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Using the integrated motivational-volitional (IMV) model of suicidal behaviour to differentiate those with and without suicidal intent in hospital treated self-harm

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Highlights

- Research into the utility of the IMV factors to further understand subtypes of self-harm is limited.
- Univariately many factors distinguished between those with and without suicidal intent.
- Multivariately, a smaller number of factors, all from the IMV model, remained central in differentiating between groups.
- Findings highlight the complex profiles of individuals presenting at hospital with self-harm.
- Frameworks such as the IMV can further our understanding of differences between subtypes of self-harm.

Abstract

Self-harm is a major public health concern. In order to respond to self-harm effectively, it is important to understand the factors associated with self-harm with and without suicidal intent. To this end, we investigated psychological factors selected from the Integrated Motivational-Volitional (IMV) model of suicidal behaviour in individuals who had recently been admitted to hospital for self-harm, with the aim of examining the characteristics of those who expressed intent to die versus those without suicidal intent. Individuals (n= 500, 60.6% female) admitted to two hospitals in central Scotland following self-harm with (suicide attempt [SA] group, n= 336) or without (non-suicidal self-harm [NSSH] group, n= 164) suicidal intent completed a range of psychological measures. Over half of the participants reported previous episodes of self-harm (SA, n= 239, 71.1%; NSSH, n= 91, 55.5%). Univariate analyses revealed that the SA and NSSH groups differed on some of

the psychological measures with higher depressive symptoms, defeat, entrapment, acquired capability and impulsivity in the SA compared to the NSSH group. In the multivariate model, suicidal ideation, defeat, internal entrapment and perceived burdensomeness independently differentiated between the groups. These findings highlight the complex profiles of individuals presenting at hospital with self-harm and emphasise the need to investigate differences between subtypes of self-harm in order to support individuals optimally. Applying frameworks such as the IMV model to further understanding of self-harm might assist in the development of targeted psychological interventions to reduce risk of repeat self-harm or suicide.

Keywords: Hospital treated self-harm, suicidal intent, non-suicidal self-harm, clinical sample, integrated motivational-volitional model, Psychology

1. Introduction

Self-harm is a major public health concern (World Health Organization, 2014). A recent UK study suggested one in nine young people had attempted suicide and one in six had engaged in non-suicidal self-harm (NSSH) in their lifetime (O'Connor et al., 2018). A previous suicide attempt (SA) or having engaged in NSSH (Chan et al., 2016; Ribeiro et al., 2016) are both consistent predictors of a future suicide attempt, and of death by suicide (Hawton & van Heeringen, 2009; O'Connor & Nock, 2014). Indeed, individuals who present to hospital with self-harm are 30 times more likely to die by suicide than those in the general population (Cooper et al., 2005). Currently, there is a lack of consensus about how best to conceptualise self-harm (Kapur, O'Connor & Hawton, 2013), and it is unclear if there are key differences in the psychological characteristics of those who engage in NSSH and SA. In order to respond to self-harm effectively, it is important to understand the factors associated with self-harm with and without suicidal intent (Hawton, Saunders, & O'Connor, 2012).

NSSH and SA share a range of common risk factors, but a recent study highlights that there are complex differences in individuals who engage in these behaviours (Huang, Ribeiro, & Franklin, 2020). For example, there is evidence that those who endorse suicidal intent are higher on psychopathology, such as depressive and anxiety symptoms compared to those who do not (e.g., Chartrand, Bhaskaran, Sareen, Katz, & Bolton, 2015; Mars et al., 2014). Conversely, there is evidence that adolescents engaging in NSSH report higher levels of depression and anxiety than those with suicidal intent (Kim et al., 2015). Further, few comparative studies have been conducted with clinical samples of patients admitted to hospital for self-harm. In one such study, Chartrand and colleagues (2020) found that individuals admitted for NSSH compared to SA did not differ on several key correlates of mental wellbeing. However, those in the SA group reported higher levels of depression and suicidal ideation whereas those without suicidal intent reported more adjustment disorders. Therefore, the evidence suggests that there may be some key differences between these groups on psychopathology, although the picture remains complex and unclear (Huang et al., 2020).

Another limitation of the previous research is that it tends not to have been guided by theoretical frameworks, which has rendered much of the extant literature exploratory

(O'Connor & Kirtley, 2018). This is not to ignore the fact that there has been an increased focus, in recent years, on the development of theoretical models such as the interpersonal theory (Joiner, 2005; Van Orden et al., 2010), three step theory (Klonsky & May, 2015) and the integrated motivational-volitional model of suicidal behaviour (O'Connor, 2011; O'Connor & Kirtley, 2018). In this study, we used the Integrated Motivational-Volitional (IMV) model of suicidal behaviour (See Figure 1; O'Connor & Kirtley, 2018) as a framework to identify factors that may be more important in differentiating SA compared to NSSH as it incorporates the factors from the interpersonal theory (the three step theory was not published when we designed this study). The IMV model is a tri-partite diathesis-stress model which integrates major components from psychopathology, suicide research, and health psychology literatures to delineate a common pathway to suicidal ideation and self-harming behaviour (O'Connor & Kirtley, 2018; O'Connor, 2011).

