Treatment Motivation and Burden of Stress among Parents of Adolescents with Non-Suicidal Self-Injury Presenting to a Child and Adolescent Psychiatric Emergency Service

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Abstract

Introduction: The successful treatment of adolescents almost always requires parents' involvement in the treatment process. Thus, parental involvement will impact further treatment, especially concerning the acute management of self-harming behavior of their children. Parental burden or low parental motivation for treatment can significantly affect the success of the intervention. Therefore, this study aimed at investigating how especially motivational factors of the adolescents and parents, as well as stressors of the parents, affect the course of non-suicidal self-injury (NSSI) after an acute psychiatric emergency presentation. ***Methods:*** Ninety-six adolescents aged 11–18 years who have been presented to an emergency service at a child and adolescent psychiatry clinic for suicidal and/or NSSI behavior were recruited together with their accompanying parents within the framework of a specified diagnostic procedure. This included detailed questionnaire and interview procedures for psychiatric assessment. The extent of parental stress and parents' motivation for treatment and its relations to adolescents' NSSI and own treatment motivation have been investigated in a follow-up examination in the aftermath of the acute presentation. We predicted adolescents' NSSI at follow-up based on their own motivation and parental motivation and stress. ***Results:*** Data analysis demonstrated that higher adolescents' treatment motivation was associated with higher parental stress. Also, higher parental treatment motivation was correlated with a higher degree of parental distress. Furthermore, parents showed lower treatment motivation when their children engaged in NSSI for a longer duration. Finally, lower adolescents' motivation and lower parental stress due to own parental concerns were predictive for higher adolescents' NSSI frequency at follow-up investigation. ***Discussion/Conclusion:*** Patients as well as their parents who present for an emergency service are especially likely to be exposed to increased stress and strain factors. During treatment, additional focus should be placed on parental stress and parental and adolescents' treatment motivation. Identifying and addressing deficits in motivation, increases in parental stress, as well as offering support could favorably impact future NSSI behavior.

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Introduction

Children and adolescents present themselves to a child and adolescent psychiatric clinic on an emergency basis for many different reasons, which can range from minor difficulties to very serious situations for the patients themselves and their relatives and/or for the surrounding community [1–3]. Particularly, children and adolescents who report self-injurious thoughts and behaviors (SITB) make use of emergency presentation in child and adolescent psychiatric departments [4]. SITB subsumes both non-suicidal self-injury (NSSI), which is performed with no intention to die, and suicidal behavior, which is performed with at least some intention to die [5]. Even if NSSI and suicidal behavior can be distinguished in intention, there is nevertheless an overlap of the two behaviors that cannot be neglected [6]; thus, a combined assessment of the two behaviors should also be routinely made [7]. Despite the low prevalence of SITB until puberty [8], these symptoms turn into a common phenomenon during adolescence. In a representative sample, lifetime prevalence of direct self-injurious behavior (regardless of suicidal intent) ranged from 17.1% to 38.6% in 11 different European countries [6]. An important aspect is that later risk for suicidal thoughts and behavior is reduced by the cessation of direct self-injurious behavior (regardless of suicidal intent) in adolescence [9]. However, early cessation might not only depend on the affected children and adolescents alone but also on the accompanying parents.

Children and adolescents are often accompanied by their parents, especially during emergency consultations. Consultations at an emergency outpatient clinic are often the first point of contact with the health care system for children and adolescents with mental disorders and their parents [10, 11]. The participation of parents, especially in crisis situations, is an important way to gain insight into relational factors between parents and their children as well as possible conflicts. In this context, adolescent and parental motivation as well as parental stress should be taken into account. Parental stress has been previously linked to adolescents' NSSI; however, the impact of parental motivation and how both factors may serve to predict the longitudinal course of NSSI after an emergency presentation has not been investigated as far as we know.

Previous studies demonstrated a reciprocal relationship between NSSI and parental behavior [12]. Many parents lack adequate knowledge about NSSI and suffer from great emotional distress [13]. For instance, a previous study showed that mothers of female youths with NSSI reported higher levels of parenting stress and lower levels of parenting satisfaction than other parents [14]. For this reason, we wanted to examine the burden of stress experienced by parents of children and adolescents with NSSI and suicidal behavior promptly after an emergency presentation. To our knowledge, particularly, this group of parents has not yet been studied in this respect, although we would expect parental stress to be particularly high among this specific group. According to Abidin's stress model [15], three domains can be identified that play an important role in parenting stress; a parental domain (i.e., parental distress), a child domain (i.e., burdening behaviors of the child), and an interaction domain (i.e., parent-child dysfunctional interactions). These key factors are thought to contribute to parental stress, which in turn leads to negative parenting behaviors and directly influences child behavior [15–17]. Long-term exposure to chronic parenting stress can result in parental burnout, which is characterized by an overwhelming fatigue linked to the parental role, an emotional distance to their children, and ineffectiveness as a parent [18, 19].

Parental stressors can lead to impediments to seeking needed treatment for the affected child [20]. When family problems are present, parents show less motivation to seek treatment for their child or have insufficient resources to implement it [21, 22]. Therapy programs that strongly involve parents initially result in greater parental stress than programs that involve parents less; nevertheless, in both groups, parents' stress levels decreased [23]. A further study found that stress levels did not differ for parents enrolled in a treatment program for young children with autism spectrum disorder with more or less parent involvement, but there was a different distribution in stress subscales, namely higher scores for parental distress in the group with more parent involvement (early intensive behavioral intervention) and higher scores for the child domain in the other group (eclectic intervention) [24]. Here, parents in the intensive program showed no decrease in stress levels after 6 months compared to the other group [24]. This suggests that treatment program participation may have an impact on stress levels, but selectively on parents' own and child-induced stress. A study examined the impact of parental motivational beliefs (i.e., role construction and effectiveness) as a possible factor by which parental stress might influence family involvement in families with children with behavioral problems [25]. Results indicated that both parental role construction and parenting efficacy mediated the relationship between parental stress and family involvement [25]. In parents of children with externalizing behavior, parental readiness to change – a motivational factor – was

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significantly associated with parental stress and child externalizing behaviors [26]. At low levels of parental stress, willingness to change increased with the extent of the child's externalizing behavior, but at high levels of parental stress, parental readiness to change remained high regardless of the child's externalizing behavior [26]. This suggests that parental stress is a significant factor that can increase in relation to child treatment and, thereby, constitute an obstacle to treatment participation.

