index episodes has been discussed. Analysis by index episodes results in differences in the proportions of people with each characteristic, but the overall patterns of the profile of self-harm characteristics remain broadly similar.

There was some inaccuracy in my estimates of the population rates of self-harm. This inaccuracy is likely to have led to a slight underestimation of rates overall. This may have led to bias if the age groups were differentially affected by this underestimation. I therefore did not conduct further analyses based on rates of self-harm and instead kept the analyses grounded in the data. The hospitals in Leeds essentially captured all attendances for self-harm in Leeds. The two nearest hospitals with Emergency Departments (Dewsbury and Wakefield) are 10 and 12 miles away. This means that people living in Leeds who self-harm are unlikely to attend an ED outside of Leeds. Any people attending the ED who were not from Leeds, however, would impact on the accuracy of self-harm rate estimates. In order to combat this I would need to remove people from the database if they did not have a Leeds postcode. I did not have access to any person-identifiable information such as postcodes for ethical reasons, and this data cleaning was therefore not carried out.

The majority of the methods used for analysis and reporting of the data (comparison of odds ratios and confidence intervals on log<sub>2</sub> scales, stratified analyses, Mantel-Haenszel common odds ratios, Little's MCAR test, multiple imputation of missing values, chi squared tests, linear-by-linear chi squared tests for trend, one-way ANOVA, and Kaplan-Meier survival curves) were sound and suitable standard methods. There is potential for use of alternative methods, but the consistency and practicality of the methods used makes them appropriate and helpful. The use of Cox regression in a recurrent event analysis or frailty model, as in this study, is known to be problematic because it does not take into account the non-independent nature of the recurring events. I included the Cox regression for illustrative purposes in order to provide a level of statistical significance for differences between the age groups in repetition rates. It is possible that the non-independence of the data emphasised the differences between the groups. Hurdle models of analysis may be useful since the distribution of the repetition of self-harm has 'excess zeroes' (Bethell, Rhodes, Bondy, Lou & Guttman, 2010).

The older groups will have a higher level of mortality during the study period. This will affect repetition rates in this group because any individual who has died cannot repeat self-harm. Mortality data could be used to censor individuals who died before the end of the study period.

Further analyses could be carried out, for example to look for differences in self-harm characteristics between males and females or to see whether aftercare differs according to the professional discipline of the person conducting the psychosocial assessment. I conducted some analyses of this type as exploratory work but I have not reported them here because they are tangential to the aims of the present study.

### *Clinical Implications*

The principal research question for this study was 'How do hospital services respond to age-related differences in the clinical characteristics of episodes of non-fatal self-harm?' The answer to this question appears to be that hospital services respond based on age, with the youngest and the oldest receiving the highest levels of care and the working age adults receiving lower levels of care. Severity of self-harm and risk of repetition do not appear to be strongly associated with the level of care provided.

The quality of care provided to the youngest and the oldest people who self-harm by senior and specialist staff is commendable (although there is still room for improvement) and is likely to have an impact in reducing repetition rates in these groups. Increasing severity, presence of risk factors such as previous self-harm, and high risk of repetition in the working

age adult groups do not appear to be recognised in terms of the service provision they receive and these observations have clear clinical implications. Emergency department staff members who treat working age adults after self-harm should be educated with regard to the general severity and risk related to this age group. They should also be made aware that this risk is not related to the method of self-harm used, because switching of methods at the next episode of self-harm is common. While increasing the proportion of working age adults who are admitted to the general hospital following self-harm is probably not necessary or feasible, assessment of risk and need should be carried out and higher-level aftercare such as outpatient psychiatric care should be considered.

General adult mental health services could learn from the age-specific services and improve the seriousness of their assessment and aftercare arrangements. The low level of seniority and specialism of the people assessing working age adults is a particular difference that could be changed to influence service provision. Sharing of ways of working and liaison between services could be helpful in improving standards of care for working age adults.

