UNIVERSITY OF SPLIT
SCHOOL OF MEDICINE

ULRICH WERNER KASTNER, MD

CLASSIFICATION OF PATIENTS WITH SUICIDAL IDEATION AND SUICIDE ATTEMPTS IN A RURAL REGION IN GERMANY BY LATENT CLUSTER ANALYSIS: WHAT MAKES THE DIFFERENCE?

DISSERTATION

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Institution

Department of Psychiatry and Psychotherapy, Helios Fachkliniken Hildburghausen, Hildburghausen, Germany

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Dedication

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List of Abbreviations

3ST	The Three-Step Theory of Suicide
AAP	Atypical Antipsychotics
AD	Antidepressants
AdD	Adjustment Disorders
AIC	Akaike Information Criterion
AP	Antipsychotics
aSLE	Acute Stressful Life Events
BGB	Bürgerliches Gesetzbuch *(engl. German Civil Code)*
BIC	Bayesian Information Criterion
C-SSRS	Columbia Suicide Severity Rating Scale
CAIC	Consistent AIC
CBSA	Census's Core-Based Statistical Areas
CDC	U.S. Centers of Disease Control and Prevention
COVID-19	Coronavirus Disease 2019
DSM-5	Diagnostic and Statistical Manual of Mental Disorders, 5th ed.
ED	Emergency Department
EMA	Ecological Momentary Assessment
GP	General Practitioner
HBN	District of Hildburghausen, Thuringia
Helios FKH	Helios Fachkliniken Hildburghausen *(engl. Helios Specialist Clinics Hildburghausen)*
HYP	Hypnotics
ICD-10	International Classification of Diseases, 10th Revision
IEA	Individual Epidemiological Analysis
ILD	Ilm District, Thuringia
ILM	Intensive Longitudinal Methods

IMV	Integrated-Motivational-Volitional Model of Suicidality
LCA	Latent Class Analysis
LCAvarsel	Variable Selection for LCA
LGB	Lesbian, Gay & Bisexual
LGBTQ+	Lesbian, Gay, Bisexual, Transgender, Queer, and Questioning
ltSA	life-time Suicide Attempter
MGN	District of Meiningen, Thuringia
MM	Motivational moderators, IMV Model
MSA	Multisuicide Attempters
NaSSA	Noradrenergic and Specific Serotonergic Antidepressant
NeST	Network for the Prevention of Suicides in Thuringia
NSSI	Nonsuicidal Self-Injury
NSSI-D	Nonsuicidal Self-Injury Disorder
NUTS	Nomenclature des Unités Territoriales Statistiques *(engl. Nomenclature of Statistical Territorial Units)*
PIA	Psychiatrische Institutsambulanz *(engl. Psychiatric outpatient clinic)*
poLCA	Polytomous Variable for LCA
PTSD	Posttraumatic Stress Disorder
RASAC	Readmission after Suicide Attempt Cohort
RUCC	Rural-Urban Continuum Codes
SA	Suicide Attempters
SABIC	Sample-Size Adjusted BIC
SARS-CoV2	Severe Acute Respiratory Syndrome Coronavirus Type 2
SBD	Suicidal Behavior Disorder
SHL	City of Suhl, Thuringia
SI	Suicide Ideators
SIC	Suicidality Incidents Cohort
SLE	Stressful Life Events

SNRI	Serotonin and Norepinephrine Reuptake Inhibitors
SON	District of Sonneberg, Thuringia
SRA	Suicide Re-Attempters
SSA	Single Suicide Attempter
SSRI	Selective Serotonin Reuptake Inhibitors
STB	Suicidal Thoughts and Behavior
TAC	Total Admissions Cohort
TAP	Typical Antipsychotics
ThürPsychKG	Thüringer Gesetz zur Hilfe und Unterbringung psychisch Kranker *(engl. Thuringia Law on Assistance and Accommodation for the Mentally Ill)*
TLS	Thüringer Landesamt für Statistik *(engl. Thuringian State Office for Statistics)*
TSM	Threat to Self Moderators, IMV Model
URT	Urban-Rural Typologies
VM	Volitional Moderators, IMV Model

1 Introduction

According to the World Health Organization (WHO), more than 700,000 people die by suicide each year. Suicide remains a leading cause of death in the United States (1), with 45,979 deaths in 2020; suicide was the second leading cause of death for people ages 10-14 and 25-34; and was among the top nine causes of death for people ages 10-64 (1). The suicide rates differ according to ethnicity, culture, age, nation or region. There are above-average suicide rates for veterans, residents of rural areas, prisoners, and workers in specific sectors and occupations (2,3).

Still, ultimately, the causes of these differences are not fully understood (4). Studies have traditionally assumed that suicide crises occur in the context of severe mental illness, such as major depression or psychosis (5,6), which can undoubtedly be considered a proximal factor. In addition, many epidemiological and individual factors are known to increase suicide risk, including gender, age, substance abuse (7), socioeconomic status, or self-injurious behavior (4,6,8–10). Suicidal behavior is associated with genetic factors (11), shows familial aggregation, and is mediated by neurocognitive deficits or impulse control disorders (10,12). Recent research has also focused on the fact that many suicidal individuals have experienced stressful life events shortly before their death (13,14), such as unemployment (15–17), economic insecurity (18–20), financial problems (18), loss of loved ones (21), physical illness (22), and interpersonal difficulties such as family conflict (23), and separation (24). However, since no single factor can predict suicidal behavior, the interaction of different factors, specific subgroup analyses, changes in suicidality in particular situations such as pandemics or natural disasters, and regional aspects are the focus of intensive scientific research (25).

A major advance in suicide research has been the development of complex models incorporating risk factors and motivational and volitional factors to explain the transition from risk to suicide (25–28). Two current theoretical models serve as the basis for further introduction to the topic and development of this study: In his highly influential Interpersonal Theory of Suicidal Behavior (ITS), Thomas Joiner identified two primary triggers for suicidal behavior in vulnerable individuals: "perceived burdensomeness" and "thwarted belongingness" (26). O'Connor & Kirkley (2018) explain the complex interactions between distal and proximal factors of suicidality in their Integrated-Motivational-Volitional Model of Suicidality (IMV), describing the volitional phase as the transition from thinking to acting and identifying predisposing factors and moderators for the development of suicidality (25). The ITS and IMV

theories are the basis for much discussion, and numerous researchers are examining their relevance in epidemiological studies and clinical contexts.

Recent statistical methods are helping to analyze the complexity of various distal and proximal factors to improve understanding of suicide crises (29–31). This follows the scientific recommendation to develop more specific models for different populations and focus on using risk algorithms rather than single risk factors (4). The main aim of our study was to investigate whether a latent class analysis (LCA) within a group of suicidal inpatients could form specific classes that would allow conclusions to be drawn about complex risk constellations. We were also interested in whether there were differences between psychiatric inpatients with suicidal ideation and those admitted after a suicide attempt. We expected to obtain information to explain the transition from suicidal ideation to suicidal behavior.

Suicide attempts are the strongest predictor of completed suicide (32,33). Therefore, collecting information on the frequency and distribution of suicide attempts is central to suicide prevention. However, there is no established representative data source for monitoring suicide attempts in Germany. In 2019, the Robert Koch Institute initiated the development of a "Mental Health Surveillance" (MHS) for Germany (34), which will include collecting information on suicide attempts in emergency departments in Germany. Schlump et al. (2022) published the first data from the AKTIN project, in which 12 emergency departments nationwide are combined (35). However, this does not adequately solve the problem of detecting suicide attempts if psychiatric hospitals are not included in the survey of emergency departments.

Regional differences in suicidality in Germany can only be reliably determined using data from mortality statistics. In Germany, there is considerable variation in suicide rates between states and counties (36); in our study area, suicide rates ranged from 9.4 to 25.6 per 100,000 population in 2017. Because most studies of suicidality use extensive cross-sectional data, such as death registries or broader health databases, this limit understanding of specific risk factors or characteristics in regional subgroups. It is possible that the commonly used suicide clusters only describe general risk factors for suicidal behavior and cannot explain regional differences because they do not consider specific demographic, socioeconomic, environmental, and other factors.

This study is the first that relies on a comprehensive analysis of hospitalized suicide attempters (SA) and suicide ideators (SI) in a defined, predominantly rural region in Germany. The study uses LCA (30) to compare subjects on age and gender, as well as in epidemiological, regional, clinical, and psychological subgroups. It examines the impact of the COVID-19 (Coronavirus Disease 2019) pandemic and related constraints on the frequency of suicide attempts in the region, focusing on regional aspects and stressful life events.

1.1 Prevalence of Suicides and Suicide Attempts

While the overall age-adjusted suicide rate in the US rose from 10.7 deaths per 100,000 of the average population in 2001 to a recent high of 14.2 in 2018 (37), it fell in Europe. In 2001, the average (age-adjusted) suicide rate for all European Union member states was 14.24; by 2018, it had dropped to 9.71 per 100,000 population (38).

In Germany, there were 9,215 suicide deaths in 2021, resulting in a suicide rate of 11.1 deaths per 100,000 population (16.9 for males and 5.4 for females) (39). There have been notable differences in suicide rates among different age groups over the past two decades: the suicide rate among men over 75 has increased by 70.2% in the last two decades, while for men aged 35 to 54, it has decreased by 27.8%. During the same period, the suicide rates for women slightly decreased across all age groups (39).

There are significant variations in suicide rates among the different German federal states: With 7.4 suicides per 100,000 inhabitants, North Rhine-Westphalia had the lowest incidence rate. The highest suicide rates, 16.1 and 15.5, were recorded in Saxony and Thuringia (40).

The number of individuals contemplating or trying to commit suicide is even higher than suicides. By 2021, an estimated 12.3 million American adults will have thought about suicide, 3.53 million will plan to attempt suicide, and 1.75 million will attempt suicide (41). The lifetime prevalence of suicidal thoughts for the world population is approximately 9%, and about 2% within the last 12 months (5).

There is broad consensus that the identification of risk factors is also an essential step in the improvement of prevention and treatment of suicidal ideation and behavior and, by inference, suicide. Suicide attempts are considered one of the most critical risk factors for subsequent suicide (4).

In 2017, Franklin et al. conducted a meta-analysis to provide an overview of the current knowledge on individual risk factors that longitudinally predict specific STB-related outcomes. A total of 365 studies from the last 50 years were included. Summarizing the results of prior studies, it can be concluded that all previously identified risk and protective factors for suicidal behavior and suicidality must be considered weak and imprecise. Prediction was only slightly better than chance in all analyses of odds ratio, hazard ratio, and diagnostic accuracy (4). No improvement in predictive ability in 50 years of research; studies have

rarely examined the combined effect of multiple risk factors (4). Today's research approaches are moving away from studying individual risk factors and focusing on risk algorithms and specific subpopulations.

Suicidology has significant methodological limitations. The interdisciplinary nature of suicidality makes it generally difficult to obtain reliable figures on the frequency and prevalence of suicide and attempted suicide (42). Suicidal people are not treated exclusively in specialized clinics, but more often by general practitioners or in somatically oriented hospitals or emergency departments.

Inconsistent definitions in clinical practice and misclassification of deaths by forensic pathologists or physiologists may result in many suicides going unrecorded. The quality of data on suicide attempts is even less reliable than that on completed suicides. The challenge is to find universally accepted definitions that distinguish between non-suicidal self-harm and suicidal behavior with the intention of dying, and clearly distinguish between non-violent and violent means, and between people who have attempted suicide several times in their lives and those who have attempted suicide only once (43). Better training in the certification of suicides and suicide attempts needs to be developed and made available.

Because of the relative rarity of completed suicide in the population, large sample sizes are required to ensure the statistical power of studies of events with a low incidence rate (42).

The lack of longitudinal and prospective studies remains a major obstacle to understanding and preventing suicide. To understand the interacting risk and protective factors and their development, prospective, transactional research is needed. Long-term follow-up is needed to adequately evaluate preventive interventions. Large, networked research centers have helped to improve the evidence base for other social problems and are expected to do the same for suicide (42). The problem of missing or inaccurate information from people about previous suicide attempts in their life history is discussed in more detail in Chapter 5.4.1 (“Unveiling Hidden Histories: Previous Suicide Attempts”).