Parental disengagement and unwillingness to participate in treatment is a major barrier to implementing effective child and adolescent mental health interventions [27]. Children with antisocial behavior and their families, who continued treatment, showed marked differences from children and their families who discontinued treatment prematurely; children showed less delinquent behavior and fewer severe conduct disorder symptoms; mothers had lower reported stress from their relationship with the child and their own role behaviors [28]. A study in Japan investigated the importance of parental motivational factors on adolescent depression [29]. The results illustrated that parental grit, i.e., persistence in following long-term goals, decreased adolescents' depressive symptoms as a result of alterations in adolescents' grit [29]. Parental motivation for child and adolescent psychiatric treatment is therefore increasingly seen as a very influential aspect for treatment success and for preventing treatment discontinuation [30–33]. A strong factor influencing higher parental pre-treatment motivation was the severity of children's problems and perceived self-efficacy, but factors influencing lower pre-treatment motivation were financial problems, referral through school or health professionals, and perceived parenting competence [34]. In the treatment of children, it is parents' proactiveness, which is important in seeking treatment, in managing further appointments but also in agreeing to treatment procedures [30]. Three aspects of parental motivation are differentiated, namely parents' desire that their child changes (desire), parents' willingness to change their own behaviors to induce change in their child (readiness), and parents' perceived ability to modify such behaviors (ability) [31]. But also motivational factors in children and adolescents should not be underestimated in treatment, especially since participation and compliance in adolescents switches from parents to children with an increasing age [31].

According to our clinical experience, relational aspects between parents and children play a crucial role for further diagnostic assessment and treatment, especially concerning crisis situations and the likelihood of therapeutic success. Especially in the case of an emergency presentation, parents are likely to be particularly challenged with regard to stressful experiences. Therefore, high treatment motivation on the part of the patients and their parents would be of great importance. In the present article, we focus on parental stress and parental treatment motivation and their influence on relational aspects between parent and child. Therefore, we examined the influence of motivation (adolescent as well as parent) and parental stress on different domains and their interrelationships in adolescents who were presented on the basis of an emergency for suicidal and/or self-injurious behavior. Over the course of the study, participants were offered a detailed diagnostic assessment, a short-term intervention, and two further follow-up appointments. We expected increased parental motivation with higher patient symptom severity. Two hypotheses regarding a correlation between parental stress and parental motivation were formulated. On the one hand, parental stress and parental motivation could correlate positively, indicating a hope for change. On the other hand, parental motivation could also be negatively related to parental stress, for example, when parents lack resources due to extreme exhaustion. We were also interested in whether adolescents' motivation to stop NSSI, parental motivation for treatment, and NSSI behavior at follow-up investigation could be predicted. A prediction of therapy success could play an important role for further interventions. Here, we expected an improvement of NSSI symptomatology at follow-up, when adolescents' motivation was high at emergency presentation. The analysis of child and adolescent psychiatric emergency presentations, especially in relation to motivational factors (adolescents, parents) and stress factors (parents), is crucial and, to our knowledge, has not yet been studied as a longitudinal predictor for future NSSI behavior.

Materials and Methods

Participants and Recruitment
A total of 96 adolescent patients were enrolled via the emergency outpatient clinic at the Clinic of Child and Adolescent Psychiatry, Psychosomatics, and Psychotherapy, University of Regensburg, Germany. This hospital represents a typical psychiatric hospital for children and adolescents of maximum care. Data acquisition took place between July 2019 and April 2021. Patients between 11 and 19 years of age, who were presented both during the day and at night to deal with emergencies due to SITB, were offered a standardized emergency management with defined diagnostic assessments and short-term intervention through two further appointments (T2 and T3). The short-term intervention in-
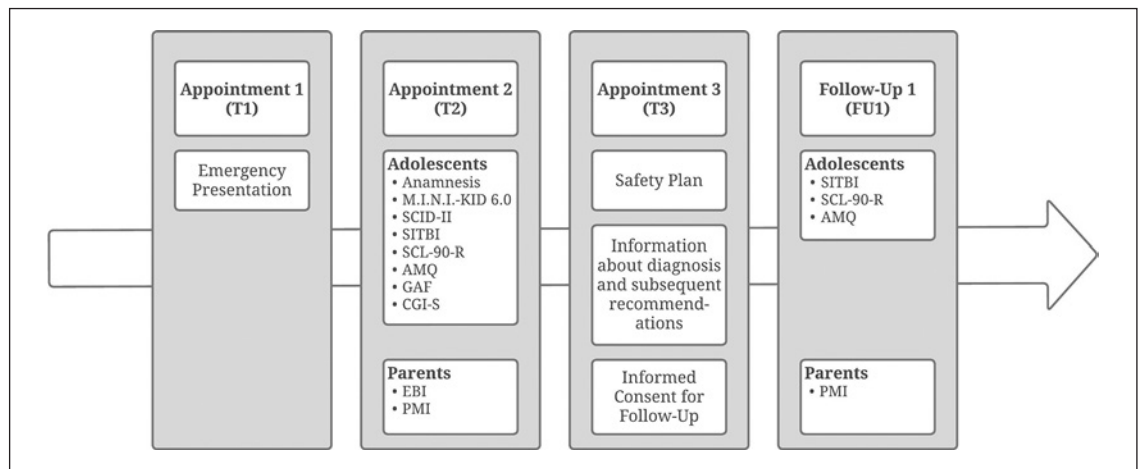
Fig. 1. Schematic representation of the psychiatric emergency service and short-term intervention process. T1: emergency presentation due to self-injurious thoughts and behaviors; T2: standardized emergency management with defined diagnostic assessments including the Mini-International Neuropsychiatric Interview for Children and Adolescents (**M.I.N.I. KID 6.0**), the Structured Clinical Interview for DSM-IV, Axis II (**SCID-II**), the Self-Injurious Thoughts and Behaviors Interview (**SITBI**), the Symptom Check-list-90 Revised (**SCL-90-R**), the Adolescents' Motivation Questionnaire (**AMQ**), the Global Assessment of Functioning Scale (**GAF**), the Clinical Global Impressions Scale (**CGI-S**), the German Version of the Parental Stress Index (**EBI**), and the Parent Motivation Inventory (**PMI**); T3: short-term intervention via safety plan and subsequent recommendations; FU1: assessment of short-term intervention outcome.