The recent consultation document on preventing suicide in England (DoH, 2011) recognises the increased risk of suicide in various groups including people who self-harm, people in the care of mental health services and men aged under 50. Suicide rates over the past decade have been highest in males aged 15 to 44 and females aged 45 to 74 (ONS, 2011). The results of the present study indicate that working age adults receive lower standards of care for self-harm at the ED than both younger and older age groups; working age adults have higher rates of suicide and a focus on improvements in care for this age group is imperative, not only at the ED, but also in wider healthcare services and society in general. The DoH (2011) consultation document on preventing suicide suggests several approaches, interventions and changes at the ED and in wider society which can help to reduce suicides. These suggestions are also applicable to the care of people who self-harm. They include:

- Improving care pathways between EDs, primary and secondary care, inpatient and community care and at discharge for people in the care of mental health services.
- Ensuring that staff working with high-risk groups are trained in the recognition, assessment and management of risk and fully understand their roles and responsibilities.
- Regular assessment of ward areas to identify and remove potential risks such as ligature points, access to medications and access to windows and high risk areas (gardens, bathrooms and balconies).
- Good risk management, care planning and continuity of care.
- Use of modern communication methods such as text and email.

- Improving the facilities available for distressed patients in EDs.
- Good communication between secondary and primary care, as many people who present at EDs following self-harm will consult their GP soon afterwards.
- Appropriate training on suicide and self-harm for staff working in schools, colleges, emergency services, care environments and the criminal and youth justice systems.
- Multi-agency partnerships.
- Community outreach programmes located away from formal healthcare settings.

The findings of the present study also have implications for research on self-harm, particularly intervention studies. The design of such studies should take into account the differing characteristics of self-harm in the different age bands since this could lead to bias if adolescents, working age adults and older adults are included in a study and age is not controlled for in the design. I would suggest that children and adolescents and older adults should continue to be considered separately from working age adults, but that working age adults should not be neglected in intervention research. In some studies it may be valuable to split the working age adults group into younger and older bands.

#### *Further Research*

Some ideas for further research building on the findings of the present study are:

- A qualitative study specifically targeted at people of different ages of their reasons for self-harm, precipitating factors and reasons for choice of method.
- A qualitative study of ED staff perceptions and understanding of self-harm in different age bands (child and adolescent, younger and older working age adult, older adult, for example).
- A quantitative study of staff perceptions of self-harm in different age bands and the relationship between these perceptions and the care provided.
- A qualitative, quantitative or mixed methods study of patient perceptions of their treatment in the ED with patients in different age bands.
- Analysis of historical data across the age range to help to clarify cohort effects.
- Longitudinal follow-up of current cohorts to help clarify cohort effects.
- Analysis of mortality data for the present sample across the age range, and censoring of those who have died in repetition analyses (a successful application was made to the Office for National Statistics for mortality data relating to all persons on the self-harm database and National Institute for Health Research funding for the mortality research has been secured; these data will soon be available).

As a final conclusion, self-harm is a substantial problem in the UK and it merits particular attention. Studies of self-harm which do not control for age obscure important differences in the characteristics and management of self-harm across the age range. The findings of the present study indicate that there are important differences in self-harm conducted by people of different ages, but hospital service provision does not closely reflect differences in severity or risk. Improvement in service provision is required, particularly for working age adults.

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APPENDIX

Examples of analysis of a variable with five-year age bands and service defined age bands in comparison to the final age bands used in the study; and example of a linear rather than log to base 2 scale.

Figure 31. ORs across the age groups for previous self-harm with five-year age bands. Error bars are 95% CIs.