1.2 Theoretical Models of Suicidality

Contemporary qualitative research acknowledges that suicide is a multifactorial and context-dependent occurrence and focuses on the transition of ideation to behavior. Several models have been created to explain suicidality, with numerous models including formerly researched epidemiological data and resulting risk factors. Recent models endeavor to recognize intrapsychic moderators to deduce prevention approaches for highly susceptible groups and clinical interactions during acute suicidality. Most researched models concern the shift from suicidal ideation to action and explain the phenomenon of multi-suicide-attempters or re-attempters.

Émile Durkheim (1897) was the first to suggest that suicide was not just an individual act but a social phenomenon that social factors could explain. In his 1897 book "Suicide: A Study in Sociology," he defined suicide as, on the one hand, "a general state of extreme depression and exaggerated sadness, in which the patient is no longer able to perceive rationally the ties which bind him to the people and things around him" (44). A Social-Ecological Suicide Prevention Model (SESPM) was proposed by Cramer & Kapusta (2017). This model integrates general and population-specific risk and protective factors (45). They employed a multi-level perspective to provide a structured approach to understanding current theories and intervention/prevention efforts concerning suicide (45).

The Diathesis-Stress Model is a widely accepted theoretical framework that explains the development of mental disorders, including suicidal behavior. The model suggests that the development of mental disorders occurs due to a combination of genetic predisposition (diathesis) and exposure to stressful life events (stress) (46,47). According to the model, completed suicide depends on the interaction between psychosocial stressors and a trait-like susceptibility. Stressful life events are commonly known to trigger suicide behavior, and those who are vulnerable are more likely to consider suicide in response to stress (47).

The ITS aims to explain why people become suicidal and how to identify people at risk. According to Thomas Joiner's theory, suicidal behavior occurs when a person has the desire and the ability to commit suicide (26,27). The model postulates that suicide can be explained by the simultaneous presence of three risk factors: acquired capability for suicide, thwarted belongingness, and perceived burdensomeness (48). Although the model has been criticized

for reducing suicidality to just three factors, ignoring the fact that suicidality must be understood as a complex, multifactorial, and context-dependent phenomenon, the model does not address the following issues (48), ITS is one of the current suicidality theories and is the subject of intense research.

The absence of comprehensive theoretical frameworks that have attempted to understand the emergence of suicidal ideation and the transition from suicidal ideation to suicide attempt has prompted O'Connor (2011) to develop the IMV (49). It is a second-generation model that, along with the ITS of Joiner (2015) (27,50) and the Three-Step Theory of Suicide (3ST) by Klonsky & May (2015) (28), provides a theoretical perspective that explains the suicidal process through the ideation-to-action framework (51). In summary, the IMV describes a pre-motivational phase with underlying individual risk factors and precipitating events, a motivational phase with the formation of suicidal thoughts and intentions, and a deliberate phase with the transition from ideation to suicidal behavior (49). In 2018, O'Connor & Kirtley published three significant refinements: first, the potential cyclical nature of suicidality; second, they specified the volitional phase by describing eight essential volitional moderators; and third, they specified seven key premises underlying the IMV model (25). The IMV model forms the basis for the selection and analysis of risk factors and moderators in this dissertation, which are explained in detail in the methods chapter.

Together, these models provide a comprehensive framework for understanding the transition from suicidal ideation and intent to suicidal behavior. They highlight the complex interplay between cognitive, affective, and behavioral factors and the importance of addressing internal and external factors to prevent and treat suicidal behavior. Effective interventions for suicidal behavior must target these factors. They include a range of treatments to reduce access to lethal means and increase social support, such as cognitive-behavioral therapy, problem-solving therapy, family or couples therapy, and environmental interventions.

1.3 Risk Factors of Suicidality

The following is a summary of findings on known risk factors for suicidality based on the IMV of O'Connor, 2011 (49). Not all factors can be assessed through retrospective data collection; potential factors and those subsequently used for LCA are described in detail in the Measures chapter (see Chapter 3.3). But it was one of the aims of this study to show whether routine data can be used to meaningfully cluster clinical available data or whether clinical routines should be expanded to capture additional significant factors in the future.

IMV identifies three main phases in the development of suicidality. The pre-motivational phase describes background factors and precipitating events. The motivational phase explains the emergence of suicidal thoughts and intentions. The volitional phase examines the transition from suicidal ideation to actual suicidal action.

1.3.1 Pre-motivational Phase of IMV

The background factors and precipitating events are summarized in the premotivational phase. These factors may describe a higher risk of developing suicidal ideation or even suicidal behavior in later life episodes. This is a combination of personality traits such as socially imposed perfectionism (52,53), vulnerability to psychological pain (54), effects of the environment in which one lives (44), or socioeconomic inequality. Other factors include adverse or stressful life events (55) that pose a risk at any stage of life, the formation of attachment relationships (56), natural disasters (57), war (58), flight (59), and displacement (60), or pandemics (61). According to the IMV, a triad of factors characterize the pre-motivational phase: Diathesis, environment, and life events (25). Pre-motivational factors influence suicide risk in the motivational and volitional phases through their influence on moderators.

Diathesis is a biological, genetic, or cognitive vulnerability factor or individual difference that increases the risk of suicide (10,12). Turecki, 2014, described decreased serotonergic neurotransmission as a vulnerability factor for suicidal behavior (62). These factors are not suitable for routine clinical use; in particular, the predictive approach is limited, especially with regard to the transition from suicidal ideation to suicidal action. Data are not available from medical records.

Mental Illness

Mann et al. (1999) sought to create a clinical model of suicidal behavior in a study of 184 psychiatric patients. Those who had attempted suicide did not differ from those who had never attempted suicide in the objective severity of current depression or psychosis (63). The SAs reported higher levels of depression, suicidal thoughts, and fewer reasons for living as Mann et al. found (63). They observed, that "the rates of lifetime aggression and impulsivity were also higher in attempters. Comorbid borderline personality disorder, smoking, a history of substance use disorder or alcoholism, a family history of suicide, a history of head injury, and a history of childhood abuse were more common in SA" (63).

The authors therefore propose a stress-diathesis model in which suicide risk is determined not only by a psychiatric disorder as a stressor, but also by an individual disposition, e.g. in the sense of increased impulsivity or the frequency or intensity of suicidal thoughts (63).

Further studies have examined the relationship between mental illness and suicide risk. Common disorders such as depression and anxiety contribute significantly to exacerbation (64).

Several studies found that emotional dysregulation and stress intolerance encourage suicidal ideation (65). The strongest association between anxiety and suicidality remains in PTSD. Suicides were 22 times more likely to be diagnosed with borderline personality disorder (15). Corbitt EM (1996) reported in a small study of n = 102 psychiatric inpatients that patients with borderline personality disorder symptomatology were at risk for serious suicide attempts (66). These findings have been replicated over the years (67–72). Schaffler et al. 2014 found differences between BD and non-BD groups, with more females, fewer married, and more living alone; they had almost twice as many previous suicide attempts and more substance abuse (73).

The relationship between addictive disorders and suicidality is well established, with a strong interaction between the two. Addictive disorders may increase the risk of suicidal behavior by increasing psychosocial distress, hopelessness, and social isolation. People with addictions are often at risk for depressive symptoms and other mental health problems, which can increase suicide risk. Substance use disorders (74) are influential risk factors in the analysis of youth suicide. Furthermore, adolescents who exhibit suicidal behaviors (e.g., suicidal ideation, previous suicide attempts) also demonstrate conduct problems, substance use, and risk behaviors, and exhibit a lower quality of life (75).

Based on the existing literature, Franklin and colleagues (2017) investigated whether depression, PTSD, or similar diagnostic subcategories stand out as particularly strong risk factors for STB (76). Their findings did not support this hypothesis. Only four subcategories exhibited a weighted mean odds ratio exceeding 3.0: previous suicidal thoughts, hopelessness, non-suicidal self-injury (NSSI), and suicide attempts or psychiatric hospitalization in the past (76). For specific diagnoses, such as depression OR=2.45 (95% CI [1.39, 4.34]), or anxiety disorders OR=1.79 (95% CI [1.34, 2.40]), there was little evidence of increased risk (76).

Age

Suicide affects individuals across the lifespan, ranking as one of the top nine leading causes of death among individuals aged 10 to 64 (41). Among those aged 15 to 29, suicide represents the second leading cause of death, with a particularly high prevalence among young men. In this age group, the suicide rate for men is nearly three times higher than for women (41).

Several risk factors for suicide in older adults, including a history of suicide attempts, psychiatric disorders, physical illness, and social isolation, were identified in a study by Conwell et al. (2002) (77). The study also found that older adults who experienced a recent loss, such as the death of a spouse or close friend, were at increased risk for suicide (77).

In order to facilitate comparison with previous international studies of late-life suicide, several studies have employed three age groups: 65-74 years, 75-84 years, and 85+ (109-114). Characteristics of suicide in older people vary by age. It is evident that mental health services do not necessarily identify the oldest individuals who die by suicide. A primary care-based approach that includes screening for depression and suicide risk is therefore clearly needed (78).

Gender

While evidence of depressive symptoms is pervasive in female suicide deaths, it is only reported in association with advanced age in male suicide deaths (79). In the United Kingdom and most Western countries, male suicide rates increased significantly between 1974 and 1992 (80). In addition to the increase in the over-75 age group, in many countries there was also a disproportionate increase in young men in the 25-34 age group (81).

Sexual orientation

With regard to sexual orientation, there is evidence indicating a higher prevalence of suicidal ideation and attempts among individuals identifying as LGBTQ+. Among gay and bisexual men, 12% to 17% have reported suicidal thoughts in the past year, and approximately 2% have attempted suicide. Among lesbian or gay and bisexual women, 11% to 20% have reported suicidal thoughts, and approximately 3% have attempted suicide (82). The lifetime prevalence of suicide attempts is four times higher among gay and bisexual men and twice as high among lesbian and bisexual women compared with heterosexual individuals (83,84). A significant proportion of LGB youth (29%) had attempted suicide at least once in the previous year, compared with a much lower rate of 6% among heterosexual youth (85,86). A study found that lesbian, gay, bisexual (LGB) students were less likely to experience threats of violence, miss school because they felt unsafe, or attempt suicide than students in schools without LGB support groups (87). Lesbian, gay, bisexual, and transgender (LGBT) people are more likely than their non-LGBT counterparts to report a lifetime suicide attempt. However, research on suicide prevention among LGBT people regarding access to lethal means (e.g., firearms) is limited (88).

Race and cultural issues

There is clear evidence that race may have an impact on suicide mortality and the frequency of suicide attempts. In 2021, the highest age-adjusted suicide rates in the United States were found among non-Hispanic American Indians or Alaska Natives at 28.1 per 100,000 population (89). This group also exhibited the greatest percentage change in suicide rates between 2018 and 2021, with an increase of 26%. However, the results within age groups are not uniform. For instance, the suicide rate for Black individuals between the ages of 10 and 24 years old exhibited a notable increase of 36.6% (11.2 per 100,000 population) between 2018 and 2021, whereas the rate for individuals between the ages of 45 and 64 years old demonstrated a decline of 12.4% (89).

Furthermore, several studies (59,90,91) have already shown that the risk of suicide in the group of refugees is exceptionally high. It is essential to consider whether refugees have just arrived or have been in the country for longer, e.g., awaiting decisions on their right to stay. No conclusions about a particular race, country of origin, or migration status can be drawn from the retrospective data alone. The clinical data contain no information about the patient's

migration status or cultural origin. In the administrative data, only information on nationality was found, which hardly allows conclusions on social integration or duration of stay in Germany, etc. We therefore restrict ourselves only to the special group of refugees, which is defined in the clinical documentation solely by the form of residence (reception facility for refugees or asylum seekers).

Socio-economic factors

The 2013 review by Milner et al. demonstrated that suicide mortality rates (deaths per 100,000 population) are responsive to a diverse array of social factors (92). The associations between divorce, unemployment, and suicide mortality exhibited relatively stable patterns. This is consistent with many other studies that have found an association between being unemployed (especially for more than six months) and living alone, or having lower educational status in general, (early) retirement, or homemaker status, independent of categorized psychiatric diagnosis (93,94). In addition, unemployed suicides were ten times more likely (compared with living unemployed controls) to have had poor social support (15). The investigators routinely recorded current occupation, education, and whether there was incapacity or unemployment (without a time period).