cluded a detailed safety plan formulated with the patient to prevent or assist in future crisis situations. A core feature of the existing emergency management system is an early intervention for adolescents with NSSI and suicidal behaviors with the intent of avoiding exacerbation of SITB or helping to facilitate remission and rapid planning of further appointments (time interval between emergency appointment and T2: $M = 7.92$ days [SD = 5.64 days], time interval between emergency appointment and T3: $M = 17.67$ days [SD = 10.40 days]). Schematic representation of the psychiatric emergency service and short-term intervention process is shown in Figure 1. Patients to whom regular outpatient treatment is already provided by established child and adolescent psychiatric services and who did not have a need for a specified treatment service were not included. Patients with IQ below 80 according to clinical assessment, acute suicidality needing prolonged inpatient treatment (more than 12 nights) in one of the hospital wards, or acute psychotic disorder or other acute psychiatric conditions that could influence the patient's competency to consent, were not offered to attend the standardized emergency management program. Thus, the sample represents a typical outpatient clinic clientele after an emergency consultation.

The specified standardized psychiatric assessment included the involvement of at least one parent or caregiver to investigate parental stress and parental motivation to participate in the treatment. At T3, a safety plan for dealing with future crisis situations was reviewed with the adolescents. The safety plan (based on the model developed by Stanley and Brown [35, 36]) was translated into German and adapted for children and adolescents in our clinic. Warning signs, coping strategies, social contacts for support and for resolving a crisis situation, contacts to professionals, and ways how others can support and protect the patient were worked out together with the clinician and recorded in writing on the safe-ty plan [35, 36]. This was taken home to offer the adolescents help in the event of a future crisis. In addition, patients and parents were asked whether they were willing to attend follow-up investigations after 4 and 8 weeks (FU1 and FU2). These two follow-up investigations were designed to analyze the effectiveness of the standardized procedure. The initial emergency consultation and the standardized specified diagnostic measurements (T2) and the short-term intervention and information about subsequent recommendations (T3) were clinical routines. The longitudinal part of the study consisted of two follow-up investigations. If one of the clinical appointments or one of the two follow-up appointments revealed an indication for inpatient units, this was realized accordingly. Here, we report findings from the clinical assessment after an emergency presentation (T2) and the first follow-up investigation (FU1).

The present study was approved (No.: 19-1426-101) by the Ethics Committee of the University of Regensburg. Written informed consent to participate in this study was provided by the patients and patients' legal caregiver.

Measures

T2 and T3 were handled by 4 experienced clinicians in the field of child and adolescent psychiatry. These clinicians were intensively trained on how to conduct the structured clinical interviews. For the two follow-up investigations, doctoral candidates/research assistants were trained and instructed. The accompanying parents were asked about the following sociodemographic information: age/date of birth, school type of the patients, relationship status of the parents, and type of residence.

Categorical and dimensional diagnostic assessments were performed to clinically characterize the patients using semi-structured clinical interviews and questionnaires. Experienced clinicians conducted the German Version of the Mini-International

Neuropsychiatric Interview for Children and Adolescents (M.I.N.I. KID 6.0), which is a structured clinical interview according to DSM-IV and ICD-10 [37]. Based on this interview and consultation of at least two clinical experts, with at least one of them being a child and adolescent psychiatrist, the patients' final diagnosis/diagnoses were determined. To query the diagnostic criteria for borderline personality disorder (BPD) in adolescents, the German version of the Structured Clinical Interview for DSM-IV, Axis II (SCID-II), and subsection BPD, was performed to assess the diagnostic criteria of BPD [38]. This subsection consists of 9 questions based on DSM-IV diagnostic criteria, and diagnosis of BPD is confirmed if criteria are met on at least 5 items. The M.I.N.I. KID 6.0 and SCID-II were conducted with the patients at T2. The Symptom Checklist-90 Revised (SCL-90-R) is a broadly used psychological status symptom inventory with patients, which we used in the German version [39, 40]. This questionnaire encompasses 90 items scored on a 5-point Likert scale (0–4), which can be averaged over 9 subscales and produces the Global Severity Index (GSI), an indicator of psychological distress. Internal consistency, especially for the GSI, is very good ($\alpha = 0.97$), also for the German version ($\alpha = 0.96–0.98$), and validity is adequately demonstrated [39]. Patients were further asked questions about their own motivation to stop NSSI. Several questions were asked using the short adolescents' motivation questionnaire (AMQ) developed by Armitage and co-workers [41]. All questions were adapted from English and adjusted to query participants' motivation in relation to NSSI avoidance. The AMQ consists of 6 questions, 3 of which measure "intention" (internal reliability at baseline ($\alpha = 0.41$) and 3-month follow-up ($\alpha = 0.40$)) and 3 of which measure "self-efficiency" (internal reliability was $\alpha = 0.71$ at baseline and $\alpha = 0.69$ at the 3-month follow-up) [41]. The adapted version of the AMQ used in this study had very high reliability with $\alpha = 0.93$ (intention: $\alpha = 0.87$; self-efficiency: $\alpha = 0.93$). The Self-Injurious Thoughts and Behaviors Interview (SITBI) [42] constitutes a structured interview that is divided into 6 units (suicidal ideation, suicide plans, suicide gestures, suicide attempts, thoughts of NSSI, and NSSI itself), measuring the occurrence, severity, and features of the types of SITB mentioned above. Of particular interest was the lifetime prevalence of NSSI, which was collected from this questionnaire with the following question: "How many times in your life have you purposely hurt yourself without wanting to die?" The SITBI is a highly suitable diagnostic tool to use in clinics and research, which has also been confirmed for the German version of the SITBI [43]. The SCL-90-R, the questionnaire for adolescents' motivation, and the SITBI were administered to patients at T2 and FU1, to show variation of these parameters over time.