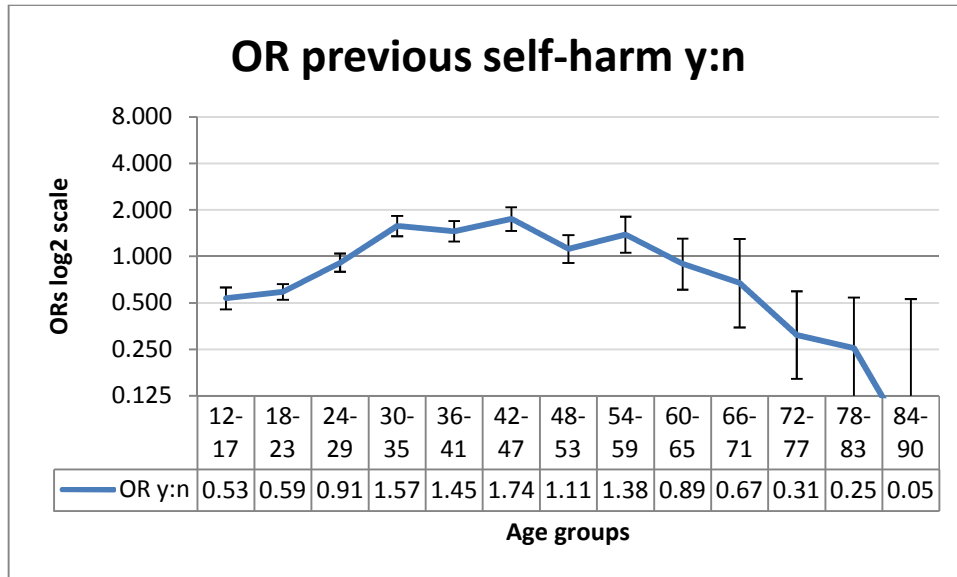
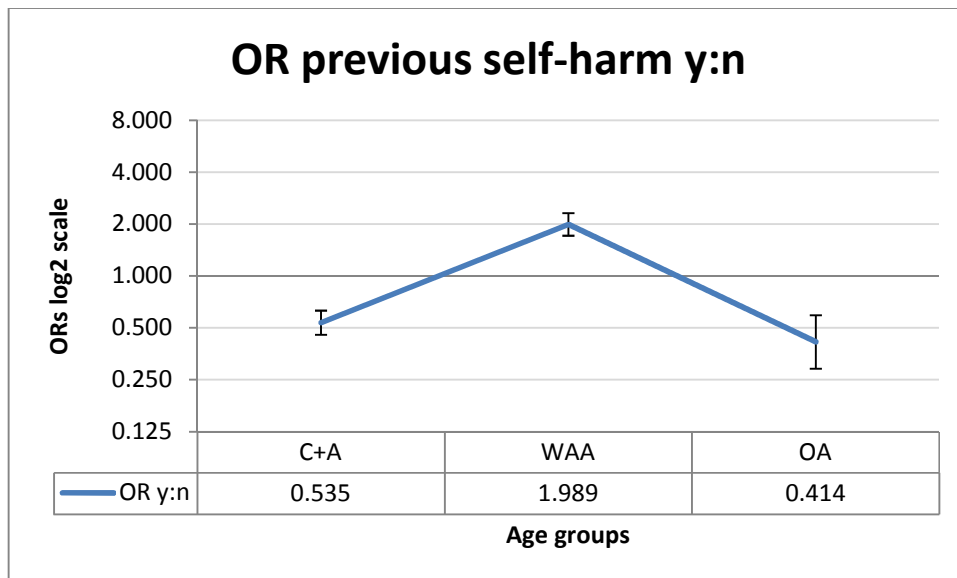


Figure 32. ORs across the age groups for previous self-harm with service defined age bands. Error bars are 95% CIs.



C+A = Children and adolescents, up to age 17.

WAA = Working age adults, age 18 to 64.

OA = Older adults, age 65 and above.



Figure 33. ORs across the age groups for previous self-harm with the age bands used in the study. Error bars are 95% CIs.