Marital status

The relationship between marital status and suicide has been studied extensively (81,95–97). In 1988, Smith et al. found that married individuals had the lowest suicide rates across all age and gender groups compared with unmarried individuals (97). In addition, young widowed men were found to have exceptionally high suicide rates. As reported by Luoma and Pearson in 2002, U.S. national suicide mortality data for 1991-1996 showed that young widowed men had a 17-fold increased risk of dying by suicide compared with married men in the general population (81).

Furthermore, the research conducted by Lorant et al. (2005) indicates that marriage serves as a protective factor against suicide disparities. This protective effect does not depend on the country's level of social capital (98). The findings of this study highlight the importance of marital status in suicide risk, suggesting that marriage may confer some protection against suicide, particularly among vulnerable groups such as young widowed men. The investigators routinely recorded the current relationship status, and in which living arrangement the participant lived.

1.3.2 Stressful Life Events (SLE)

Theories of suicide have evolved to include the role of life stressors in the development of suicidal behavior. The integrated motivational-volitional model, for instance, recognizes this role (25). Research has shown that individuals who attempt suicide are often exposed to multiple stressors, and stressful interpersonal relationships are a significant risk factor (99). Furthermore, life stress has been associated with other forms of psychopathology, such as depression, which is known to be an essential moderator of suicidal behavior (100).

Previous research has focused primarily on the role of stressful life events (SLE) or single forms of life stress, such as child maltreatment (101). However, people typically experience multiple types of stressors that are unlikely to occur in isolation. Results from psychological autopsy studies indicate a dose-response effect: On average, nearly three lifetime incidents precede suicide deaths, compared to less than one in control groups (102).

Stressful life events are prospectively associated with increased suicidal ideation and behavior, according to a systematic review and meta-analysis by Howarth et al. 2020 (55). Furthermore, even distal stressors, such as childhood bullying, have increased the likelihood of suicide attempts later in life (103–107). In addition, various forms of life stress, such as financial difficulties (108), job loss or insecurity (109,110), relationship problems (102,111), and conflict (112–114), have been implicated in the etiology of suicidal behavior.

Severe Illness

A link between serious physical illness and increased risk of suicide has been suggested by previous research. Hörte et al. (1996) found that while physical illness was rarely a determinant of suicide, it was an important complicating risk factor (115). Fiske et al. (2008) indicated that certain physical conditions, including cancer, neurological disorders, chronic lung disease, incontinence, kidney failure, hearing or vision problems, insomnia, and congestive heart failure, increase the risk of suicide in older age (116). Bhaskaran et al. (2017) identified several physical conditions such as sexually transmitted infections, heart and lung disease, epilepsy, and sleep problems that were significantly associated with increased suicide risk (117). Ahmedani et al. (2017) corroborated these findings, showing that nearly all physical illnesses increase suicide risk, even after adjusting for potential confounders (118). The presence of multiple physical conditions also significantly increased suicide risk. Other studies

have examined whether serious mental illness or physical disorders increase the risk of suicide. Patients with psychiatric disorders have a higher risk of suicide than patients with neither physical nor psychiatric disorders, according to Chang et al (2020) (119). Specifically, they found that the risk of suicide was relatively higher when psychiatric disorders were a prelude to physical illness than the other way around (119). This provides insight into how patients with psychiatric disorders compensate for other stressful experiences. This provides insight into how patients with psychiatric disorders compensate for other stressful experiences.

In our data collection, we focus on the presence of a physical disorder, such as a tumor, neurological disorder, or chronic pain, if the patient in the study associated it with a current suicide attempt or suicidal ideation. However, we could not determine if the patient had a long history of this or if it was a recent burden.

Personal Loss

Personal loss or grief and acute suicidality are assumed to be related. Early studies described an increased risk of STB due to personal loss. Dorpat (1973) suggested that the suicidal crisis is a complicated grieving process that fails to bring closure to the lost object (120). Sandler et al. (2021) found that certain aspects of grief, such as intrusive bereavement thoughts, are associated with increased suicide risk in adolescents who have lost a parent (121). One study found that older adults who had recently experienced a loss, such as the death of a spouse or close friend, were at increased risk for suicide (77). Stein el al. (2010) suggested that traumatic events such as the loss of a close person may predict suicidal ideation, but not the transition from thought to action (122). In addition, the influence of traumatic events decreases with time, which may be due to a degree of habituation (122). Therefore, distinguishing between acute and past events would be necessary, which was not possible in our study. We could not say how long ago the loss had occurred and sometimes did not even know which person was involved. As in other SLE, the patient's statement that the loss was related to the current crisis was critical to fulfilling criterion C2 - personal loss.

Interpersonal Conflicts

Evidence shows that interpersonal conflict can lead to an increased risk of suicidality. Several studies have found an association between interpersonal factors and suicidal behavior.

In their 2016 study, Kazan and colleagues identified relationship separation and poor relationship quality as significant risk factors for suicidal ideation and behavior, as well as frequent triggers for suicide attempts. They further asserted that intimate partner relationships are essential to suicide risk assessment, regardless of the clinical setting (123).

Research shows that poor partner relations (124), interpersonal conflict (125), and separation and divorce (24) are precipitating factors for suicide (123). Adverse life events experienced by spouses or partners contribute significantly to suicidality (103). Specifically, the impact of a relationship dissolution is linked with a pronounced surge in thoughts of suicide, plans, and attempts over the two-year period that follows the dissolution (126). The risk of suicidal behavior is particularly elevated for males in the 15 to 24 age group (24). Additionally, numerous systematic reviews have explored the association between specific elements of intimate partner relationships, including intimate partner violence and abuse (127,128), separation (129), and suicidality.

Financial Crisis

Other work generally suggests a link between financial crises and suicidality. Georgievski & Mostert (2016) found an association between increased suicides and increased unemployment during the financial crisis in Portugal, Italy, Ireland, Greece, and Spain (130). Almasi et al. (2009) made a connection between job concern or unemployment (110). Stevenson & Wakefield (2020) found that financial distress predicts suicidal thoughts and behaviors through increased stress and loneliness (131). Charalambous & Asimakopoulou (2020) also confirm the link between economic recession and increased suicide rates (132). Stack & Wassermann (2007) found that suicide risk was associated with all categories of occupational stress (108); however, these were generally associated with other stressors in the genesis of suicide, such as loss of housing, stressful social relationships, or death (108).

ACE and Trauma

Studies have shown, that there is a link between suicide attempts and the presence of childhood trauma (133–135)**.** There is evidence that early life adversity is associated with epigenetic changes in genes, cortisol dysregulation, and disrupted attachment formation. This relationship has been reported by Fergusson et al. (2000) and Turecki & Brent (2016) (136,137).

A review of the existing literature reveals a consistent indication that children who have been maltreated are at an elevated risk for a range of behavioral and psychological issues, including poor academic performance, higher rates of anxiety disorders, depression, suicidal ideation and attempts, eating disorders, conduct disorder/antisocial behavior, psychosis, and substance abuse (138–141). In addition, research has shown that childhood sexual abuse (CSA) is associated with a significantly higher risk of sexual victimization and violent relationships in adulthood (142). Moreover, recent studies have indicated that childhood victimization may have long-term effects on physical health and healthcare utilization in adulthood (143–146).

In the past, researchers have concentrated on a single type of victimization, such as child sexual abuse (CSA) (147) or physical abuse, to the exclusion of other forms of co-occurring victimization (148). However, recent studies have shown that different types of victimization do not occur independently (149).

The study of victimization is a complex issue in psychology. Focusing on a single type of victimization can obscure the potential impact of other types of harm on individuals. However, Holt et al. (2007) reported that such a focus could be problematic because it ignores the interplay between different types of victimization (150). For instance, Trickett et al. (1995) pointed out that physical abuse often involves other forms of abuse, including belittlement, disdain, or neglect, while child sexual abuse (CSA) may involve violence or threats of violence (151). In addition, sexual abuse itself may be painful and accompanied by physical abuse.

Furthermore, Lau et al. (2005) reported that multiple types of maltreatment are present in a significant proportion of child welfare cases, ranging from 46% to 90% (148). These findings suggest that victimization experiences may not occur in isolation, and multiple types of victimization may occur together. For example, McLaughlin et al. (2012) and Serafini et al. (2015) found that a variety of adverse life events, including experiencing victimization, were associated with increased risk for mental health problems (128,152).

Refugees, Flight and Displacement

There is a lack of epidemiologic studies on suicidal ideation and attempts among refugees in Germany. However, there are studies from other countries and other time periods. Timmons 2011 found that parental displacement is associated with an increased risk of suicide

attempts among adolescents, especially when combined with low levels of belonging (153). Cogo et al. (2022) reviewed several studies and found varying rates and prevalence of suicidal behavior among displaced persons, with some evidence of increased suicide risk among asylum seekers and refugees living in camps (154). However, a high level of psychological distress in this population is suggested by the high prevalence of suicidal ideation (155).

Vijayakumar et al. (2021) highlights that refugees face various risk factors for suicide, including exposure to trauma, psychological disorders, and rejection of asylum status (156). Wasserman (2017) emphasizes the challenges in providing mental health care to refugees and asylum seekers, as well as the need for effective treatments and support to minimize suicide risk (157). Prémand et al. (2018) compared asylum seekers and permanent residents attending an outpatient clinic and found that both groups have a similar frequency of suicidal thoughts, but asylum seekers receive outpatient crisis intervention more frequently and inpatient care less frequently (158).

Overall, the works suggest that displacement and mobility may be associated with increased suicidality, particularly among vulnerable populations such as adolescents and refugees/asylum seekers.

1.3.3 Motivational Phase of IMV

Threat to Self-Moderators (TSM)

One of the components of the IMV that explains the transition from suicide risk to suicidal ideation or action is the concept of Threat to Self-Moderators (TSM). TSM refers to factors that can influence an individual's decision-making and emotion regulation, which may affect an individual's vulnerability to suicidal behavior. These include cognitive factors such as negative thought patterns and beliefs, rumination, coping (159), and social problem-solving (160–162). For example, ruminating is more strongly associated with suicide risk than reflecting (163–165).

Motivational Moderators (MM)

Furthermore, emotional variables such as feelings of hopelessness, lack of perspective, thwarted belongingness (50), connectedness (166), and being a burden (167) to others have been identified as critical motivational factors (27). "Thwarted belongingness" is a term used

to describe the experience of not being part of a valued group. The construct of "Perceived Burdensomeness" represents the thought or feeling that one's death will be a relief to others. The most common motive for suicide has been identified as fear of being a family burden (26). This observation is significant because it aligns with the theoretical framework proposed by Thomas Joiner, known for his influential work on suicidal behaviour. The Interpersonal Theory of Suicidal Behaviour hypothesizes that two key factors are crucial in understanding suicidal behaviour in individuals vulnerable to such actions. These are the concepts of "thwarted belongingness" and "perceived burden" (26).

Other authors have identified various motivators, such as defeat, humiliation, entrapment, or arrested flight, that lead to suicidal ideation (168). The 2011 study by Taylor et al. provided evidence for a model in which both defeat and entrapment fully mediate the effects of social support and problem-solving appraisals on suicidality (169). They found that people who were more defeated became more suicidal over time (170).

In addition to the above characteristics, defeat or humiliation may be further defined by social rejection and loss (171–173). It is important to distinguish defeat from hopelessness, which is defined as a pervasive pessimism about the future (174). Arrested flight, on the other hand, describes an experience in which a person feels brought down (defeated) with no apparent prospect of escape or rescue (entrapment) (175).

Furthermore, entrapment is directly related to suicidal ideation in adolescents. Additionally, it mediates the relationship between anger suppression and suicidal ideation, along with psychosomatic symptoms, resilience, and depression (176). Furthermore, defeat and entrapment mediate the relationship between PTSD symptoms and suicidal behavior (177). The centrality of entrapment in the suicidal process was also evident in a study of 200 adult psychiatric patients hospitalized after a suicide attempt or suicidal ideation (178).

The ability to entertain positive future thoughts, goals, norms, and reasons for living on the other side allows one to perceive alternatives, imagine a more positive future, and experience less psychological distress (179–181). Individual resilience is a crucial factor in this process; diminished stability contributes significantly to hopelessness and despair (182). Individual attitudes toward suicide and death are also crucial, as individuals with more positive attitudes are more likely to consider suicide as a viable option when they feel trapped (183,184).