We also administered the following questionnaires to the accompanying parents: first, the Eltern-Belastungs-Inventar (EBI) [44], the German version of the Parenting Stress Index (PSI) developed by Abidin [15], which allows the description of parent- or family-related stress from a dimensional perspective and supports profound context-centered treatment planning [45]. The EBI uses 48 items with 5-point Likert scales (1 = not at all true; 5 = strongly true) to assess parental stress in three domains, namely the parent domain, the child domain, and the interaction domain, and was administered to parents at T2. The short version of the EBI was originally developed with two domains, namely a parent and a child domain. However, factor analyses for the full-length version of the EBI have demonstrated three domains [46], and the same applies for the short and long version of the PSI [47, 48]. Thus, as

mentioned above, three domains were computed in the current study. The parent motivation inventory (PMI) developed by Nock [31] was designed to measure the motivation of parents to participate in treatment. The PMI is a 25-item self-report measure of parents' treatment motivation on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree) [31], and was administered to the parents at T2 and FU1 to show a time course of parental motivation. The PMI shows strong internal consistency and test-retest reliability [31]. The items were developed to represent the three components of motivation, including "desire to change child behavior" (desire), "readiness to change parenting behavior" (readiness), and "perceived ability to change parenting behavior" (ability) [31].

In addition, the general functional level and the degree of mental illness severity were recorded at T2, by the experienced clinicians in consultation with the child and adolescent psychiatrist. To evaluate clinical severity, the Clinical Global Impressions Scale (CGI-S) was included [49]. The severity of the patient's disease was assessed with a 7-point Likert scale ranging from 1 (normal) to 7 (belonging to the most extremely ill) [49]. Psychological, social, and professional abilities were estimated by means of the Global Assessment of Functioning Scale (GAF) [50]. The GAF scale is grouped into 10 functioning levels, each with 10 points. It has a range from 1 (lowest level of functioning) to 100 (highest level of functioning).

Statistical Analyses
First, the effect of sex and differences between those who took part in FU1 and those who did not were tested through Mann-Whitney U tests as most outcome variables (parental motivation, NSSI duration in years, NSSI lifetime prevalence, and measures assessing symptom severity and functioning) were not normally distributed. Mann-Whitney U tests do not require a normal distribution of data and are robust against unequal sample sizes [51]. A Missing Completely at Random (MCAR) test was used to determine whether missing values were due to a pattern in the data. The test was nonsignificant ($p > 0.05$), and missing values were excluded from the analysis. The role of age and parental relationship status as control variables for subsequent regression models was determined via bivariate correlations. In order to determine the relationship between parental motivation, adolescents' motivation, parental stress, and indicators of symptom severity, additional bivariate correlations were computed; Pearson's r for normally distributed variables and Kendall's τ otherwise. Correlations were corrected for multiple comparisons. To predict adolescents' and parental motivation at FU1, linear regressions were calculated with the main measures of T2 as predictors. Additionally, to determine the relationship between parental motivation, parental stress, and adolescents' motivation with symptom severity at FU1, bivariate correlations were computed. Significant correlations were used to determine possible predictors for a linear regression model with NSSI behavior at FU1 as the dependent variable. Linear regression models with all predictors were followed by reduced models only including significant predictors to have a better estimation of explained variance and achieve a parsimonious model [52]. An a priori power analysis using G*Power [53] determined that a total of $n = 50$ participants would be necessary to reach a power of 0.80, assuming an effect size of $f^2 = 0.31$. The effect size was based on the assumption that predictors would have an average correlation of $r = 0.20$ with the predictor variable. Multiple comparisons were cor-

rected via the false discovery rate (FDR) [54]. Reported *p* values already correspond to the correction. All major statistical analyses were conducted using SPSS 25 (IBM Corp. Released 2017, IBM SPSS Statistics for Windows, Version 25.0, Armonk, NY: IBM Corp.). The statistical significance level was set to $\alpha = 0.05$.

Results

Sample Characteristics

Detailed sociodemographic information is shown in Table 1. Overall, a total of 96 children and adolescents between the ages of 11 and 18 participated in T2. Subsequently, 72.9% of the sample participated at FU1. An additional number of patients ($n = 14$) were recruited but could not be included in the final analysis as they either showed no symptoms according to the SITBI ($n = 3$), failed to come to T3 or refused to participate ($n = 5$), had language difficulties ($n = 3$) or did not come with parents/caregivers and therefore, had no information on parental stress and treatment motivation ($n = 3$). On average, participants were 15;7 years old at the second appointment (SD = 1;6, range = 11–18) and 76.0% were female. A Mann-Whitney U test showed no significant difference between boys and girls in respect to age, U ($N_{girls} = 73$, $N_{boys} = 23$) = 786.00, $z = -0.46$, $p = 0.646$. The EBI was filled by $N = 71$ mothers (78.9%) and $N = 19$ fathers (21.1%). For the PMI, the proportion of mothers was $N = 70$ (82.6%) and fathers was $N = 17$ (17.4%). It was examined whether participants who took part in the FU1 differed from those who did not in respect to adolescents' and parent motivation, parental stress, and symptom severity. Mann-Whitney U tests showed that there was a significant difference in parental stress on the child domain between parents who took part in the FU1 ($M = 5.56$) and those who did not ($M = 6.21$), U ($N_{FU} = 70$, $N_{NoFU} = 20$) = 485.00, $z = -2.09$, $p = 0.037$.

The distribution of psychiatric diagnoses according to the ICD-10 is shown in Table 2. Several diagnoses were possible per patient. Additionally, the SCID was used to determine the presence or absence of BPD within the sample. In total, $n = 2$ patients fulfilled criteria for a BPD. Overall, details on clinical variables including the dependent variables are shown in Tables 2 and 3.