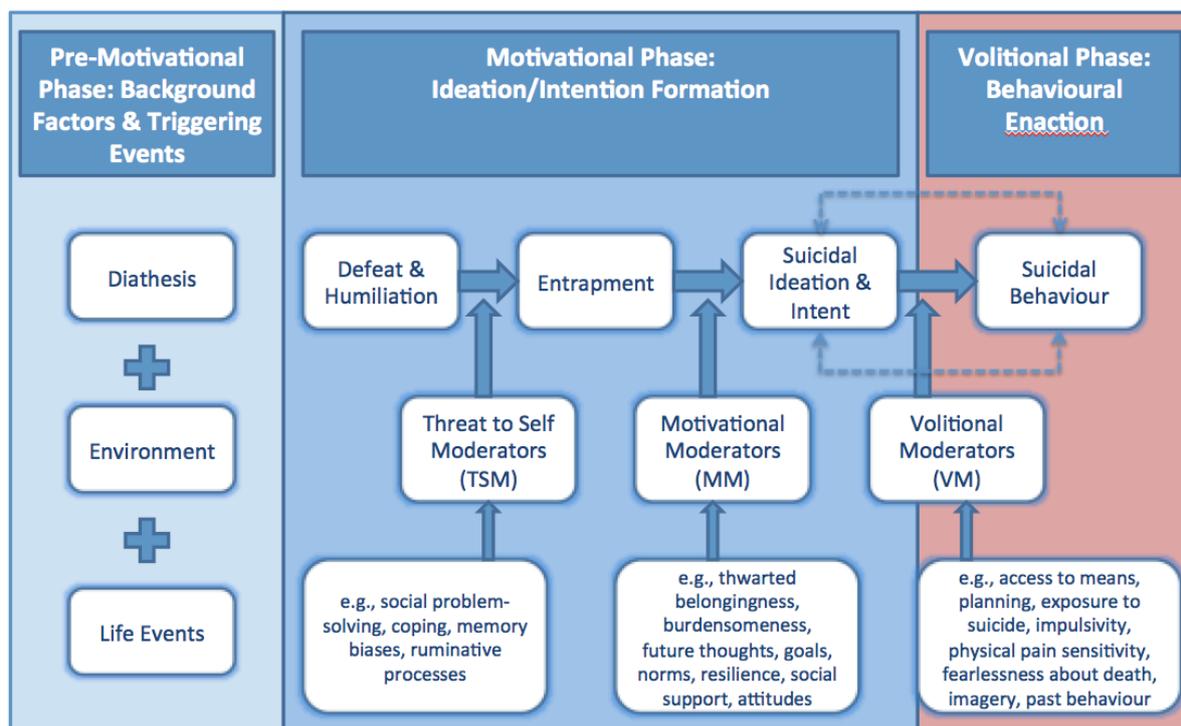


Figure 1: The integrated motivational-volitional model of suicidal behaviour (O'Connor & Kirtley, 2018)

The first phase of the IMV model, the pre-motivational phase, describes the background context (e.g., social disadvantage, genetics, negative life events and personality factors such as perfectionism) in which suicidal ideation and suicidal behaviour may occur (O'Connor & Kirtley, 2018). Next, the motivational phase highlights defeat and entrapment as key tenets in the development of suicidal ideation as when an individual feels defeated and trapped by their circumstances then thoughts of suicide may become more salient (Williams, 1997). Additional factors within the motivational phase may facilitate the transition from defeat to entrapment (threat to self- moderators; e.g., rumination and problem solving) and from entrapment to suicidal ideation (motivational moderators; e.g., social support, perceived burdensomeness, thwarted belongingness, goal adjustment). The volitional phase outlines factors including impulsivity, access to the means for suicide and acquired capability (volitional moderators) which reduce the intention- behaviour gap, therefore increasing the likelihood that ideation will be acted upon and that someone engages in self-harming behaviours. Full details of the model can be found in O'Connor and Kirtley (2018).

The evidence supporting the volitional facets of the IMV model in differentiating between ideation and enactment is growing (e.g. Branley-Bell et al., 2019; Wetherall et al., 2018). However, research into the utility of the IMV factors to further understand subtypes of self-harm is limited. Consequently, in this study, we examined whether variables from throughout the IMV model would differentiate between individuals treated in hospital following NSSH versus a SA. We selected factors from the IMV model which have previously been associated with self-harm including: socially prescribed perfectionism (pre-motivational phase); defeat, entrapment, belongingness, perceived, burdensomeness, social support, goal reengagement and disengagement (motivational phase); and impulsivity, and acquired capability (volitional phase). We hypothesised that, in multivariate analyses, i) individuals who endorsed suicidal intent associated with their self-harm (SA) would report higher levels of risk factors from within the motivational phase of the IMV model, including defeat and entrapment, and ii) given that all participants were recruited following an episode of self-harm we expected that in line with predictions of the IMV model, volitional phase variables such as impulsivity and acquired capability would not differentiate between NSSH and SA subgroups in the multivariate analyses.