1.3.4 Volitional Phase of IMV

The transition from suicidal ideation and intent to suicidal behavior is a complex process involving cognitive, affective, and behavioral factors. To understand this process, several theoretical models have been proposed. These include the Suicidal Mode Model, the ITS and the IMV.

The Suicidal Mode Model, proposed by Rudd in 2000 (185), describes the process of suicidal behavior in terms of a sequence of cognitive and behavioral events. According to this model, the process begins with the activation of a suicidal mode, which is characterized by negative thoughts, emotions, and behaviors that increase the vulnerability of the individual to engage in suicidal behavior. Various internal and external factors, including life stressors, mental health conditions, and substance abuse, can trigger this mode. The IPT emphasizes the importance of two key factors in transitioning from suicidal ideation to suicidal behavior: perceived burdensomeness and thwarted belongingness. These factors can lead to hopelessness and a desire to escape unbearable psychological pain. The theory also emphasizes the importance of the acquired capacity for suicide, which is developed through repeated exposure to painful and provocative events that lead to habituation to the fear and pain associated with suicidal behavior (186).

Finally, the volitional phase of the IMV emphasizes the importance of loss of volitional control in the final stage of suicidal behavior. O'Connor & Kirtley (2018) delineated eight pivotal volitional moderators: “access to means, planning, exposure to suicide or suicidal behaviors, impulsivity, physical pain, fear of death, mental imagery, and prior of suicidal behavior” (27).

Except for information on previous suicide attempts, there is usually little information on these factors described in the medical records. In the first admittance examination, we trained investigators to explore motivational and volitional factors. Especially for hopelessness or burdensomeness, this was successful in many cases. At the same time, we found no documented protective, resilience-supporting factors or information about mental pain, fear of death, or mental imagery. This again underlines the unique study situation. Examiners and patients focus on deficit-oriented information in current emergencies without concrete assessment specifications or guidelines. The collection of this information must become part of the further therapy or discharge planning to establish it into clinical routines.

Volitional moderators refer to factors influencing an individual's ability to act on suicidal thoughts or intentions. These factors can include internal and external factors affecting an individual's volition or willpower to carry out suicidal behavior. Internal factors include an individual's level of self-control, self-efficacy, and impulsivity or compulsivity. External factors may include access to resources, social support, and environmental stressors or triggers. Experiencing the suicidal behavior of others, such as family or friends, may influence an individual's will to control (187,188).

The mental image of suicide or suicidal thoughts can affect a person's sense of control. Individuals who experience intrusive thoughts or images related to suicide may have difficulty controlling their behavior (189), especially if intense emotions accompany these thoughts or images. Various studies have examined the relationship between exposure to graphic or sensational depictions of suicide and the risk of suicidal behavior (190,191), but the results are not clear. Williams et al. (2021) discovered that there were no observable effects on explicit and implicit measures of suicide risk as a result of exposure to suicide news articles (192). In a systematic review and meta-analysis conducted by Niederkrotenthaler et al. (2021), it was found that portrayals of suicide in entertainment media may increase the risk of suicide. However, the evidence is limited and subject to bias (193). Finally, Pirkis & Blood (2001) reviewed studies on the impact of fictional portrayals of suicide and found the evidence to be equivocal regarding a causal association with actual suicidal behavior (194).

In addition, individuals with higher levels of impulsivity (195,196) and aggression may have difficulty regulating their behavior and may be more likely to act on suicidal thoughts or intentions (137,196).

Sensitivity and fearlessness have been identified as possible risk factors for suicidal behavior. Sensitive individuals may be more vulnerable to negative emotions, increasing the risk of suicidal thoughts or behaviors. Conversely, fearless individuals may be more likely to engage in risky behaviors, including suicidality. The availability of means of suicide is an established risk factor for suicidal behavior (197).

Finally, previous suicide attempts and using violent methods (43,198,199) are also significant risk factors for suicidal behavior (4,9,200,201).

1.4 Distinguishing Suicide Ideators from Suicide Attempters

The differences between SI and SA have been the subject of extensive research. Several studies have examined these differences and have identified distinct processes and factors associated with each group. Of particular interest were the factors that determine the transition from suicidal thoughts to actions. Emphasizing the transition between ideation and suicide attempt, O'Connor & Kirtley (2018) (25) proposed an integrated motivational-volitional model of suicidal behavior. Similar to this, Klonsky & May (2015) developed the 3ST (28), which also emphasizes the distinction between the development of suicidal ideation and the transition from ideation to suicide attempt. Dhingra et al. (2015) applied the integrated motivational-volitional model to differentiate SA from SI (202). They found that ideators differed from attempters on measures related to the volitional phase, but there were no differences between them in the motivational phase. Most researchers assume that under specific motivational or volitional modulators, a suicidal act is highly probable, even if May & Klonsky (2016) found in a meta-analysis that most SI do not attempt suicide (203). This suggests that there are factors that differentiate those who only experience suicidal thoughts from those who engage in suicide attempts. In their 2018 systematic review, Wolford-Clevenger et al. employed the ideation-to-action theory to investigate the correlates of suicide ideation and attempts among transgender individuals (204). Their findings highlight the challenge of differentiating the risk for suicide ideation versus attempts.

In a further study, Klonsky and May (2013) examined adolescent psychiatric inpatients and found that depression was elevated in those who had attempted suicide compared to those who had not, while alcohol use was elevated in those who had attempted suicide compared to those who had ideated about suicide (205). Several other studies have also explored the differences between SI and SA. Lawrence et al. (2021) found gender differences in suicide risk among preadolescents, with higher rates of ideation among males, but no significant differences in attempts by race and ethnicity (206). Liu & Wilkinson (2021) found that marital status was a more robust correlate of ideation than attempt among transgender individuals (207). Wiebenga et al. (2020) identified childhood trauma, lower education, and non-Western descent as factors associated with suicide attempts among patients with depression and anxiety (208). Ko et al. (2021) found that depressive disorder and hopelessness were more prevalent among SI, while SA had a higher prevalence of comorbid substance use disorder and a lack of social support (209). Research suggests that SI and SA differ regarding

underlying factors, processes, and correlates. Understanding these differences is crucial for developing targeted interventions and prevention strategies for individuals at risk of suicide.

1.5 Regional Characteristics of Suicidality

One of the main objectives of the study is to analyze different sub-regions of a German service region where significantly different suicide rates in recent years indicate differences between SA and SI. In studies of regional structures, many preliminary studies show a higher incidence of suicides in rural structures. This is usually explained by the poorer accessibility of the help system or the availability of suicide means. Helbich et al. (2017) found that suicide rates in rural areas of Germany ranged from 12.6 to 13.2 per 100,000 population, compared with urban areas where suicide rates ranged from 11.0 to 11.6 per 100,000 (36).

This is in line with international observations. The Suicide Prevention Resource Center has identified several factors that contribute to higher suicide rates in rural areas of the United States. These include greater access to firearms, high rates of drug and alcohol use, and a lack of healthcare providers and emergency medical facilities (89). The differences in suicide rates between rural and urban areas in the U.S. also widened significantly between 2000 and 2018. The suicide rate in rural areas increased by 48%, while it only increased by 34% in urban areas (210). For Finland, Isometsä et al. reported in 1997 that urban suicides were more often accompanied by separation and that people who died by suicide had more often lived alone (211). A greater proportion of rural suicides were preceded by a health-related stress experience, which may also be related to the slightly older age of these individuals. A greater proportion of rural suicide victims had resided with their parents (22% compared to 8% in urban areas) but did not cohabitate with a partner (211). For Australia, Kõlves reported in 2012 in a review that, similar to others, many suicides occur in rural areas (212). They pointed out the differences to other countries like India or China, where younger females are at risk of Suicide (213–215). In Australia, like England, those who intend to die tend to be young to middle-aged males. A study conducted in Australia revealed that men residing in remote areas were approximately two and a half times more likely to die by suicide than those residing in metropolitan areas (212). Fitzpatrick et al. (2021) found associations with unemployment, absent and undiagnosed mental illness or addictions in remote areas (216).

A survey conducted by the U.S. Department of Health and Human Services revealed that 1.9 million, or 5.1%, of adults residing in nonmetropolitan areas reported experiencing severe suicidal ideation over the course of the year (41). Populations in rural communities are less likely to have access to mental health professionals, which may contribute to the higher suicide rates observed in these areas (217). The use of firearms by males has also been a factor

in the higher suicide rate in rural areas (210). Furthermore, rural areas exhibit a higher incidence of motor vehicle fatalities than their urban counterparts (218). This may have to be linked to suicide attempts or suicide deaths. A case-control study of 21,169 suicides and 423,128 age- and sex-matched controls in Denmark yielded a very different result (219). The study found an increased risk in urban areas. However, the author discussed that this could be explained primarily by additional risk factors such as marital status, ethnicity, income, and psychiatric status. When these factors were removed, the risk increased in rural populations. In addition, the risk of suicide associated with urbanicity varied significantly by gender and age group (219). An essential factor discussed by Lopez-Castroman et al. (2015) is whether we are studying the right populations: Many global and national studies focus on low-risk or urban settings (220). Almost half of the scientific production on suicide in the European Union comes from countries with low baseline suicide rates (<10 suicides per 100,000), and most suicide studies are conducted with urban samples. Rural areas, on the other hand, have the highest rates (221).

However, the comparison with international studies also draws attention to the methodological problem of defining rurality and urbanity. The geographical concept of remoteness is not equally applicable to the German situation, yet similar results can be found when comparing rural and urban regions in Germany. It, therefore, seems much more important to us to focus not only on problems such as accessibility to medical care but rather on individually experienced inequalities (222), different abilities to deal with crises, or experienced prospects for the future.

Helbich et al. 2017 examined the suicide risk in German regions at the district level (36). In addition to population density, they included other parameters in the classification. A key finding was that rural areas were associated with a higher risk of suicide. The steady transition from urban to rural areas was supported by consistent indicators along the urban-rural continuum. In the Helios FKH service area, these study results showed minor significant differences in suicide risk based on the 2016 figures. The residual real risk for all subregions in our study ranges from 1.06 to 1.10, and the posterior probability ranges from 0.8 to 1.0. For future replications, Helbich et al. recommended the inclusion of accessibility indicators and population potential in addition to population density (36).

Comparing regional suicide rates, it should be noted that death by suicide is relatively rare. This alone can explain the considerable variability in the long-term evaluation of regional

suicide rates. However, when looking at regional suicide rates over a 10-year period (2009 to 2018), we see stable variability in the regions studied, ranging from 19.2/100,000 for Suhl to 14.2/100,000 for Hildburghausen. We therefore suspected subgroup differences in epidemiological and regional factors and attempted to investigate these in the population of suicidal psychiatric patients according to regional affiliation.

1.6 Clustering in Suicidality

Suicide clusters can be defined as groups of suicides, suicide attempts, and self-harm events in the same community that occur more closely than expected in time and space (223). The Center of Disease Control and Prevention (CDC) proposes a concept in which two common types of suicide clusters are distinguished (224):

Point clusters (or spatiotemporal clusters) describe a more significant number of suicides within a given period in a given location. This may be a community or an institution such as a school, university, or psychiatric hospital. Delineated clusters describe a more significant number of suicides in a specific geographic region.

Network analysis is a statistical technique for understanding the relationships among different variables in a system. To understand how different theoretical constructs interact and relate to suicidal ideation, De Beurs et al. (2019) conducted a study using network analysis (29). They reported: “Perceived burdensomeness and internal entrapment contributed equally to suicide ideation. While defeat, external entrapment, and thwarted belongingness were mainly related to factors other than suicide ideation, it is important to note that there is a correlation between these factors and suicide ideation” (29).

LCA results differ from known clusters in that they are formed by selected individual factors (31) and allow the determination of group membership of individuals based on a “particular set of symptoms, behaviors, or characteristics” (225,226). LCA has been used for various purposes in previous studies of suicidal behavior. Some studies have focused on identifying precipitating death and suicidal ideation in adolescents (227,228). McFeeters et al. (2015) used LCA to identify several classes based on SLE (229). We conducted LCA for the population of suicidal psychiatric inpatients to identify class differences. We focused on a combination of epidemiological and clinical factors and SLE.