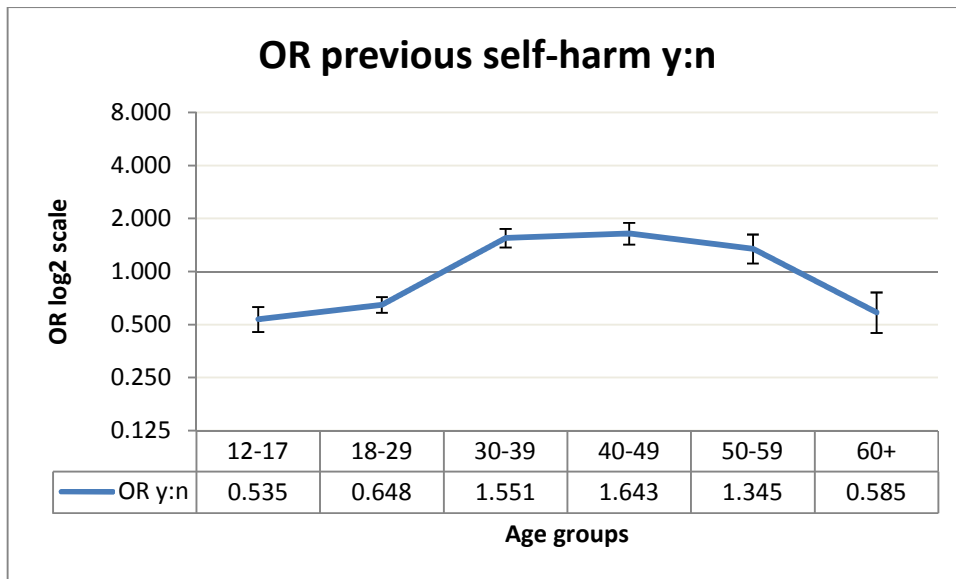


Figure 34. ORs across the age groups for previous self-harm plotted with a linear scale on the y axis. Error bars are 95% CIs.

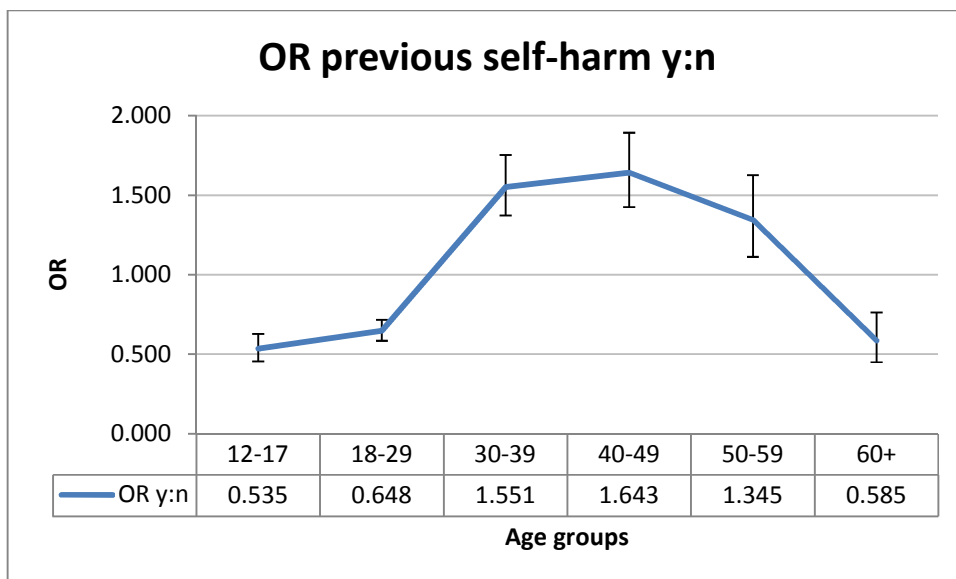


Figure 35. ORs across the age groups for drugs taken in self-poisoning. Error bars are 95% CIs.