Control Variables

To determine the effects of sex on the outcome measures (adolescents' and parental treatment motivation, parental stress, symptom severity) at T2, Mann-Whitney U tests were computed. After correcting for multiple

Table 1. Sociodemographic characteristics of participants at standardized emergency management with defined diagnostic assessments (T2)

Sex	N	%
Female	73	76.0
Male	23	24.0
Age	M	SD
	15;7[a]	1;6
School type	N	%
Gymnasium	20	20.8
Realschule	26	27.1
Mittelschule	24	25.0
Förderschule	2	2.1
Berufsschule	12	12.5
Other/no School	7	7.3
Unknown	5	5.2
Parental relationship status	N	%
Live together	37	38.5
Separated/divorce	43	44.8
Separated by death	2	2.1
Never lived together	7	7.3
Unknown	7	7.3
Household composition	N	%
With biological mother	69	71.9
With other mother figure	3	3.1
Unknown	24	25.0
With biological father	45	46.9
With other father figure	13	13.5
With no father/father figure	4	4.2
Unknown	34	35.4
With mother/father	82	85.4
At institutional care	2	2.1
Lives with partner	1	1.0
Unknown	11	11.5

Gymnasium (higher level education, usually 8–9 years of school after 4 years of elementary school, terminating with the general university entrance qualification), Realschule (intermediate secondary school, 6 years of school after 4 years of elementary school), Mittelschule (9 years of elementary school), Berufsschule (2–3 years vocational training school most commonly after Mittelschule or Realschule but also possible after Gymnasium) and Förderschule (school for special needs). [a] Years;months.

comparisons, there was no effect of sex on adolescents' or parental motivation, parental stress, NSSI duration, and NSSI behavior; however, girls ($M = 1.35$) had higher GSI values on average than boys ($M = 0.87$), U ($N_{girls} = 73$, $N_{boys} = 23$) = 470.00, $z = -2.98$, $p = 0.003$. The relationship between participants' age and the main variables was examined via bivariate correlations. None of the variables significantly correlated with age ($p > 0.05$). As an additional control variable, correlations with parents' relationship status were examined. None of the main vari-

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Table 2. Clinical characteristics of patients at standardized emergency management with defined diagnostic assessments (T2) and follow-up investigation 1 (FU1)

Diagnostic groups		N	%	Range	Total N
F0		0	0		
F1		15	15.63		
F2		0	0		
F3		89	92.71		
F4		56	58.33		
F5		4	0.04		
F6		5	0.05		
F7		0	0		
F8		4	0.04		
F9		31	32.30		
Structured Clinical Interview for DSM-IV, Axis II (SCID), (Borderline Personality Disorder section)	T2	N	%	Range	Total N
3 fulfilled criteria		13	14.3		96
4 fulfilled criteria		14	15.4		96
≥5 fulfilled criteria		2	2.2		96
Symptom Checklist-90 Revised (SCL-90-R): Global Severity Index (GSI)		M	SD		
	T2	1.23	0.69	0.02–3.03	93
	FU1	1.05	0.73	0.06–2.91	69
Global Assessment of Functioning Scale (GAF)	T2	M	SD		
		47.89	8.17	35–72	96
Clinical Global Impressions Scale (CGI-S)	T2	M	SD		
		3.58	0.54	3–5	86
Adolescents' Motivation Questionnaire (AMQ)		M	SD		
	T2	4.40	1.68	1.17–7	91
	FU1	4.87	1.62	1.17–7	71
NSSI duration	T2	M	SD		
In years		1.94	1.76	0–8	79
NSSI behavior		N	%		
Prevalence	T2	79	83.2		95
		M	SD		
Lifetime (number of episodes)	T2	76.88	193.99	0–1,000	89
Last month (number of episodes)	FU1	4.64	7.96	0–40	61

The distribution of psychiatric diagnoses follows according the chapters of ICD-10: F0 (Organic, including symptomatic, mental disorders), F1 (Mental and behavioral disorders due to psychoactive substance use), F2 (Schizophrenia, schizotypal and delusional disorders), F3 (Mood [affective] disorders), F4 (Neurotic, stress-related and somatoform disorders), F5 (Behavioral syndromes associated with physiological disturbances and physical factors), F6 (Disorders of adult personality and behavior), F7 (Mental retardation), F8 (Disorders of psychological development), F9 (Behavioral and emotional disorders with onset usually occurring in childhood and adolescence). Several diagnoses were possible per patient.

ables significantly correlated with parents' relationship status ($p > 0.05$).

Correlational Relationships between Treatment Motivation, Parental Stress, and Symptom Severity

The correlational relationships between adolescents' motivation, parental motivation, parental stress, and variables of symptom severity are shown in Table 4. Concerning the relationship between motivation and parental stress, there was a significant positive correlation between adolescents' motivation at T2 and the child domain ($r(86) = 0.28, p = 0.011$) and the parent domain of parental stress (EBI) ($r(86) = 0.25, p = 0.034$). Also, parental motivation, in particular, the domain "desire" of the PMI, correlated positively with one aspect of parental stress, namely the interaction domain of the EBI ($\tau(87) = 0.19, p = 0.012$). There was no significant correlation between adolescents' motivation and parental motivation ($\tau(83) = -0.08, p = 0.273$). Relating to symptom severity and adolescents' and parental motivation, a significant negative correlation between adolescents' motivation and lifetime prevalence of NSSI (reported at T2) was found ($\tau(84) = -0.38, p < 0.001$), suggesting that higher lifetime prevalence was associated with lower motivation. Also, the GSI score at

Table 3. Clinical characteristics of patients' parents at standardized emergency management with defined diagnostic assessments (T2) and follow-up investigation 1 (FU1)

Parent Motivation Inventory (PMI)		*M*	SD	Range	*N*
Desire	T2	27.04	5.93	7–35	87
Readiness		59.83	7.53	34–70	87
Ability		14.67	3.12	4–20	87
Total		101.66	12.79	51–120	87
Parent Motivation Inventory (PMI)	FU1	*M*	SD	Range	*N*
Desire		25.10	6.81	7–35	65
Readiness		58.22	8.64	28–70	65
Ability		14.25	3.48	3–21	65
Total		97.44	14.54	51–120	65
Parental Stress Index (EBI)	T2	*M*	SD	Range	*N*
Parent domain		31.42	9.29	15–60	90
Child domain		22.83	6.31	8–36	90
Interaction domain		18.67	3.78	9–26	90

Parental Stress Index (EBI) and Parent Motivation Inventory (PMI) scores reported are the projected scores for compatibility. Mean scores were used for the analysis.