1.7 COVID-19 Pandemic and Suicidality

Past epidemics, such as severe acute respiratory syndrome (SARS), or financial crises, have been linked with unfavorable mental health consequences (14,230). Studies have indicated that during periods of elevated unemployment and considerable economic uncertainty throughout Europe, suicide rates have risen across Europe (14). For illustration, in Asia, the suicide rate increased by 30% in Hong Kong during the SARS epidemic, particularly among female elders (231).

Therefore, it was assumed early in the pandemic of SARS-CoV-2 (COVID-19) that the impact on mental health would be profound, and there were fears that suicide rates would rise as the pandemic continued. In addition, long-term effects on the general population, the economy, and particularly vulnerable groups were expected (232).

As a result, the pandemic has had a significant impact on global mental health, particularly at the beginning of the pandemic, with numerous studies showing the negative impact of the pandemic on people's mental well-being (233).

For example, the COVID-19 outbreak in China was associated with an increase in generalized anxiety disorder, depressive symptoms, and poor sleep quality, according to a study by Huang & Zhao (2020) (234). Similarly, Kessler et al. (2022) found that, during the first year of the pandemic, there was a greater prevalence of significant anxiety and depression in U.S. (235).

Contrary to initial fears, several studies showed an overall decrease in suicide attempts and hospitalizations for self-injury or suicide attempts during the first phase of the pandemic (236,237). However, Pirkis et al., 2022, also emphasized that there were regions where suicide rates and rates for specific sex and age groups (238,239) were higher than expected. Moreover, as demonstrated by Mitchell & Li's (2021) analysis of state-level data on suicide mortality during the COVID-19 quarantine period, the pandemic has had a disproportionate impact on racial minorities (240).

This underscores the need for targeted interventions to address mental health disparities and promote equitable access to care. Antičević et al. (2021) focused on peritraumatic distress during the pandemic. The study demonstrated that higher levels of peritraumatic distress are statistically predicted by several factors, including female gender, exposure to multiple

stressors, lower levels of attachment to people and activities, as well as resistance to challenge (241).

Despite the significant challenges posed by the pandemic, researchers such as Manchia et al. (2022) highlighted that societies have shown surprising resilience over time and have recovered quickly from responses to COVID-19 (242). Even if some groups were more affected by the ongoing measures than others. Many studies have shown that the number of suicide attempts and suicides has decreased in many areas during the pandemic. This is similar to previous research showing that suicides decrease in times of war or terrorism (44,243), possibly reflecting increased social cohesion in times of external threat (244).

Erlangsen et al. (2023), who studied populations with SARS-CoV-2 infection, discussed whether reductions in self-injury might also be related to increased levels of informal support from one's social network (236). However, they also indicated that access to ongoing treatment and other formal support might have likely been interrupted or impaired during the SARS-CoV2 infection.

An increase in suicide rates in certain regions or groups would be worrying in the acute phase of a pandemic but has so far only been observed in underdeveloped regions and for individual sub-regions, or the results have been derived from observations of previous pandemics or epidemics. The effects of indirect pandemic consequences, such as economic problems, are well documented from previous studies, so it is still important to monitor the overall course of the pandemic and its aftermath, but meaningful results on the long-term consequences of the pandemic and related restrictive measures are still lacking (61).

1.8 Conclusion of the Introductory Part

Risk factors for suicidal behavior have been studied and described for decades. And yet, little can be deduced from them in terms of specific interventions; the predictability of suicidal behavior is somewhat arbitrary. On the one hand, this is because the description of individual risk factors alone does not allow us to understand the transition from suicidal ideation to suicidal behavior in order to develop concrete clinical techniques or therapeutic interventions. On the other hand, cross-sectional or national surveys allow only a very superficial view of regional characteristics or specific vulnerable populations to derive targeted prevention.

Due to the nature of the study, this research does not claim to be able to contribute significant findings to the prediction of the general population.

However, it does provide indications for prevention for the specific subgroup of a rural region and the vulnerable group of inpatient psychiatric patients. The statistical technique of LCA is used to avoid selection bias of factors in modeling clusters. Comparison with data from the subsequent Corona pandemic allows conclusions to be drawn about the possible impact of the pandemic on individual patient groups.

2 Aims and Hypotheses

The present study used a clinical sample in a rural service area to test whether there were individual risk factors that could discriminate between suicidal individuals and suicide attempts, whether there were regional differences in suicide rates, that could be related to known differences in suicide rates among subregions of the service area, and whether latent classes could be formed based on epidemiologic and clinical data. In a second sample, we hypothesized that the number of suicides might increase during the COVID-19 pandemic despite other findings from previous studies which indicate no increase in the number of suicides. These results have been previously published as a condition for PhD approval (238).

2.1 Research Aims

Research Aim #1: To describe the documented characteristics of patients with suicidality admitted at Helios FKH in 2017 and 2018 by (A) gender and (B) region. As aim one is descriptive, no specific hypotheses are outlined.

Research Aim #2: Comparison of epidemiological and specific characteristics of SA and SI (A), different types of suicide attempts (B), such as family status, employment, mental disorder, or stressful life events and description of suicide specific characteristics (C).

Research Aim #3: To perform a variable selection process and determine the optimum number of clusters to classify a randomly selected sample.

Research Aim #4: To perform interrupted time series to identify the influence of the COVID-19 pandemic and its restrictions on the incidence of suicide attempts.

2.2 Hypotheses

Hypothesis #1: SA [single-suicide attempter (SSA), re-attempter (RA), multi-suicide-attempter (MSA)] as well as SI will be similar in terms of demographic factors.

Hypothesis #2: There are no regional differences that allow inferences about known differences in suicide rates among subregions in the service area.

Hypothesis #3: SA and SI are not homogeneous groups and can be classified into distinct subgroups via latent class analysis based on demographic, psychosocial, and clinical characteristics.

Hypothesis #4: There is no influence of the COVID-19 pandemic and its restrictions on suicidal behavior.

3 Material and Methods

The Helios FKH is the central care facility for mentally ill patients in a region with an area of 3,051 km² and 295,000 inhabitants, which corresponds to a population density of 97.69 inhabitants per km². The region is predominantly rural (36). It has a diverse population distribution: 18% live in municipalities with less than 500 inhabitants, 29% in municipalities with 500 to 5,000 inhabitants, 13% in cities with up to 10,000 inhabitants, and 41% in cities with up to 35,000 inhabitants (245). The geographic focus of this study is the southern part of the German federal state of Thuringia, which borders Bavaria to the south. Thuringia consists of six independent cities with populations ranging from 42,000 to 213,000 and 17 counties ranging from 63,000 to 123,000. A significant demographic trend in Thuringia is the steady decline in population since 1950, from 2,932,242 in 1950 to 2,143,145 in 2018, a decrease of 26.9%.

It is important to note the relatively stable population, with a marginal decrease of 0.99% between 2017 and 2021. This population is characterized by a significantly higher average age than the national average of 47.99 years in 2017. In addition, there was a slight but noticeable increase of 0.45 years in the average age of the study population during the same period.

Data collection for this study was conducted as part of the Network for Suicide Prevention in Thuringia (NeST) project, funded by the German Federal Ministry of Health (BMG) and Helios Kliniken GmbH. The project's main goal is to establish a more integrated network of institutions involved in the care and treatment of suicidal individuals. Key partners of NeST include other regional psychiatric hospitals and the University Hospital of Jena, Thuringia.

During the extended study period from January 1, 2017, to December 31, 2021, Helios FKH admitted 14,502 inpatients. According to the hospital plan, patients must be admitted with priority to the hospital in whose service area the patient's first registration address is located. In addition, patients from other states or regions may be admitted electively upon request. In the current period from January 1, 2017, to December 31, 2018, a total of 6,459 patients were admitted to the hospital, 1,080 cases were included in the study. The vast majority, approximately 91.8%, were local, while 6.8% were from adjacent areas, and 1.8% were from outside the study region. The average length of stay was 27.01 days, and a remarkable 9.6% of patients were admitted for observation for up to 24 hours.

The study region is delineated by the specifications of the 7th Thuringian Hospital Plan, which assigns counties and independent cities to specific psychiatric hospitals. For Helios FKH, this region includes the counties of Hildburghausen (HBN) and Sonneberg (SON) and the independent city of Suhl (SHL). In addition, parts of Schmalkalden-Meiningen (MGN) and Ilm-Kreis (ILD) are allocated proportionally. Certain epidemiological data are only published for an entire county; this leads to discrepancies in the total number of inhabitants, for example. In these cases, the corresponding statistics are reported separately.

In the following, the term "South Thuringia" is used for the Helios FKH service area, but this is not identical with the official term "Southwest Thuringia", which also includes the city of Eisenach and the Wartburg district. Due to the regional location, there are also a number of patients from the border regions of Bavaria and the city of Coburg. These patients are assigned to the "Northern Bavaria" region.

This comprehensive overview of the material and methods provides a solid foundation for understanding the context of the study, the geographic scope, and the population studied, while also clarifying the collective efforts and goals of the research project.

3.1 Study Design

The methodology of this thesis aims to develop different populations and subpopulations to gain a comprehensive understanding of patient admissions to the Department of Psychiatry and Psychotherapy at Helios FKH over a two-year period from January 1, 2017, to December 31, 2018 and for some participants in a prospective period until December 31, 2021. The overall aim is to capture admission patterns of suicidality and categorize patients according to suicidal ideation and suicide attempts.

3.1.1 Study Populations

Total Admissions Cohort (TAC, n = 6,459):

- This population includes all patients who were admitted to Helios FKH within the period from January 1, 2017, to December 31, 2018.
- The further selection process includes the identification of people in suicidal crises and on the basis of their first admissions during the study period.

Suicidality Incidents Cohort (SIC, n = 1,080):

- This cohort focuses on cases of suicidality and emphasizes the analysis of characteristics associated with the respective stay during the study period from January 1, 2017, to December 31, 2018 (e.g. means of suicide attempt, motivation to attempt suicide, acute stressful life events).
- This cohort may include patients with multiple admissions, but a significant proportion will have only one admission during the study period.

Individual Epidemiological Analysis (IEA, n = 938):

- This subgroup includes all persons who were treated for active suicidality during the study period from January 1, 2017, to December 31, 2018; the focus is on epidemiological individual patient characteristics (e.g. age, gender, nationality, place of residence, education, occupation).
- The selection criterion was the first admission date in the study period in order to avoid multiple registrations of individuals.
- In the data analysis, additional information on suicidality is analyzed for each person retrospectively for the period up to 1998 and prospectively up to December 31, 2022.

Readmission after Suicide Attempt Cohort (RASAC, n = 825):

- Derived from the extended IEA period (January 1, 2017, to December 31, 2021), the RASAC concentrates on individuals who experienced readmissions due to suicide attempts.
- The study aims to explore the impact of the COVID-19 pandemic and prospectively examine outcomes related to risk factors associated with re-attempts.

The development of these populations and subpopulations provides a nuanced framework for the analysis of patient admissions, thereby enhancing the depth and precision of the study.

3.1.2 Study Population for Research Aim #1 to #3

A prospective observational cohort study was conducted from January 1, 2017, to December 31, 2018. The study population consisted of all patients aged >18 years admitted to Helios FKH in the Department of Psychiatry and Psychotherapy. Patients exclusively admitted to the day hospital were excluded (see figure 1).

We reviewed the physicians' letters and records for specific information on acute suicidality in severe suicidal ideation or a suicide attempt, including aborted and interrupted suicide attempts, within the last four weeks before admission. The collection of demographic data and other relevant measures was conducted through a process of record review, adhering to the principles of the four-eyes method. Accordingly, the data set was created retrospectively without directly collecting the variables of interest from the patient. The 4-eye principle improved the rater agreement. Cases without agreement were subsequently discussed, and a common consensus was reached. The raters included a highly experienced colleague (Chief of Psychiatry) and a medical student with an interest in psychiatry.

Inclusion criteria: Suicide attempt four weeks before inpatient admission or current suicidal ideation at admission.

A suicide attempt was defined based on the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) criteria (246) for current suicidal behavior disorder (SBD): "A self-initiated sequence of behaviors by an individual who, at the time of initiation, expected that the sequence of actions would lead to his or her death" (246).