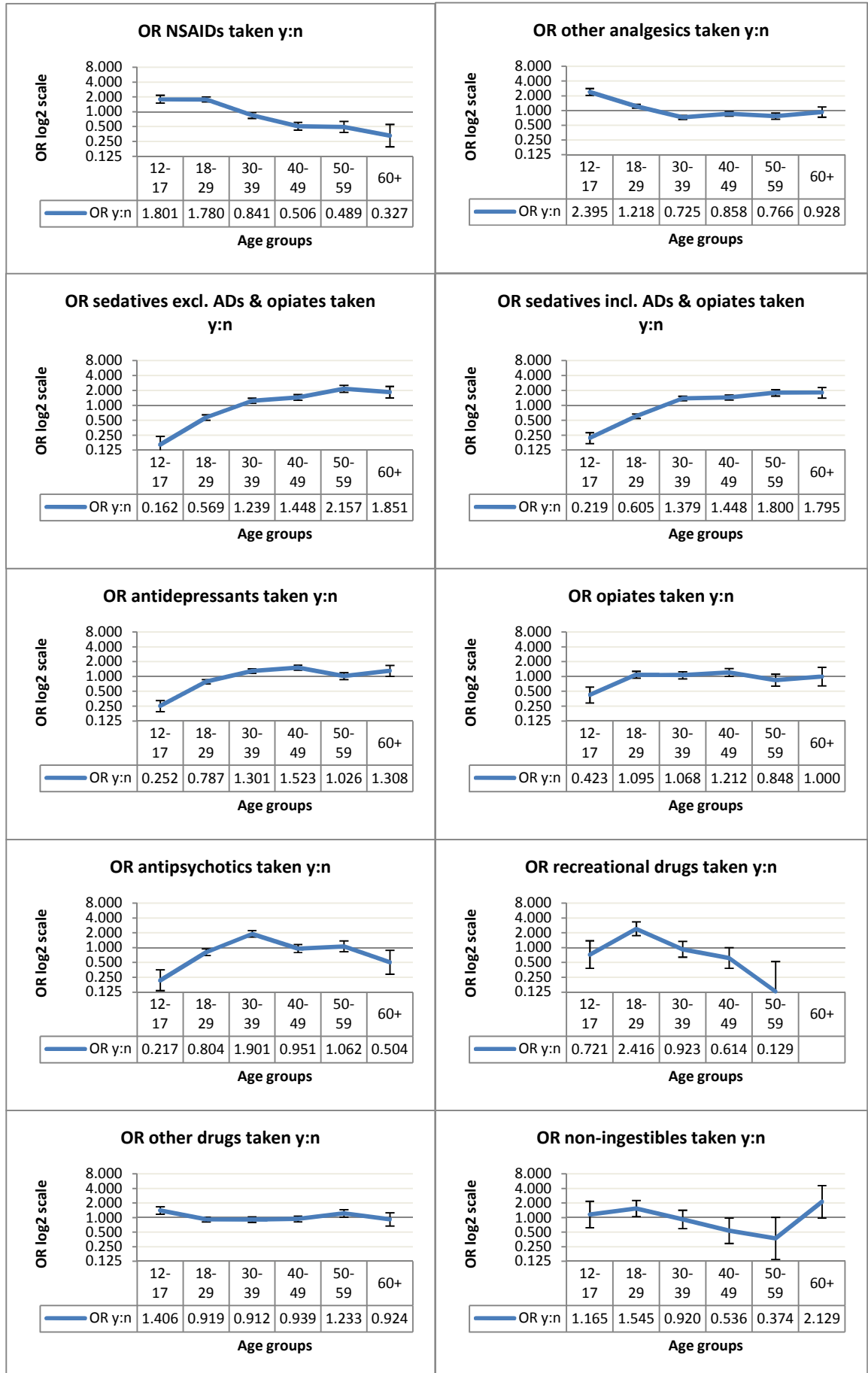


Figure 36. ORs across the age groups for method of self-injury used. Error bars are 95% CIs.