2. Methods

2.1 Sample and participant characteristics

Participants were recruited from two Scottish hospitals. All individuals over 18 years of age, admitted to either the Combined Assessment Area Base 6 (CAAB 6; specialist unit for patients admitted following self-harm) of the Royal Infirmary of Edinburgh (RIE; Site 1), or the Emergency Department at Forth Valley Royal Hospital (FVH; Site 2) following an episode of self-harm (ICD codes X60-X84 and Y10-Y34, intentional self-harm), were considered eligible for participation in the study. We followed the UK's National Institute of Health and Care Excellence (NICE; 2004, 2011) definition of self-harm (i.e., "self-injury or self-poisoning irrespective of the apparent purpose of the act"). Exclusion criteria included being unable to provide written informed consent (e.g., being medically unfit or not competent in English), currently involved in another study conducted in the hospital, or if they were actively psychotic, aggressive or were prisoners. A total of 925 potentially eligible patients were admitted across the two hospital sites between February 2013 and April 2015 (see Figure S1 in supplementary material for participant flow). A total of 559 individuals consented to take part in the study, however 59 participants were subsequently excluded from analysis as they did not complete the self-harm questions.

Sample size for the study ($n = 500$) was calculated using G-power for binary logistic regression. In accordance with similar studies carried out by the research group (O'Connor et al., 2007; O'Connor, Fraser, Whyte, MacHale, & Masterton, 2008) we proposed a medium effect size of .15, consistent with (Cohen, 1988), setting alpha at .05, power at .95. Assuming a maximum of 15 predictors in the multivariable analysis, this suggested a minimum sample size of 200. A sample size of 500 therefore affords analysis of sub-groups as planned in the present study.

2.2 Procedure

Patients were eligible once they had been assessed by the Liaison Psychiatry (LP) team. LP staff identified potential participants and assessed medical fitness (i.e. ability to give informed consent). Patients deemed medically fit were asked by a member of the LP team if they would be interested in learning more about the study. If they agreed the

researcher would visit the patient at their bedside to provide further information about the study, answer any questions and obtain informed consent if they wished to take part. We did not have ethical approval to collect any information on patients prior to their consenting to take part in the study. Depending on patients' preferences, interviews were carried out either at patients' bedsides or in a private room. All interviewers were trained in the administration of the measures. The demographic information and self-harm history were collected by interview. To minimise the potential cognitive load, participants were offered the following methods to complete the questionnaire bundle:

- 1) participants could complete the self-report questionnaire bundle by themselves (n= 131, 26.2%); 2) the researcher could display the response options on a card and read the question aloud to the participant. The participant could then verbalise their response number (n= 224, 44.8%) or 3) the researcher could read both the question and the response options out loud (n= 145, 29.0%). Therefore, around three quarters of the sample (74% n= 369) opted to use the response cards.

Those who chose to use the response cards were more likely to be female (n= 128, 57.1%), to have completed high school education or college (n= 141, 62.9%) and unemployed (n= 131, 58.7%). Those who completed the measures using either response card options were also older (response cards mean age 37.6 years, researcher 39.7 years) than those who chose self-report (mean age 33.3 years).

It was emphasised that the study was voluntary, and that non-participation would not interfere with their treatment during or following their stay in hospital. Participants received no incentive to participate in the study.

Ethical approval was granted by the relevant ethics committees (REC) for each recruitment site (Site 1; South East of Scotland REC ref:2012/R/PSY/04. Site 2; East of Scotland REC ref:12/SS/0195). Participants were provided with written and oral information about the study and all participants provided written informed consent to take part.

2.3 Measures

Self-harm history was established via items adapted from the Adult Psychiatric Morbidity Survey (APMS; Coope et al., 2015); “Have you ever harmed yourself without wanting to die, by taking an overdose of tablets or in some other way?” and “Have you made an attempt to take your life, by taking an overdose of tablets or in some other way?”. Self-harm history includes endorsement of either or both of these behavioural items. Participants were also asked to indicate how many times in their life they had engaged in these behaviours. Suicidal intent associated with the current episode was assessed via the following item; “Did you intend to kill yourself this time?”. This method has been effectively used in other hospital studies conducted by our research group (Cleare et al., 2018; O’Connor et al., 2015).

The Beck Scale for Suicidal Ideation (SSI; Beck, Kovacs, & Weissman, 1979) was used to assess suicidal thinking over the preceding 7-days. This scale has shown good concurrent validity and internal consistency (Luxton, Rudd, Reger, & Gahm, 2011) and Cronbach’s alpha (α) in the current study was high ($\alpha = .91$).

The Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996) was used to assess depressive symptoms. The BDI-II has been shown to yield reliable, internally consistent, and valid scores in many different populations (e.g., Dozois, Dobson, & Ahnberg, 1998). The reliability was high in the current sample ($\alpha = .93$).

Demographic information including age, gender, marital, ethnicity and employment status was collected from participants.

2.4 Pre-motivational phase factors

The socially prescribed perfectionism (MPS-Social; Hewitt & Flett, 1991) subscale of the Multidimensional Perfectionism Scale was used to measure the extent to which an individual perceives that others demand perfection from them. The MPS has exhibited good validity and reliability in many studies (Hewitt & Flett, 1991) and the reliability was acceptable in this study ($\alpha = .87$).