For SI, we include adult subjects who scored “yes” on the Columbia Suicide Severity Rating Scale (C-SSRS) (247,248) as a wish to be dead [question 1] or nonspecific active suicidal ideation [question 2] and who scored “yes” on questions for severe active suicidality, as active suicidal ideation by any method without a plan [question 3], with some intent to act [question 4], and active suicidal ideation with a specific plan [question 5].

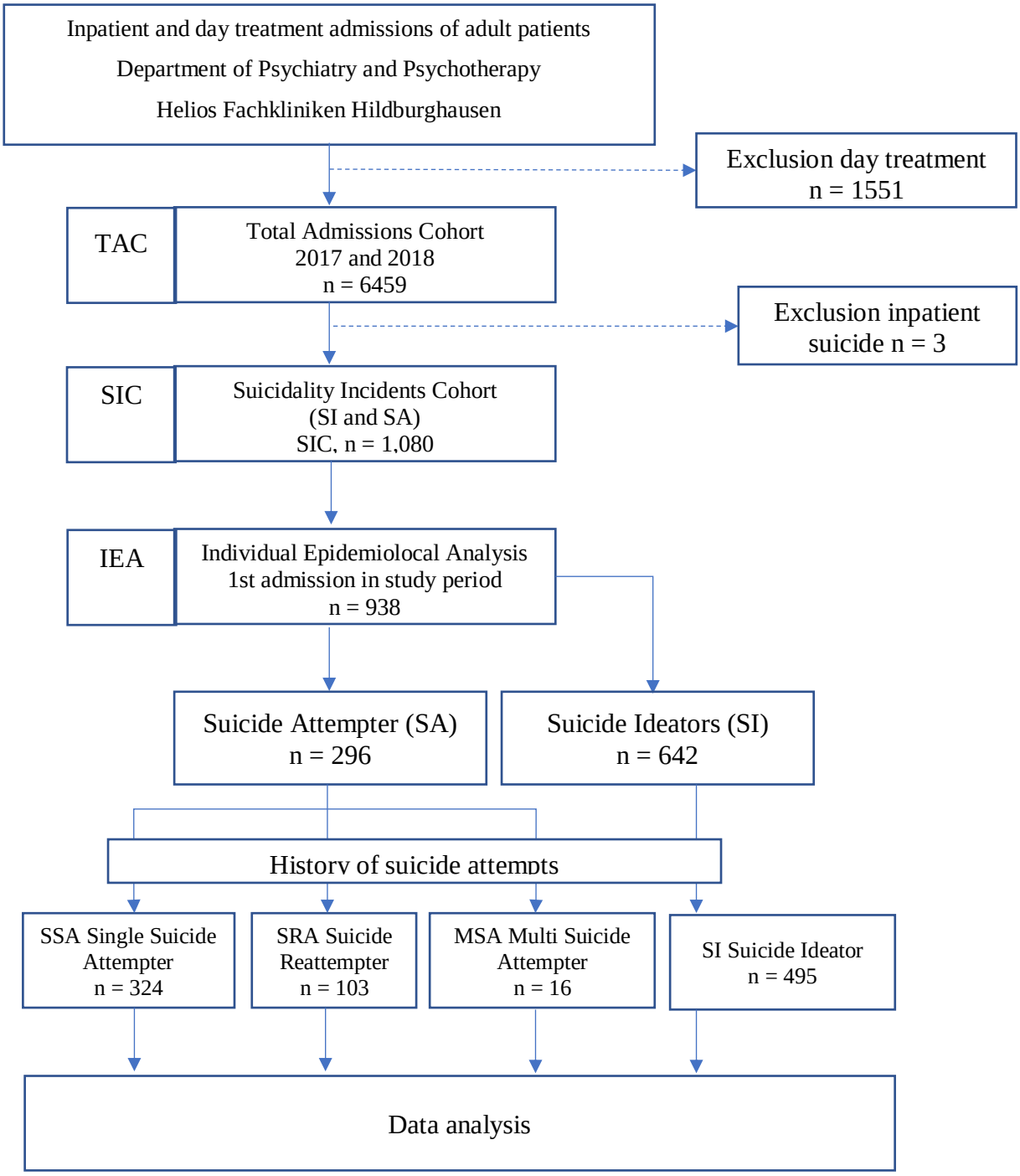
Exclusion criteria: The presence of a suicide attempt during inpatient treatment, the occurrence of self-injurious behavior during an altered mental state, such as delirium or confusion, or when the act is ideologically motivated, are the criteria that exclude individuals from the study. The current diagnosis of SBD is therefore clearly distinguished from NSSI.

The dataset contains 1080 cases (SIC) of 936 adult patients (IEA). We use only the first stay for patients with multiple stays to ensure the observations' statistical independence and not overestimate the latent group size. This population formation allows person-specific descriptions of epidemiologic factors such as sex, nationality, region of origin, or sociodemographic factors and forms the basis for LCA (see chapter 4.6). N = 296 patients of the IEA were admitted after a suicide attempt (SA), and n = 642 patients were admitted due to acute suicidality without a current suicide attempt (SI).

In order to examine the motivating factors for the suicide attempt or crisis in more detail, we used the population of all cases observed during this period (SIC, n = 1,080), which allowed us to make situation-specific evaluations. Our rationale was that at different times, the individual participant's other motives must be taken into account. In this way, statements can be made about suicide-specific factors such as method, concomitant alcohol consumption, or trigger. In the case-related population SIC, n = 339 cases were found after a suicide attempt, and n = 741 cases of admission with acute suicidal tendencies without a suicide attempt.

All patients gave written consent to anonymizing their data as part of the treatment contract. The Medical Association of Thuringia, Germany's local ethics committee, approved the study (22319/2021/147). Furthermore, the authors declare that all procedures contributing to this work complied with the ethical standards of the relevant national and institutional committees for human experimentation and the Helsinki Declaration of 1975, as revised in 2013.

Figure 1
Flow chart for populations TAC, SIC and IEA



Because the occurrence of suicidality and suicide attempts must be considered individually over a longer period of time, we realized that a study period of 2 years was more like a sample study. Therefore, we supplemented retrospective suicide-specific data from 1998 to 2016 and prospective data from 2019 to 2022 from available patient records of previous stays, which enabled us to make statements about past and future suicide attempts of individual study participants.

This allowed us to group the different types of suicide attempts in our main population, i.e., participants with no suicide attempts over 20 years, participants with one suicide attempt (SSA), participants with one re-attempt (Suicide Re-Attempters, SRA), and MSA. As it is conceivable that various suicide attempts (MSA) might share the same motivational factors, leading to a higher weighting of these factors in the statistical analysis, the motivational factors for suicide are also presented in the results of the leading study group and included in the LCA.

3.1.3 Study Population for Research Aim #4

To investigate research aim #4, we created a second sample of n = 825 (RASAC) adults from January 1, 2017, to December 31, 2021, at the Department of Psychiatry and Psychotherapy at the Helios FKH.

Inclusion criteria: Suicide attempt (SA) 4 weeks before admission. A suicide attempt was defined based on the DSM-5 (246) criteria for current SBD: "A self-initiated sequence of behaviors by an individual who, at the time of initiation, expected that the sequence of actions would lead to his or her death" (246).

Exclusion Criteria: Exclusion criteria are the presence of SA during inpatient treatment, self-harm behavior in an altered mental state such as delirium or confusion, or if the act is ideologically motivated. The current diagnosis of SBD is also clearly distinguished from NSSI.

All patients gave written consent to anonymizing their data as part of the treatment contract. The Medical Association of Thuringia, Germany's local ethics committee, approved the study (22319/2021/147). Furthermore, the authors declare that all procedures contributing to this work complied with the ethical standards of the relevant national and institutional committees for human experimentation and the Helsinki Declaration of 1975, as revised in 2013.

3.1.4 Analytic Components

This dissertation has three distinct analytical components:

[1] LCA is used to examine a cohort of 938 participants admitted to a psychiatric hospital over two years (research aim #3, IEA), focusing on the first hospitalization within this defined period. This approach characterizes the study as a retrospective observational study.

[2] In addition to this primary analysis, a secondary investigation will further explore the data set (research aim #1 and #2, SIC and IEA). It will include a comprehensive analysis of suicide-related retrospective data for each study participant going back to 1998. This additional retrospective component will provide a longitudinal perspective to examine factors and trends that may have influenced the profile of participants. This secondary analysis also includes prospective data collected over a 3-year period from 2019 to 2022. This prospective aspect provides insight into how study participants' suicidality may evolve beyond their initial hospitalization.

[3] A third analytical approach results from a modification of the primary cohort. In this approach, 296 participants who attempted suicide were removed from the baseline cohort. This subgroup was then supplemented with 529 individuals admitted to the same hospital for suicide attempts through 2021 (RASAC). Interrupted time series analyses were conducted to examine the effects of the COVID-19 pandemic. The focus of this observational analysis was on the timing of the implementation of interventions to contain the spread of the COVID-19 pandemic in the study region (research aim #4).

This comprehensive approach, including both retrospective and prospective dimensions, accounts for the depth and complexity of the study and provides a more holistic understanding of the psychiatric patient population studied.

3.2 Definitions and Phenotyping

The definition of suicidal behavior is often inconsistent, influenced by the theoretical framework and the heterogeneity of individuals who have attempted suicide. A variety of clinical factors, sociodemographic aspects, personality profiles, as well as different definitions of suicidal ideation, suicidal behavior, and self-harm lead to a high variability of phenotypes of suicidal ideation and behavior, which is crucial for the development of effective prevention strategies (249–253).

3.2.1 Suicidal Behavior Disorder (SBD)

As a fundamental preliminary step, the DSM-5 (254) proposed 2013 criteria for SBD in order to provide a common language for researchers and clinicians and to serve as the foundation for more accurate identification and definition (255). It is introduced for further consideration and possible inclusion in the diagnostic system.

The potential inclusion of SBD in the DSM-5 could result in several positive implications. One such implication could be the increased awareness of the necessity to recognize risk factors for suicide. Nevertheless, the current proposal for the diagnosis of SBD presents significant limitations, including an inadequate level of reliability, the potential for overdiagnosis in individuals experiencing suicidal ideation during highly stressful situations, and an inability to capture those at risk of suicide for the first time (256).

Table 1
DSM-5 Criteria for suicidal behavior disorder (SBD) (256)

DSM-5 criteria for suicidal behavior disorder (SBD)
A. Within the last 24 months, the individual has made a suicide attempt.
B. The act does not meet criteria for non-suicidal self-injury (NSSI).
C. The diagnosis is not applied to suicidal ideation or to preparatory acts.
D. The act was not initiated during a state of delirium or confusion.
E. The act was not undertaken solely for a political or religious objective.

The DSM-5 proposes five criteria for SBD, which include the presence of suicidal behavior or suicidal ideation and the exclusion of other psychiatric diagnoses that may better explain the suicidal behavior [3]: “(A) suicide attempt within the past 24 months, (B) the act does not meet criteria for NSSI, (C) the diagnosis does not apply to suicidal ideation or preparatory acts, (D) the act was not initiated during a state of delirium or confusion, and (E) the act was not committed solely for a political or religious purpose” (256).

Several objections have been raised against suicidality as a diagnosis. First, critics argue that suicidality should be seen as a symptom of other diseases. Moreover, reducing it to a diagnostic term would disregard the fact that suicidal behavior has several dimensions related to the degree of intention to die, the precision of planning, or the choice of method (255). Another criticism is that the categorization of suicidal behavior as a diagnosis may result in the "medicalization" of behaviors (255). Additionally, there was concern that the inclusion of suicidal behavior in the DSM-5 could potentially increase the liability of psychiatrists (255).

We also see the time criterion of 24 months as critical, as it takes too little account of the dynamics of the suicidal event. For our study purpose, it was necessary to distinguish clearly between acute suicide attempts and suicidal ideation. We, therefore, changed the time criterion from 24 months to 4 weeks.

3.2.2 Suicide Ideators (SI)

The objective of improving the understanding and prevention of suicide has led to an increased focus on the prospective assessment of suicidal behavior in clinical trials. These assessments are supported by instruments such as Posner's (2014) C-SSRS (247), which seeks to improve conceptual uniformity and ease of classification of suicidal behavior (257). The C-SSRS is available in more than 140 country-specific languages, the psychometric strength has been well validated across demographic groups and cultures (258). Many of these translations have been linguistically validated. A validated German translation of the C-SSRS is provided by ICON Language Services, a global leader in medical translation and linguistic validation (259). The German translation is called "Beurteilungsskala zur Suizidalität (C-SSRS)" and is versioned as of April 23, 2014 (see Supplement 10.3.4, page 237).