T2 was negatively correlated with adolescents' motivation ($\tau(89) = -0.21$, $p = 0.004$). Parental motivation, in particular the domain "readiness" of the PMI, was negatively correlated with NSSI duration in years ($\tau(73) = -0.22$, $p = 0.015$), suggesting that parents showed less readiness for change when their children engaged in NSSI for a longer duration.

Predicting Adolescents' Motivation and Parental Treatment Motivation at Follow-Up Investigation

In order to predict adolescents' motivation at FU1, a simple regression model was computed, including the three domains of parental stress (EBI), parental motivation (PMI) as well as NSSI duration in years and lifetime prevalence of NSSI (T2). The regression model was significant ($F(6, 57) = 5.28$, $p < 0.001$) and explained 38.30% of variance in adolescents' motivation at FU1. The parent domain of parental stress (EBI) ($t = 2.34$, $p = 0.023$) and NSSI duration in years ($t = -3.29$, $p = 0.002$) were the only significant predictors. Also, a reduced model that excluded the child domain of parental stress, the interaction domain of parental stress and lifetime prevalence of NSSI was significant ($F(3, 57) = 9.42$, $p < 0.001$), explaining 34.40% of the variance and with the parent domain of parental stress (EBI) ($t = 4.42$, $p < 0.001$) and NSSI duration in years ($t = -3.26$, $p = 0.002$) remaining as significant predictors with one unit increase resulting in an 0.49 increase and 0.32 decrease for adolescent's motivation, respectively. A depiction of the reduced model is shown in Table 5.

Similarly, parental motivation at FU1 was entered as the dependent variable into a linear regression and the three parental stress domains, adolescents' motivation, NSSI duration in years, and lifetime prevalence of NSSI (T2) were added as possible predictors. As only the domain "desire" and the domain "readiness" of parental motivation (PMI) significantly correlated with possible predictors, no regression model for the total score was computed. The regression model predicting the desire domain of parental motivation was significant ($F(6, 51) = 2.51$, $p = 0.035$), explaining 25.10% of variance in parental desire for change. Only the parent domain and the interaction domain of parental stress (EBI) were significant predictors, $t = -2.88$, $p = 0.006$, and $t = 3.05$, $p = 0.004$, respectively. The parent domain of parental stress negatively predicted parental desire for change, whereas the interaction domain of parental stress positively predicted parental desire. Also, a reduced regression model with NSSI duration in years, the interaction domain of parental stress (EBI), and the parent domain of parental stress (EBI) was significant ($F(3, 54) = 4.51$, $p = 0.007$), explaining 21.00% of the variance and with the parent domain ($t = 1.36$, $p = 0.006$) and the interaction domain of parental stress (EBI) ($t = -3.38$, $p = 0.001$) as significant predictors with one unit increase resulting in a 0.37 decrease and a 0.38 increase in parental motivation, respectively. A depiction of the reduced model is shown in Table 5. The regression model predicting the readiness domain of parental motivation (PMI) was not significant ($F(6, 51) = 1.05$, $p = 0.404$).

Predicting NSSI Behavior at Follow-Up Investigation

Finally, to predict adolescents' NSSI behavior at FU1 (during the previous month), a linear regression model

was computed with adolescents' motivation, parental motivation, parental stress, and NSSI duration at T2 as possible predictors. The regression model was significant ($F(7, 48) = 2.78$, $p = 0.016$) and explained a total of 28.80% of the variance in NSSI at FU1. Only adolescents' motivation ($t = -2.67$, $p = 0.010$) and the parent domain of parental stress (EBI) ($t = -2.03$, $p = 0.047$) were significant predictors. Also, a reduced regression model only including adolescents' motivation and the parent and interaction domains of parental stress (EBI) was significant ($F(3, 60) = 6.13$, $p = 0.001$), explaining a total of 24.40% of the variance. Adolescents' motivation at T2 ($t = -2.55$, $p = 0.013$) and the parent domain of parental stress (EBI) ($t = -2.05$, $p = 0.045$) were confirmed as significant predictors with one unit increase resulting in a 1.65 and 1.57 decrease in NSSI behavior at FU1, respectively. A depiction of the reduced model is shown in Table 5.

Discussion/Conclusion

The major purpose of the present study was to determine the relationship between motivational treatment factors (adolescents as well as parents), parental stress, and adolescents' subsequent NSSI in a sample of child and adolescent psychiatric emergency presentations. Subsequently, it was examined which factors could serve as longitudinal predictors of adolescent and parental motivation and adolescents' NSSI at a later time point. These factors play a significant role in the treatment of mentally distressed children and adolescents, and to our knowledge have not been studied as of now in relation to patients presenting in the context of an emergency consultation.