2.5 Motivational Phase risk factors

Defeat was assessed via the Defeat scale (Gilbert & Allan, 1998) which is designed to tap into perceptions of failed struggle and loss of social standing over the last 7 days. The reliability for the measure was high in this sample ($\alpha = .94$).

Entrapment was assessed using the Entrapment Scale (Gilbert & Allan, 1998). This scale can be used to give an overall entrapment score, or to assess external (feeling trapped by circumstances) and internal (feeling trapped by ruminations or self-critical thoughts) entrapment. In the current study the Cronbach α was high ($\alpha = .93$).

2.6 Motivational Moderators

Interpersonal Needs Questionnaire (INQ; Van Orden, 2009) was used to explore the extent to which individuals felt disconnected from others (i.e., thwarted belongingness) and the extent to which they feel a burden on others (i.e., perceived burdensomeness). The scale has shown good internal consistency and construct validity previously and reliability was good in the current study ($\alpha = .88$).

Social support was assessed using the ENRICH Social Support Instrument (Mitchell et al., 2003), which has been found to be a valid and reliable measure of social support (Vaglio et al., 2004). In the current study reliability was good ($\alpha = .88$).

Goal Reengagement and Disengagement were measured via the goal adjustment scale (GAS; Wrosch, Scheier, Miller, Schulz, & Carver, 2003). This measure assesses goal disengagement (perception of difficulty in reducing effort toward unobtainable goals) and goal reengagement (perceived ability to engage with new goals). The GAS is well validated in a range of populations (e.g., Miller & Wrosch, 2007), with both subscales showing good reliability (disengagement $\alpha = .85$, reengagement $\alpha = .93$) in the current sample.

2.7 Volitional Phase risk factors

Impulsivity was assessed using the Barratt Impulsiveness Scale, Version 11 (BIS-11; Patton, Stanford, & Barratt, 1995). The BIS-11 is widely used to assess

impulsiveness as a multi-dimensional construct and has been shown to be a reliable measure of impulsivity (Martin & Potts, 2004), and demonstrated reasonable reliability in the current study ($\alpha = .85$).

Acquired Capability, an individual's fearlessness about lethal self-harm, was assessed using the Acquired Capability for Suicide Scale (ACSS; Van Orden, Witte, Gordon, Bender, & Joiner, 2008). The ACSS has previously been reported as having good internal consistency (Van Orden et al., 2008), however, internal consistency was relatively low in this sample ($\alpha = .64$).

2.8 Statistical analysis

Participants were excluded from analysis if they had not completed the self-harm questions ($n = 59$). Scales were assessed for completeness and if a participant had completed less than 75% of a measure their data for that scale were omitted from the analysis. A missing values analysis was then conducted for all variables. Missing data ranged from 0.2% (ACSS) to 1.7% (BDI; range $n = 1$ to $n = 9$ across measures). Missing value analyses established that there was no pattern to the items missed on any of the scales. As a result, the missing data were replaced using Expectation-Maximization replacement methods.

All statistical analyses were conducted using SPSS v24 (IBM Corp., Armonk, NY). Initial correlation analyses were conducted to test the associations between all study variables. Univariate binary logistic regressions were used to explore which variables differentiated between those admitted following a suicide attempt (SA; intent to die reported) and for non-suicidal self-harm (NSSH; no intent to die reported). Variables which significantly differentiated between the groups individually were then included in a multivariable binary logistic regression model to establish the independent effect of the variables when the other variables were controlled for, including number of previous self-harm episodes and sex as covariates.

3. Results

3.1 Sample characteristics

Of the 500 participants included, the sample primarily identified as female (60.6%, n= 303) and was predominantly white (97.2%; n= 486). Around half (53.4% (n= 267) were unemployed, and 63.6% were not married (n= 318). The mean age was 37 years old (SD= 13.8), and the age range 18 – 88 years. Around two thirds of the sample (n= 336, 67%; male; n= 149, 44.3%; female N= 186, 55.7%) reported suicidal intent with their self-harm (the suicide attempt group). The primary reason for presentation was overdose (90.6%, n= 453); 27 (5.4%) had self-injured and 20 (4%) were attending following a mixed method episode.

3.2 Univariate binary logistic regressions

Correlations (Pearson's *r*) between all study variables are presented in Table S1 in the supplementary materials. Univariate binary logistic regressions exploring sociodemographic associations between the SA and NSSH groups are reported in Table S2 in the supplementary materials. The NSSH group had more female (NSSH = 7.07%, SA= 55.7%; OR= .49, 95% CI .33-.74), those in the NSSH group were more likely to be students, those looking after the home, long-term sick, disabled or retired (i.e., economically inactive; 14.3%) than those in the SA group (7.5%) who were more likely to be unemployed (OR= .43, 95% CI = .23-.81).

One third (34%, n= 170) reported this was their first episode of self-harm, 41% (205) reported two to three episodes, and around a quarter (25%, n= 125) of the sample reported four or more past episodes. Significant differences between the groups were found ($\chi^2(2, n= 500) = 17.26, p < .001$); the NSSH group were more likely to report the current episode as their first (NSSH= 44.5% vs SA= 28.8%), whereas the SA group were more likely to report 4 or more previous episodes (NSSH= 15.3% vs. SA= 29.8%).