The C-SSRS is a series of simple, easy-to-understand questions that anyone can ask to identify and assess suicidal individuals (247). The screener serves to inform clinicians as to whether a patient is suicidal, to ascertain the severity and immediacy of the risk in question

and to determine the degree of support that the patient requires. It can be used to monitor treatment outcomes and identify suicide risk in various research and clinical settings (260).

In comparison to other screening instruments that combine the ideational and behavioral domains, the scale has demonstrated a capacity to mitigate some of the weaknesses of the traditional open-ended clinical interview, including an enhanced accuracy in risk estimation and predictive validity (261–264).

All versions of the interview questionnaire are divided into a section to assess suicidal ideation and a section to assess suicidal behavior.

The instrument was developed to assess two principal dimensions, namely (a) suicidal ideation and (b) suicidal behavior, which are considered key factors in the measurement of suicidality. The first dimension of the instrument examines suicidal ideation in a progressive manner, from lower to higher severity. This is divided into two categories: passive suicidal ideation, which is defined as the absence of a concrete plan or intention to act, and active suicidal ideation, which is defined as the presence of a plan and intention to act. The second dimension of the instrument, suicidal behavior, examines suicide attempts, defined as actions with the intent to end one's own life, as well as interrupted suicide attempts, which are actions with the intent to end one's own life that are interrupted by an external agent. Both dimensions entail an examination of the occurrence (yes or no) and frequency (e.g. less than once a week to several times a day) of the various indicators of suicide severity.

Several studies, including a 2011 study by Posner et al. (247,248), demonstrate the initial validity and reliability of the C-SSRS across languages and highlight its effectiveness in assessing suicidal ideation and behavior (258,259). A multitude of studies have demonstrated the divergent, convergent, predictive, and incremental validity of the protocol, as well as its sensitivity to change, internal consistency, inter-rater reliability, and cross-cultural and multilingual application (258).

The internal consistency of the Intensity subscale is moderate, with a Cronbach's alpha of .73 (Posner et al., 2011) (248). In addition, strong predictive validity was found for both suicidal ideation (95% CI 4.18-9.23, $p < 0.001$) and suicidal behavior (95% CI = 1.36-7.19, $p < 0.01$). Reliability was also demonstrated for both suicidal ideation (ICC = 0.09, $p < 0.001$) and suicidal behavior ($K = 0.81$, $p < 0.001$).

The C-SSRS has been validated by the CDC, Joint Commission Accreditation, and the World Health Organization as a reliable instrument for assessing suicide risk.

For SI, we include adult subjects who scored "yes" on the C-SSRS dimension "suicidal ideation" (247,248) as a wish to be dead [question 1] or nonspecific active suicidal ideation [question 2] and who scored "yes" on questions for severe active suicidality, as active suicidal ideation by any method without a plan [question 3], with some intent to act [question 4], and active suicidal ideation with a specific plan [question 5].

3.2.3 Suicide Attempters (SA)

For suicide attempts, we only included subjects who fulfilled the DSM-5 (246) criteria for the current SBD. In the DSM-5, a "suicide attempt" is "a self-initiated sequence of behaviors by an individual who, at the time of initiation, expected that the set of actions would lead to his or her death" (246). The diagnosis would require an individual to meet five diagnostic criteria presented in Table 1.

In contrast to DSM-5 criterion A, we used a more restricted time criterion than DSM-5 criterion A with the prerequisite of a suicide attempt within the *last four weeks* before admission. Only in this way could we make valid conclusions about the motivation for the current suicide attempt. According to DSM-5, we excluded participants who initiated the act during delirium or confusion. The current diagnosis of SBD was thus clearly distinguished from NSSI, another condition under further investigation in DSM-5, presented as nonsuicidal self-injury disorder (NSSI-D). Therefore, we use the proposed criteria to distinguish SA from other self-harming behaviors and to compare the study results with future research.

3.2.4 Nonsuicidal Self-Injury Disorder (NSSI-D)

Suicidal behavior (SB) and NSSI are two distinct forms of self-destructive behavior and distinguishing between them is essential for effective diagnosis and treatment. According to recent research, NSSI involves intentional self-injury without suicidal intent, whereas suicidal behavior consists of the intent to die (265). In addition, NSSI is not suicidal in intent; it is a significant risk factor for subsequent suicidal behavior, suicide attempts, and death by suicide (266). NSSI behaviors can range from mild to severe and include cutting, burning,

scratching, hitting, and hair-pulling, among others. These behaviors are typically used as coping mechanisms to relieve emotional distress or to regulate intense emotions (267).

It is essential to distinguish between suicidal behavior and NSSI because the treatment approaches differ significantly. Suicidal behavior is considered an emergency and requires immediate intervention, such as hospitalization, crisis intervention, and suicide prevention programs. In contrast, treatment for NSSI involves identifying and treating the underlying emotional and psychological factors contributing to the behavior, such as depression, anxiety, trauma, or relationship problems. In some cases, however, it is impossible to distinguish between the two behaviors, and sometimes both symptoms co-occur.

NSSI is defined as "the deliberate, self-inflicted destruction of body tissue without suicidal intent and for purposes not socially sanctioned" (246).

Criterion A of NSSI-D requires "self-inflected acts such as cutting, burning, or hitting intended to cause moderate physical damage to the body occurring on five or more days over the past year. Criterion B of NSSI-D in the DSM-5 requires that individuals engage in NSSI for one or more of the following reasons: (1) to obtain relief from a negative feeling or cognitive state, (2) to resolve an interpersonal difficulty, or (3) to induce a positive feeling state" (246).

The frequency of NSSI was based on the information provided by the patients in the admission interview and on the assessment of the trained investigators. This was sufficiently successful in the analysis of the majority of medical records. In a few situations (intoxication, lack of documentation, or lack of information from the patient), it was impossible to make a statement in this regard.

So, in case of doubt, a pronounced suicidal self-injurious concealment was evaluated as a suicide attempt, superficial injuries, however, usually as NSSI. As with the assessment of suicide attempts, however, there is also the possibility of systematic error, which we tried to minimize through the 4-eyes principle and prior training.

3.2.5 Suicide Re-Attempter (SRA) and Multi-Suicide Attempter (MSA)

Another significant differentiation is the distinction between single suicide attempts and repeat attempts. Only a few studies have compared different suicidality groups: SI, SSA, SRA,

and MSA (268). According to that, however, MSAs are more likely to have a history of early trauma and a family history of suicide, as well as a higher proportion of diagnoses and higher ratings of psychopathology (suicidal ideation, anxiety symptoms, or problematic alcohol use), higher levels of stress, and the trait of impulsivity (203,269,270). Previous studies have reported differences between SI and SSA (203) and between SSA and MSA (270) or between all groups (268,271). Some studies do not distinguish between reattempters with a single suicide attempt and with multiple suicide attempts. The combined term reattempter (RA) is used here. Therefore, the comparability of the studies is only possible to a limited extent due to methodological problems.

It is not precisely defined who will be classified as an MSA, as only the number of suicide attempts is decisive. From a clinical perspective, there are probably significant differences between people who have attempted suicide three times in 10 or 20 years and those who have attempted suicide several times in only three months, suggesting an ongoing suicidal mode.

In addition to the methodological problems regarding the time criterion, it must also be taken into account that the recording of information about previous suicide attempts by the patient is fraught with considerable shortcomings. Due to different motivations, patients often do not tell the truth about their past suicide attempts (272). Long-term observations are therefore necessary to collect reliable data.

Comparative analysis of various variables, including depressive and anxiety symptoms, suicidal ideation, hopelessness, problem-solving, and a wide range of personality traits, revealed that multiple attempters exhibited a more severe clinical profile with a correspondingly elevated risk of suicide compared to attempters and ideators (273). Furthermore, a multinomial logistic regression model with groups demonstrated that MSAs exhibited a higher lethality of their last suicide attempt than SSAs; they were more likely to be single, less likely to be married, and younger (271).

Boisseau et al. (2013) followed 668 patients in the Collaborative Longitudinal Study of Personality Disorders (CLPS) for ten years. A total of 21% of participants attempted suicide during the 10-year follow-up period. Of these, 9.0% (n = 39) reported a single suicide at-

tempt, while 12.5% (n = 54) reported multiple suicide attempts. Those who had made multiple attempts were significantly more likely to meet criteria for borderline personality disorder and to have higher impulsivity scores than those who had made a single attempt (274).

In a study of 228 patients presenting to the emergency department after a suicide attempt, Choi et al. (2013) found that MSAs were younger, unmarried, had more severe psychopathology and suicidality, and had lower psychiatric resources (e.g., interpersonal stress/conflict, social isolation, and lower ability to control emotions) than first-time attempters (125). Furthermore, Liu et al. (2017) found that in the Chinese population, family history of suicide, mental disorders, and hopelessness, emerged as significant predictors of multiple suicide attempts, social support was identified as a protective factor.

In addition, re-attempters were shown to have more severe psychopathology in general, including higher levels of affective, anxiety, psychotic, symptoms of posttraumatic stress disorders (PTSD) and a higher frequency of comorbid, alcohol, and substance abuse disorders (93,275).

In addition to the aforementioned demographic factors, other clinical variables were found to be significantly associated with re-attempters compared to first-attempters. These included a family history of suicidal behavior, the presence of childhood trauma and emotional abuse, higher scores on hopelessness and motor impulsivity, a lifetime history of aggressive behavior, poorer interpersonal functioning (e.g., deficits in conflict resolution skills), and a more significant number of stressful life events (270,276).

A particular challenge arose from the patients' statements regarding a history of a previous suicide attempt. Based on previous study results, this represents one of the most critical risk factors for a person's suicide, yet we were surprised at the small number of patients who did not provide information. We assume this is not primarily explained by memory distortions or forgetting but was deliberately not stated by patients (e.g., due to fear of negative consequences, such as a prolonged inpatient stay). Therefore, a review of the patient’s available medical records for possible suicidal behaviors in previous stays or information on previous suicide attempts was performed. We assumed that this could minimize a potential dark field. Patients with a history of a suicide attempt were classified as suicide re-attempters (SRA), and patients with at least two or more prior suicide attempts were classified as MSA. Information from the 2019 to 2021 prospective review was included in the classifications.

3.2.6 Rurality and Urbanization

Uniform size criteria should enable international comparability for the two terms, rural or urban land structures. In the U.S., the criteria of the Rural-Urban Continuum Codes (RUCC) and the Census's Core-Based Statistical Areas (CBSA) are used for this purpose. In the European Union, the Urban-Rural Typologies (URT) or the Nomenclature des Unités Territoriales Statistiques (NUTS-3) criteria are used. However, the respective categories are not comparable and are based on different classifications (277).

The RUCC-based variable distinguishes between large and small metropolitan areas and non-metropolitan areas. Large metropolitan areas are defined as those with a densely populated center with 1,000,000 inhabitants, including the surrounding economically integrated areas, which are designated RUCC 1. Small metropolitan areas are similar, except that the center has between 50,000 and 1,000,000 inhabitants, which are designated RUCC 2 or 3. All other areas are defined as non-metropolitan (RUCC = 4 through 9) (277).

In our view, the RUCC criteria only have limited applicability to South Thuringia. None of the areas is adjacent to a metro area defined as RUCC 3 or higher. The City of Suhl is the largest area in the study region, with 35,608 Inhabitants (Dec. 2016).

The URT developed by Eurostat, provide a classification system for categorizing regions within the European Union (EU) based on urban and rural characteristics. These typologies aim to capture the diversity of urban and rural areas across EU member states. The URT considers three main dimensions of population size, population density, and degree of urbanization: *predominantly urban, intermediate, and rural regions.* Predominantly rural regions have low population density, and a small share of their population residing in urban areas. They generally consist of sparsely populated rural areas, agricultural regions, and remote areas.