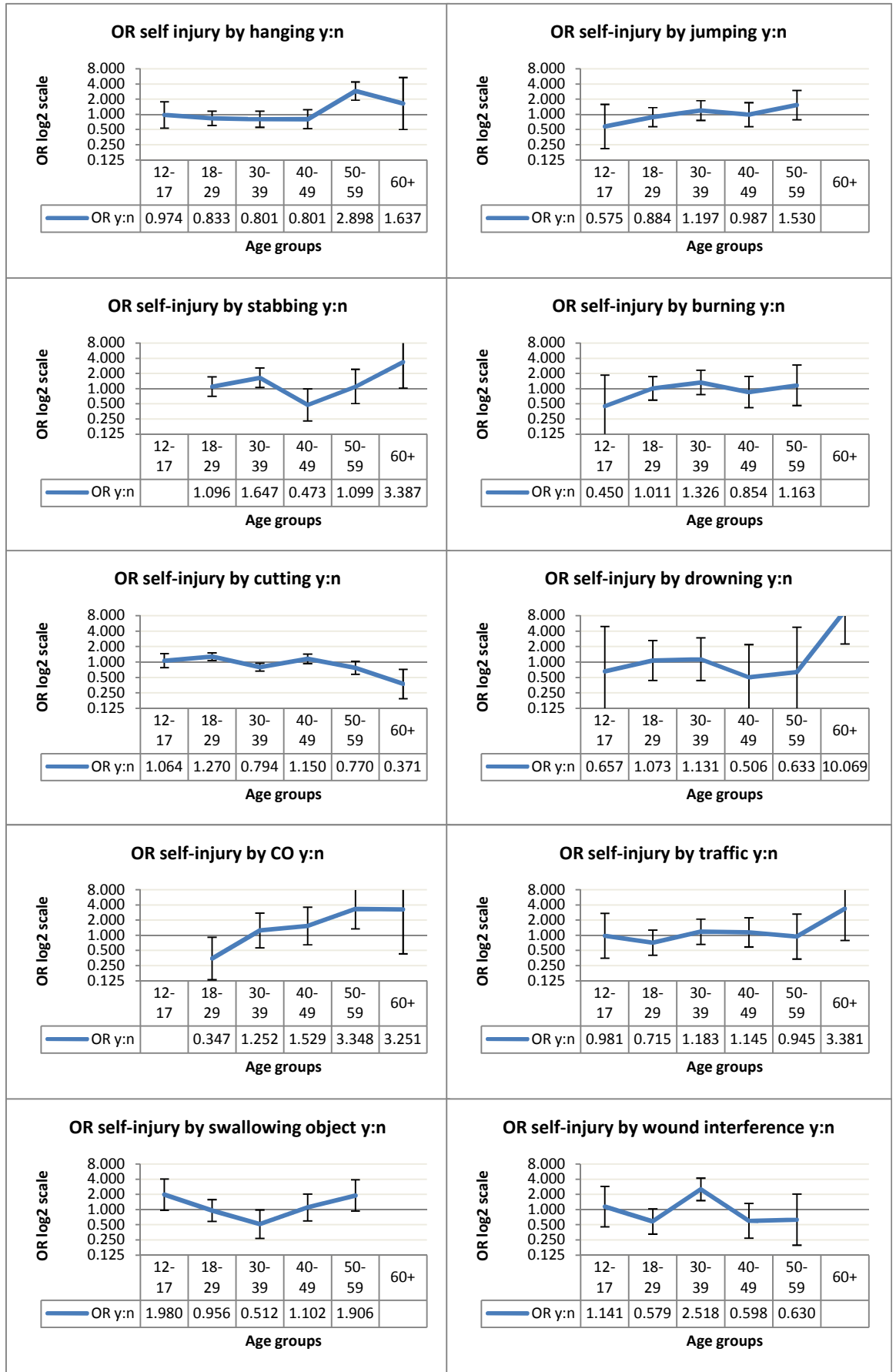


Figure 36 continued.