The NSSH and SA groups differed on most of the predictor variables in the univariate analyses (see Table 1). Specifically, the SA group reported higher levels of depressive symptoms, suicide ideation, defeat, internal and external entrapment, feelings of burdensomeness, problematic goal adjustment, impulsivity, acquired capability as well as lower social support and feelings of belongingness compared to the NSSH group.

Table 1

Univariate binary logistic regression analyses showing differences between participants who reported no intent to die (NSSH) vs. intent to die (SA) on predictor variables.

Predictor variables	Total (N= 500)	NSSH (N= 164)	SA (336)	Odds Ratio	95% Confidence Intervals
	M (SD)	M (SD)	M (SD)		
Suicidal ideation	20.00 (14.46)	10.77 (11.25)	24.52 (13.69)	1.08	1.06-1.10
Depressive symptoms	35.69 (13.68)	30.83 (13.68)	38.07 (13.06)	1.04	1.03-1.06
<i>Pre-motivational phase</i>					
Perfectionism	60.84 (18.75)	57.22 (18.88)	62.62 (18.46)	1.02	1.01-1.03
<i>Motivational Phase</i>					
Defeat	45.00 (14.93)	37.63 (15.70)	48.59 (13.13)	1.05	1.04-1.07
Entrapment					
Internal	17.70 (6.76)	15.19 (7.49)	18.94 (6.00)	1.06	1.04-1.08
External	22.93 (9.85)	19.27 (10.13)	24.74 (9.20)	1.08	1.05-1.11
Social support	19.32 (6.76)	21.19 (6.56)	18.40 (6.67)	.94	.91-.97
Interpersonal needs					
Burdensomeness	31.64 (11.28)	26.36 (11.27)	34.25 (10.34)	1.07	1.05-1.09
Belongingness	19.96 (8.15)	17.14 (8.14)	21.35 (7.80)	1.07	1.04-1.10
Goal Adjustment					
Goal					
disengagement	11.02 (4.26)	11.11 (4.45)	10.98 (4.16)	.99	.95-1.04
Goal	18.37 (6.03)	19.41 (5.51)	17.85 (6.22)	.96	.93-.99
reengagement					
<i>Volitional phase</i>					
Acquired Capability	11.35 (4.96)	10.21 (5.37)	11.91 (4.66)	1.07	1.03-1.11
Impulsivity	78.33 (13.77)	74.61 (13.94)	80.14 (13.33)	1.03	1.02-1.05

3.3 Multivariable analysis

To determine the utility of each of the predictors in uniquely distinguishing between the SA and NSSH groups, all of the predictors variables that significantly distinguished between the groups in univariate analysis were entered into a multivariable model (Table 2). Number of previous episodes and gender were included as covariates. The SA group experienced higher levels of suicidal ideation (OR= 1.08, 95% CI= 1.06 to 1.11), and were more likely to be male (OR= 2.90, 95% CI = 1.75 to 4.81) than the NSSH group. Those in the SA group reported higher levels of defeat (OR= 1.04, 95% CI= 1.01 to 1.08) and perceived burdensomeness (OR= 1.04, 95% CI= 1.01 to 1.07) when controlling for the remaining psychological variables, gender and previous self-harm history. However, the SA group reported lower levels of internal entrapment (OR= .93, 95% CI= .87-.99)

than the NSSH group. The NSSH and SA groups did not significantly differ on any other predictor variables in multivariable analysis¹.

Table 2
Multivariable binary logistic regression analysis of factors distinguishing those reporting no intent to die vs. intent to die

Predictor variables	Odds Ratio	95% Confidence Intervals
Gender	2.90	1.75-4.81
No. of previous self-harm episodes ^a		
First episode (vs 4+)	1.25	.61-2.56
1-3 previous episodes (vs first)	.96	.56-1.62
4+ episodes (vs 1-3)	1.20	.63-2.29
Suicidal ideation	1.08	1.06-1.11
Depressive symptoms	.98	.96-1.01
<i>Pre-motivational phase</i>		
Perfectionism	1.00	.98-1.01
<i>Motivational Phase</i>		
Defeat	1.04	1.01-1.08
Internal Entrapment	.93	.87-.99
External Entrapment	1.01	.97-1.05
Social support	1.01	.95-1.06
Perceived Burdensomeness	1.04	1.01-1.07
Thwarted Belongingness	.98	.93-1.03
Goal reengagement	1.02	.97-1.06
<i>Volitional phase</i>		
Acquired Capability	1.00	.96-1.06
Impulsivity	1.00	.98-1.02

^a Number of previous self-harm episodes with or without intent to die

¹ In response to a reviewer's request, we reran the analysis without suicidal ideation and depressive symptoms. These analyses yielded the same findings as the multivariate model with the exception internal entrapment became non-significant.