We investigated the relationship between treatment motivation and parental stress. There was a significant positive correlation between adolescents' motivation to avoid NSSI at T2 and parental stress in the child domain and the parent domain. Also, parental motivation, in particular, the desire domain of the PMI, namely parents' desire that their child change [31], correlated positively with one aspect of parental stress, namely the interaction domain of the EBI. One possible interpretation regarding adolescents' motivation and parental stress is that adolescents may be trying to reduce parental stress by demonstrating therapy motivation. Parental motivation may, on the one hand, relate to parental stress through parents' desire for their children to change causing stress in the interaction between parent and child. On the other hand, existing parental stress could in turn also lead to higher

Table 4. Correlation matrix for study variables at standardized emergency management with defined diagnostic assessments (T2)

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Adolescents' Motivation Questionnaire (AMQ)	–											
2. Parent Motivation Inventory (PMI): desire	0.05	–										
3. Parent Motivation Inventory (PMI): readiness	–0.12	0.20**	–									
4. Parent Motivation Inventory (PMI): ability	–0.05	0.24**	0.35***	–								
5. Parental Stress Index (EBI): parent domain	**0.20***[1]	0.11	–0.15	–0.03	–							
6. Parental Stress Index (EBI): child domain	**0.24***[1]	0.02	–0.12	–0.02	0.48***	–						
7. Parental Stress Index (EBI): interaction domain	0.13[1]	**0.19***	–0.14	–0.04	0.66***	0.54***	–					
8. Duration NSSI, years	–0.03	0.03	**–0.22***	–0.02	0.13	0.12	0.16	–				
9. NSSI lifetime prevalence	**–0.38***	–0.08	0.01	–0.01	0.00	–0.02	–0.01	0.40***	–			
10. Symptom Checklist-90 Revised (SCL-90-R): Global Severity Index (GSI)	**–0.21***	–0.13	0.08	–0.01	–0.01	–0.00	–0.06	0.20*	0.19*	–		
11. Clinical Global Impressions Scale (CGI-S)	–0.03	0.01	0.02	0.07	0.18	0.18	0.23**	0.17	0.07	0.23**	–	
12. Global Assessment of Functioning Scale (GAF)	0.03	0.11	0.01	–0.03	–0.08	0.03	–0.07	–0.19*	–0.21**	–0.24**	–0.56***	–

NSSI, non-suicidal self-injury. Correlation coefficients correspond to Kendall's τ. An FDR correction has been applied. Significant correlations relevant to study questions are marked in bold. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. [1] As adolescent motivation and parental stress were normally distributed, Pearson correlations were computed.

Table 5. Results of reduced linear regression models for adolescents' and parental motivation and NSSI behavior

Dependent variables at FU1	Predictor at T2	B	SE	β	t	p value
Adolescents' Motivation Questionnaire (AMQ)	Parental Stress Index (EBI): parent domain	0.49	0.11	0.50	4.42	<0.001
	NSSI duration in years	−0.32	0.10	−0.37	3.26	0.002
	Parent Motivation Inventory (PMI): total score	0.57	0.32	0.20	1.79	0.080
Parent Motivation Inventory (PMI): desire	Parental Stress Index (EBI): parent domain	−0.37	0.11	−0.58	−3.38	0.001
	Parental Stress Index (EBI): interaction domain	0.38	0.13	0.49	2.88	0.006
	NSSI duration in years	0.10	0.07	0.17	1.36	0.179
NSSI prevalence (past month)	Parental Stress Index (EBI): parent domain	−1.65	0.81	−0.33	−2.05	0.045
	Parental Stress Index (EBI): interaction domain	0.25	0.94	0.04	0.27	0.789
	Adolescents' Motivation Questionnaire (AMQ)	−1.57	0.62	−0.31	−2.55	0.013

AMQ (Adolescents' Motivation Questionnaire), $R^2 = 0.34$; PMI (Parent Motivation Inventory), $R^2 = 0.21$; NSSI prevalence at FU1, $R^2 = 0.24$. NSSI, non-suicidal self-injury; T2, standardized emergency management with defined diagnostic assessments; FU1, follow-up investigation 1.

motivation in parents (desire). Previous research found that when parents are affected by a burden of stress, there is often less motivation to seek treatment [20, 21]. The finding in our study may be explained by the fact that parents show motivation mainly in the area of desire, namely in seeking change in their child, and that our clientele are patients who are seen in emergency settings. The fact that no significant correlation between adolescents' motivation and parental motivation was found, shows how important it is to work independently on the treatment motivation of adolescents and their parents.

The proportion of mothers filling in the questionnaires and thus acting as accompanying persons for the children was about 80% at T2. This proportion of mothers is found to be similar or even higher in other studies [31, 34, 55]. The GSI, an indicator of psychological distress, was assessed and we found higher GSI values in girls than in boys. In line with previous studies [6, 56], we found a high proportion of girls as we selected the sample for NSSI and suicidal behavior. This could also explain the higher GSI value for girls.

There was a significant difference in parental stress in the child domain between parents who participated in FU1 and those who did not. Surprisingly, parents who participated in FU1 were less stressed on the child domain (at T2). This difference can be interpreted as parents' resignation regarding their child's problems and how hard it can be to deal with such behavior [15], even in light of upcoming treatment.

Surprisingly, higher lifetime prevalence of NSSI was associated with lower adolescents' motivation; also, the GSI score at T2 was negatively correlated with adolescents' motivation. But similar results were also found for parental treatment motivation, namely that parents showed less readiness for change when their children engaged in NSSI for a longer duration. However, the correlation between lower parental treatment motivation and NSSI of longer duration in children could also be due to a selection effect as a result of the study design (i.e., because children who were already in treatment were excluded from the study). Contrary to the results of this present study (that parents showed less readiness for change when their children engaged in NSSI for a longer duration), another study [34] found that the severity of internalizing problems, followed by externalizing problems, was the strongest predictor for higher parental treatment motivation. The difference to our study could be due to the fact that the aforementioned study used an outpatient sample in a child and adolescent psychiatric service. Furthermore, it was supposed to be about newly referred patients, the average age of patients was 10.2 years and children referred for eating disorders or forensic problems were not included because treatment motivation of parents could differ in this case [34]. Our patients show a significantly higher mean age and were recruited from emergency presentations. From such crisis situations, according to our clinical experience, parents must partly be motivated to perform further diagnostic assessments and treatment planning. Accordingly, in another study [12], NSSI at age 14 was found to be related to less supportive parental behavior, which can be explained in the context of an acute family crisis. Especially at the first realization that their children are engaging in NSSI, parents are overwhelmed with feelings of guilt and

shame [57]. Understanding, accepting, and acting on self-injurious behavior by parents is a continuous, gradual process [58].