4. Discussion

This is the first study to test whether the key components of the Integrated Motivational-Volitional (IMV) model of suicidal behaviour (O'Connor & Kirtley, 2018; O'Connor, 2011) differentiate between hospital presentations of self-harm with (suicide attempt; SA) and without suicidal intent (non-suicidal self-harm; NSSH). When each of the variables was investigated univariately, those in the SA group scored higher on a range of psychological risk factors drawn from across the phases of the IMV model, compared to those in the NSSH. However, in the multivariable analysis, those in the SA group were significantly higher in suicidal ideation, defeat, internal entrapment and perceived burdensomeness than the NSSH group, and they were more likely to be male. These were the only psychological risk factors that differentiated between the groups. Given that these factors are all within the motivational phase of the IMV model which describes the development of suicidal ideation and intent, our findings indicate that assessing these components could be useful to better characterise self-harm profiles.

In particular, as the groups differed in defeat and internal entrapment suggests that these are potential areas for intervention. Our findings are in line with previous research, re-iterating the pervasive relationship between defeat, entrapment and suicidal intent (Johnson, Wood, Gooding, Taylor, & Tarrier, 2011; O'Connor & Portzky, 2018; Siddaway, Taylor, Wood, & Schulz, 2015). Our finding that internal entrapment remained associated with suicidal intent in multivariable analysis contributes to the growing body of evidence highlighting the pernicious impact of internal entrapment in the maintenance of suicidal ideation (Owen, Dempsey, Jones, & Gooding, 2018; Wetherall et al., in press). Furthermore, it echoes findings from a previous hospital treated self-harm who found that internal entrapment, not external entrapment, mediated the defeat to suicidal ideation relationship (Rasmussen et al., 2010). Additionally, our findings are in line with predictions from the IMV model and other models of suicidal behaviour highlighting that feeling like a burden on others can lead to suicidal ideation (Van Orden 2015; O'Connor 2011). Our finding that the SA group reported lower levels of internal entrapment than the SH group is interesting. We need to be cautious in over-interpreting this effect as it was statistically marginal (95% CI .87- .99) and it may reflect residual variance when

external entrapment is controlled for in the analyses. As a result, future research is needed to explore this finding further.

In the current study, the volitional factors did not differentiate between the groups when they were included in the multivariable model. This is consistent with the IMV model which specifies that volitional phase factors differentiate between ideation and enactment (O'Connor et al., 2011; O'Connor & Kirtley, 2018) and as this study is focused on differences in motivation not in action, we did expect volitional phase factors to play a key role multivariately. In addition, given that participants were recruited following self-harm the volitional moderators (impulsivity and acquired capability) are already high in both the groups regardless of intent. As highlighted above, it is important to note, that although significant differences were observed between the groups on some facets of the IMV model, similar to other psychological studies, these were small in magnitude and should be interpreted accordingly when thinking of the clinical implications.

However, our findings add to the growing body of research emphasising the complex profiles of people with different self-harm characteristics (C. Huang et al., 2020). Specifically, in light of the intricate differences between those with or without suicidal intent, investigating self-harm as a unidimensional construct may preclude our understanding and ability to respond appropriately to individuals in distress. However, the dichotomy of NSSH versus SA may not be sensitive enough to reflect the complexities of the differences between self-harm profiles. For instance, 90% of our sample were admitted to hospital following an overdose, but in line with previous research (Kapur et al., 2006; O'Connor et al., 2007), we found that 40% of our sample reported no suicidal intent. This is an important consideration in the potential classification of NSSH or SAs as self-poisoning is currently not routinely classified as a method of non-suicidal self-harm (Kapur, Cooper, O'Connor, & Hawton, 2013). Given that an individual's experiences may span both categories, and "desire to die" associated with an episode can change from moment to moment (Silverman, 2016), similar to other studies, the assessment of suicidal intent associated with a self-harm episode is challenging. Therefore our current static means of assessing suicidal intent may not reflect the level of intent present during a self-harm episode.

4.1 Clinical implications

Given the complexities in self-harm it is imperative that intervention and prevention efforts shift focus from self-harm (regardless of intent) as an outcome and direct their focus towards 'psychological primitives' underlying self-harm (see Franklin, 2019 for discussion). Psychological primitives are factors posited to be fundamental non-reductionable components from which all psychological experiences stem. In terms of self-harm, psychological primitives may suggest that an individual's self-harm concept (i.e., their prior experiences/exposure to others' self-harm) could be activated by the experience of an external situation (e.g., deprivation) and internal stimuli (i.e., affect, depression, defeat) which then leads to self-harming behaviours. Our study represents an important step in furthering our understanding of which of these factors underlie different self-harm profiles and reinforces the importance of identifying and addressing expressions of defeat and entrapment in responding to people who self-harm. Extending our research focus to include how and under what circumstances these factors contribute to the aetiology and course of non-suicidal self-harm and suicide risk would be worthwhile (Franklin et al., 2017).

Although the univariate analyses highlight that many factors distinguish between those in the SA and NSSH groups, the multivariable analyses suggest that a relatively small number of factors, derived from the IMV model, seem to be particularly central. For instance, our findings reinforce the importance of identifying and addressing expressions of defeat and entrapment in responding to people who self-harm. Applying a framework such as the IMV model to assess an individual's experiences could enable a more precise understanding of the factors underlying different profiles of self-harm. Clinically therefore, it would be useful to target these variables to inform clinical formulation and treatment intervention.

5. Limitations and Future Directions

The data reported here were cross-sectional thereby limiting the conclusions we can draw in terms of causality or direction of effect. Our recruitment method is another consideration; patients had to be invited to consider participating in the study following assessment by the liaison psychiatry staff. This procedure was the method of recruitment agreed by the clinical team and the ethics committee. However, potential participants were lost, as they may have been discharged prior to the

researcher meeting them, or they chose to decline citing having spoken to too many people already. Additionally, our recruitment strategy precluded those patients who were receiving inpatient treatment following self-harm. As a result, the final sample may not be representative of the wider population of people who are admitted to hospital following presentation to emergency departments with self-harm.

Within our sample there may be some issues with the generalisability of these findings, firstly the sample was almost 100% white, which is not reflective of the Scottish population which is more mixed (Office for National Statistics, 2011). Additionally, our categorisation of episodes of self-harm as occurring with either suicidal or non-suicidal intent was based on participants' retrospective interpretation of the episode which is subject to recall bias and other demand characteristics.

Models of suicidal behaviour provide testable pathways of factors underlying self-harm regardless of suicidal intent. In light of the research supporting the utility volitional factors within the IMV model in distinguishing between suicide ideators and suicide attempters or self-harmed (e.g Branley-Bell et al., 2019; O'Connor, Rasmussen, & Hawton, 2012; Wetherall et al., 2018) we tested the ability of the IMV model in distinguishing between self-harm with or without intent. However, it is important to highlight that other theoretical models may be more appropriate in this population and more research is needed to further explore these models in this context.

In light of the complexities of self-harm and of recording suicidal intent, incorporating innovative technological measures such as ecological momentary assessment could allow insight into how suicidal intent changes over time (Stone & Shiffman, 1994) and be pertinent to understanding how best to quantify and respond to such complex behaviours.

6. Conclusions

Irrespective of motive, self-harm is an indicator of unbearable emotional distress (O'Connor & Nock, 2014) and is one of the most consistent predictors of a future suicide attempt or death by suicide (Arensman, Griffin & Corcoran 2016; Chan et al., 2016). The current research emphasises the need for longitudinal studies which focus on understanding the complex relationship between individuals presenting with different self-harm characteristics, how best to respond and what factors predicts future suicide risk. The findings highlight the importance of the core factors within the IMV model which should be targeted in treatment. Future studies should focus on how and under what circumstances factors such as internal entrapment develop and contribute to the aetiology and course of psychological distress (O'Connor & Portzky, 2018).

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Supplementary Material

Figure S1: Flowchart of potential participants admitted to either hospital during study recruitment period.