We were also interested in whether adolescents' motivation to stop NSSI, parental motivation, and NSSI behavior could be predicted at FU1. We could confirm that the parental domain of parental stress (EBI) (positive) and NSSI duration in years (negative) were significant predictors for adolescents' motivation. With longer duration of NSSI, adolescents show lower treatment motivation, possibly due to resignation. Indeed, often children with self-injury do not seek help, or they are reluctant to communicate their concerns to a professional [59]. NSSI can be called a process addiction in some individuals who self-injure [60] that can compete with motivation for treatment and may interfere with treatment of self-injury [61]. In contrast, parental stress (parent domain) seems to increase adolescents' treatment motivation. From our point of view, this shows an unexpected family dynamic. This may show a strong sense of responsibility of the young people towards their parents, which could possibly even represent signs of parentification [62–64].

Moreover, we found that the parent domain of parental stress negatively predicted parental motivation (desire), whereas the interaction domain of parental stress positively predicted parental desire. We would interpret this finding as follows: personally stressed parents are less motivated, for example, because they are absorbed by their own concerns, but parental stress in relation to interaction with their children predicts higher motivation. For example, caregivers who are suffering from a depressive disorder (stress on the parent domain) are significantly less likely to have the willingness to start indicated treatment [22]. In parents of children with externalizing behavior, high levels of parental stress revealed that one motivational factor (namely, readiness to change) was high regardless of the child's externalizing behavior [26]. Further, only adolescents' motivation and the parent domain of parental stress (EBI) were significant predictors for NSSI behavior at FU1 in the sense that adolescents injured themselves less at FU1 when their motivation was higher at T2, and their parents were more stressed by personal factors at T2. An important but understudied area of investigation that could be used to develop and improve treatment is the patients' motivation for stopping NSSI [65]. Research on a range of psychiatric disorders underscores the relevance of motivation for change in predicting engagement in problematic behaviors [66]. This finding in particular confirms a combination of parental stress factors while also emphasizing that adoles-cents' motivation for treatment should not be forgotten, since participation and compliance in treatment increasingly shift to adolescents as they get older [31]. In a longitudinal study analyzing intrapersonal and interpersonal factors in adolescent NSSI, higher levels of experienced family support and higher self-esteem predicted NSSI cessation [67]. Providing an understanding of the role of parents in the progress of NSSI may enable clinicians to more effectively empower parents to support their adolescents [68]. So there is a reciprocal influence in the sense that parents can have an important role in help-seeking and in the treatment of adolescents with NSSI, but also that adolescent NSSI can have an impact on parental well-being and parenting [68].

Some limitations of the current study must be named. Four experienced and trained clinicians performed the diagnostic assessments and doctoral candidates were trained in handling a part of the follow-up investigations. Psychiatric diagnoses were determined including certified child psychiatrists. A limitation to be mentioned here is that no interrater reliability was calculated. However, the above-mentioned professions/research personnel were carefully instructed and trained in performing the interviews. Another limitation may be that we related adolescents' treatment motivation only to NSSI avoidance. Self-report measures are likely to suffer from bias, and especially in the setting of clinical practice, limited possibilities exist to determine the exact frequency of NSSI behaviors. No information on educational status or socioeconomic status was collected from parents, which should be considered in future studies of this type. Furthermore, the patient sample was recruited from only one child and adolescent psychiatric clinic, so that the generalizability of the data may be limited. Especially regarding stress factors of parents and treatment motivation of parents and adolescents, it should be pointed out that we excluded patients with a prolonged need for inpatient treatment or severe acute psychiatric disorders. Furthermore, patients with already existing adequate outpatient care were excluded. Nevertheless, the present study sample can be regarded as typical for an outpatient emergency setting at a psychiatric hospital for children and adolescents of maximum care.

However, a major and important strength of our study is that our examination of outpatients took place in the emergency outpatient clinic and the evaluation of parental stress factors as well as parental treatment motivation and adolescents' motivation was performed without time lag. In addition to detailed standardized clinical diagnostic assessments performed by clinical experts, we added

parents to the focus of our study and thereby included a crucial factor for therapy initiation. Especially the combination of investigating motivational factors in parents and adolescents while at the same time inquiring about parental stress factors in a clientele presented based on an emergency presentation emphasizes the added value of the study. By assessing treatment motivation in an affective and highly stressed patient group, as recommended by Drent et al. [34], we are able to provide valuable insight on future treatment outcomes. Overall, our data analysis showed a positive relationship between adolescent motivation and parental stress as well as between parental treatment motivation and parental stress. Unexpectedly, parents showed lower treatment motivation when their children practiced NSSI for a longer period of time. Finally, adolescent motivation and parental stress due to personal concerns were significant predictors of adolescent NSSI prevalence (past month) at follow-up. This analysis is crucial and, to our knowledge, has not been studied so far with regard to parents of adolescents with NSSI in a context of crisis. With increased knowledge concerning the interrelationship of these relevant factors in child and adolescent psychiatry and further research on this topic, the future treatment of adolescents, also in interaction with the accompanying parents, can be optimized [68].

Acknowledgments

Statement of Ethics

The study has been performed in accordance with the Declaration of Helsinki and has been approved (No. 19-1426-101) by the Ethics Committee of the University of Regensburg. Participants and their parents/caregivers gave their informed and written consent to take part in the study.

The study has been registered in the German Clinical Trials Register since August 13, 2019, DRKS00017586. In our study, we were guided by the reporting guidelines in accordance with TREND.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Stephanie Kandsperger and Romuald Brunner had the idea for the study and developed the study design. Irina Jarvers contributed to hypotheses, sample size calculation, and statistical analyses. First manuscript has been written by Stephanie Kandsperger and Irina Jarvers. Angelika Ecker, Alexandra Otto, and Daniel Schleicher participated in the design and coordination of the study. As a clinical collaborator, Joseph Madurkay plays an important role in patient coordination and has conducted a significant proportion of appointments with patients. Stephanie Kandsperger, Irina Jarvers, Angelika Ecker, Alexandra Otto, Daniel Schleicher, Joseph Madurkay, and Romuald Brunner read and approved the final manuscript.

Data Availability Statement

The data that support the findings of this study are not publicly available as the period in which patients have the right to delete their data has not yet expired, but the data are available from S.K. upon reasonable request.

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