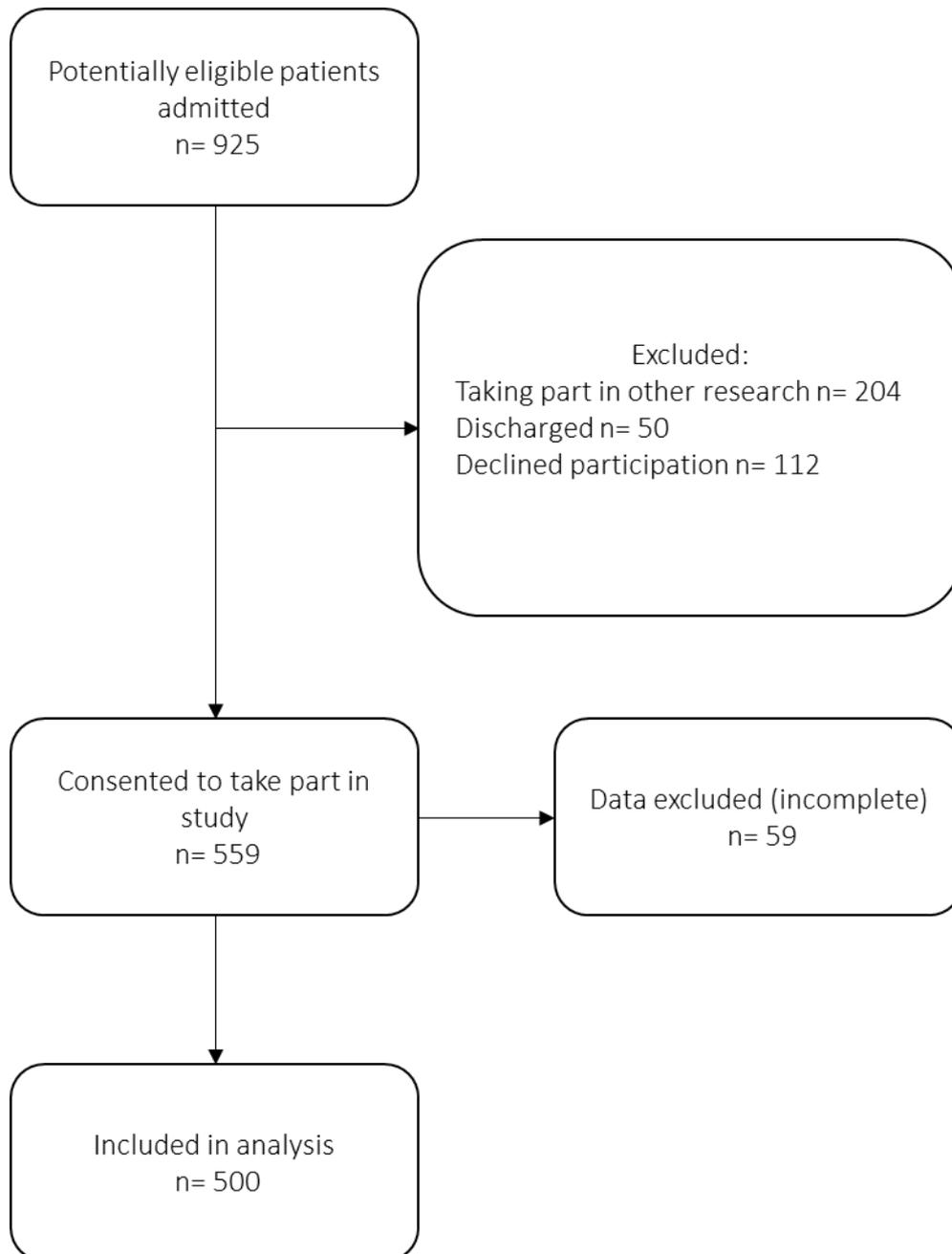


Table S1: Correlations (Pearson r) of all study variables.

		Depressive symptoms	Defeat	Entrapment		Perfect ionism	Interpersonal needs		Social Support	Goal adjustment		Acquired Capability	Impulsivity
				Internal	External		Burdensome ness	Belongingne ss		Dis engagement	Re engagement		
Entrapment	Suicidal ideation	.60	.60	.54	.51	.29	.48	.48	-.40	-.11	-.35	.29	.32
	Depressive symptoms	-	.73	.65	.65	.41	.52	.48	-.34	-.12	-.32	.09	.38
	Defeat		-	.80	.73	.40	.67	.57	-.43	-.19	-.31	.18	.42
	Internal			-	.76	.38	.62	.47	-.39	-.13	-.28	.11	.37
	External				-	.44	.56	.51	-.45	-.12	-.27	.08	.34
Interpersonal needs	Perfectionism					-	.41	.44	-.39	-.14	-.20	.12	.11
	Burdensomeness						-	.56	-.41	-.13	-.27	.18	.44
	Belongingness							-	-.74	-.19	-.31	.12	.30
Goal adjustment	Social Support								-	.13	.29	-.15	-.26
	Disengagement									-	.33	.00	-.02
	Reengagement										-	-.11	-.23
	Acquired Capability											-	.22
	Impulsivity												-

Table S2: Descriptive statistics and univariate binary logistic regression analyses showing differences between participants who reported no suicidal intent (NSSH) vs. suicidal intent (SA).

^a Number of previous self-harms episodes with or without intent to die

Model variables	Total	NSSH	SA	Odds Ratio	95% Confidence Intervals
	(N=500)	(N=164)	(N= 336)		
	N (%)	N (%)	N (%)		
Age M (SD)	37.10 (13.8)	35.5 (14.5)	37.9 (13.6)	1.01	.99- 1.03
Gender					
Male	195 (39.0)	46 (29.3)	149 (44.3)	.49	.33- .74
Female	303 (61.0)	117 (70.7)	186 (55.7)		
Ethnicity					
White background	486 (98.6)	159 (97.0)	327 (97.3)	.37	.08- 1.65
Other background	7 (1.4)	4 (3.0)	3 (2.7)		
Marital status					
Single/not married	318 (63.6)	96 (58.5)	222 (66.1)	.73	.49- 1.06
Married/ civil partnership	182 (36.4)	68 (41.5)	114 (33.9)		
Employed ^b					
Employed (vs inactive)	182 (36.6)	62 (38.5)	120 (35.7)	.43	.51- 1.12
Unemployed (vs employed)	267 (53.7)	76 (47.2)	191 (56.8)		
Inactive (vs unemployed)	48 (9.7)	23 (14.3)	25 (7.5)		
Current alcohol use					
No	119 (23.8)	31 (18.9)	88 (26.3)	.65	.41- 1.04
Yes	380 (76.2)	133 (81.1)	247 (73.7)		
Current drug use status					
No	325 (75.4)	105 (75.0)	220 (75.6)	.97	.61- 1.54
Yes	106 (24.6)	35 (25.0)	71 (24.4)		
Current smoking status					
No	206 (41.3)	71 (43.3)	135 (40.3)	1.13	.78- 1.65
Yes	293 (58.7)	93 (56.7)	200 (59.7)		
No. of previous self-harm episodes ^a					
First episode (vs 4+)	170 (34.0)	73 (44.6)	97 (28.9)	.33	.20- .57
1-3 previous episodes (vs first)	205 (41.0)	66 (40.2)	139 (41.3)		
4+ episodes (vs 1-3)	125 (25.0)	25 (15.2)	100 (29.8)		

^b Economic activity is grouped into three categories based on the Adult Psychiatric Morbidity Survey dataset: employed (economically active people), unemployed (those out of work but are available to start work) and economically inactive (e.g. students, those looking after the home, long-term sick, disabled or retired).