Rurality definition of Thuenen-Institute: For Germany, another Classification developed by the Thuenen-Institute for the Federal Ministry of Food and Agriculture. The Institute uses the term "rurality" for this purpose and attributes different degrees of rurality to other regions. The term "rurality" is defined by a number of characteristics, including loose residential development, low settlement density, a high proportion of agricultural and forestry land, a peripheral location to large centers, and a low number of inhabitants in the surrounding area. The spectrum encompasses a continuum of rurality, ranging from sparsely

populated peripheral areas (characterized by a high degree of rurality) to highly dense metropolitan centers (characterized by a low degree of rurality). Rural areas are delineated from non-rural areas at the county region level.

The care region of Helios FKH is best characterized as a very rural region (222,278).

One of the study objectives was to find differences in the individual regions to derive conclusions from suicidality and the known different suicide rates. In the absence of more precise information, as mentioned above, we, therefore, limited ourselves to the pure regional affiliation of the place of residence and classified the *region* variable with a total of 5 options ([1] *Northern Bavaria*, [2] *Hildburghausen*, [3] *Ilm-District*, [5] *Meiningen*, [6] *Sonneberg*, [7] *City of Suhl)* and the structure of the patients' place of residence, measured by the number of inhabitants with five options ([1] *0-500 inhabitants*, [2] *500-3000 inhabitants*, [3] *3000-10000 inhabitants*, [4] *10.000-30.000 inhabitants*, [5] *over 30.000 inhabitants)*.

3.3 Measures

3.3.1 Medical records

Data collection included the systematic collection of information on sociodemographic characteristics, number of suicide attempts, family history of suicidal behavior in first-degree relatives, number of previous psychiatric/psychotherapeutic treatments, medication status, and circumstances and triggers of the most recent suicide attempt. For all patients (IEA), the available medical history of the digital patient file (as of 1998) was then examined for any suicide attempts in the self-history. This included information on [1] the number of suicide attempts in the patient's medical history, [2] the year of the first documented suicide attempt, [3] whether a suicide attempt that resulted in an inpatient admission to the Helios FKH between 2002 and 2016 was recorded. Suicide attempts that were not openly reported by patients or that did not result in treatment, either at the same clinic or elsewhere, could not be documented. All participants were also followed for four years, until the end of 2022.

Table 2
Selecting variables for LCA

Epidemiological factors	Age, gender, nationality, confession, residence, education, marital status, children, living situation, employment, income
Seasonal factors	Date of admission
Stressful life events	Severe illness or injury, loss of others, interpersonal conflict, financial crisis, PTSD/interpersonal abuse, minor life stressors, refugees
Motivational moderators	Hopelessness, perspectivelessness, burdensomeness
Psychopathological factors	Depression, insomnia, delusion, psychological stressors
Clinical factors	Addiction, intoxication, mental illness (diagnosis), admission type, pretreatment, medication, somatic diagnosis, chronic pain
Suicide specific factors	Former suicide attempts, violent means, NSSI, place of suicide attempt

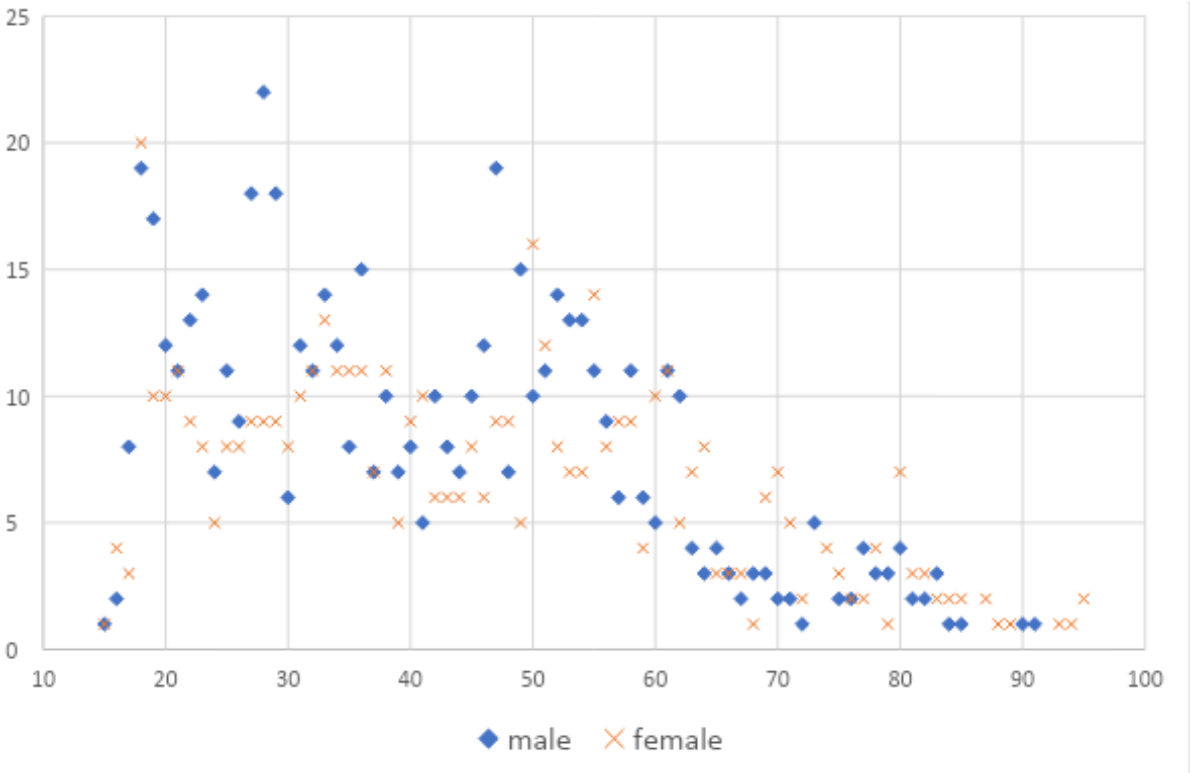
3.3.2 Indicator Variables for LCA

To identify profiles of risk factors for suicidality, we included over 50 variables; then, we performed a selection of indicator variables through LCAvarsel in R. provides an overview of the variables that were used in the preselection for modeling the various classes.

Epidemiological factors

Age. For the comparison of the age groups in the study population (SIC, IEA) and the epidemiological data of the total population (TAC), we used the age-specific groupings of the Thuringian State Office for Statistics (TLS) with a division of 5 years and a summary of the age groups 60-75 and over 75 years ([1] 18-20, [2] 20-25, [3] 25-30, [4] 30-35, [5] 35-40, [6] 40-45, [7] 45-50, [8] 50-55, [9] 55-60, [10] 60-65, [11] 65-75, [12] over 75). In the subgroup comparisons, we used a 10-year grouping ([1] 18-20, [2] 20-30, [3] 30-40, [4] 40-50, [5] 50-60, [6] 60-70, [7] 70-80, [8] 80-90, [9] over 90). For LCA, we summarized the patients in groups of [1] younger (18 to 35 years), [2] middle (35 to 60 years), and [3] older age (over 60 years).

Figure 2
Age distribution of cases in the study population (SIC, n = 1,080)



Note: grouped by sex, rhombic dot = male, x dot = female

Gender. No gender identities other than male and female were found in the entire population (IEA), so gender was recorded dichotomously.

Nationality was determined based on the entry in the administrative data of the patient's file. It, therefore, does not take into account any migration background in the case of German citizenship. 93.6% of the study population (IEA) were German. Due to the recent waves of *refugees* from Syria and Afghanistan, we established a separate category for this.

Confession. For a total of n = 872 (80.74%) participants, no information on *confession* or an entry "no information/unclear" (n = 102, 9.44%) was found in the medical records. Therefore, this characteristic was not included in the evaluations.

Residence was recorded according to the patients' current registration address. We could not distinguish whether patients lived with a partner or with friends or family for a longer period of time. The five-digit zip code was recorded from which we derived the subregions to which the patients belonged.

We examined the patient files according to *marital status*, *living situation*, *education* or *schooling*, current *employment*, and predominant *income*. All items were routinely recorded by the admitting physicians and psychologists for each new or returning admission.

In this respect, different levels of coverage were found, depending on the age of the patients or the admission situation. No school education or previous occupation was asked or documented for older, already retired patients. This information was also missing in certain admission situations, such as involuntary admission, intoxications, or highly acute clinical conditions. For patients who did not pursue any professional activity, e.g., due to their situation as housewives or during parental leave, the information on primary education was usually missing. The duration of the illness-related incapacity to work or unemployment was not to be recorded; here, the employment status was registered as full- or part-time employment. If the patient described this as a particular burden, it was documented as a SLE.

The current marital status was coded with options ([1] single, [2] married, [3] widowed, [4] divorced, [5] divorced and remarried, [6] married and separated, [9] unknown).

The current living environment of the patients was coded with 21 options (see Table 3). For the LCA, we grouped the variables into the sub-variable *living situation*, depending on the

suspected support or monitoring, with six options ([1] *living alone*, [2] *living with a partner or family*, [3] *residential care*, [4] *asylum camp*, [9] *unknown).*

Table 3
Variable selection for LCA, living situation (IEA, n = 938)

Living situation	N	%	Living	Overall (n = 938)	
Living alone [1]	365	38,9	Alone	299	31,9
			Homeless	10	1,1
			Homeless shelter	4	,4
			Hospital (future homeless)	1	,1
			children only	51	5,4
Living with partner or family [2]	478	51,0	Mother	37	3,9
			Father	5	,5
			Parents	43	4,6
			married partner	186	19,8
			heterosexual partner	100	10,7
			homosexual partner	7	,7
			children and partner	63	6,7
			other family members only	14	1,5
			3-generation household	5	,5
			other household	18	1,9
Residential care [3]	53	5,7	residential care	53	5,7
Asylum camp or prison [4]	42	4,5	Prison	3	,3
			Asylum camp	39	4,2

Note. Living items categorized by subcategories of the LCA for all participants (IEA, n = 938): living alone, living with a partner or family, residential care, asylum camp, and unknown.

We combined the total of 10 options for schooling and education into one item education level with four options ([1] low or no education level, [2] medium education level, [3] higher education level, [4] in training, [5] unknown).

Employment was based on the information the patient gave the doctor in the situation of admittance. Employment was coded with options ([1] employed, [2] housewife/-man, [3] pension, [4] unemployed, [5] in training, [9] unknown).

Income. In Germany, employees who are unable to work due to illness receive sick pay for six weeks. After that, the patient's health insurance company takes over. We recorded these patients in the sub-item salary, as the duration of the incapacity to work was generally not documented. In the case of longer absences due to illness (>72 days), unemployment or other

benefits were paid or there was support from a partner, which was documented accordingly. People in training receive a training allowance that is usually insufficient, so they live mainly off their parents or partners. The item was registered with six options ([1] *salary*, [2] *social benefits*, [3] *partner, parents or savings*, [4] *unemployment benefits,* for short-term and long-term payments, [5] *early retirement* benefits, or [6] *retirement pension*).

Table 4
Variable selection for LCA, education and education level (IEA, n = 938)

Education level	N	%	Education	Overall (n = 938)	
Low education level [1]	229	24,5	special school	18	1,9
			secondary school, lower level	68	7,2
			unskilled work	74	7,9
			without training	69	7,4
Medium education level [2]	286	30,5	secondary school	15	1,6
			Apprenticeship	271	28,9
Higher education level [3]	143	15,1	technical college	84	9,0
			grammar school	18	1,9
			University	41	4,4
In training [4]	20	2,1	in training	20	2,1
Unknown	260	27,7	unknown	260	27,7

Note. Education items categorized by subcategories of the LCA for all participants (IEA, n = 938): low, medium, higher education level, in training, and unknown.

Table 5
Variable selection for LCA, employment (IEA, n = 938)

Employment classes	N	%	Education	Total	
Employed [1]	297	31,7	Full time	245	26,1
			Part-time	35	3,7
			Federal army forces	1	0,1
			Protected employed	16	1,7
Housewife/-man [2]	14	1,5	Housewife/man	14	1,5
Pension [3]	249	26,5	Early retirement	137	14,6
			Old-age retirement	112	11,9
Unemployed [4]	208	22,2	Unemployed	152	16,2
			Other	56	6.0
In training [5]	79	8,4	College Student	11	1,2
			Highschool Student	10	1,1
			In training	58	6,2

Unknown [6]	91	9,7	Unknown	91	9,7

Note. Employment items categorized by subcategories of the LCA for all participants (IEA, n = 938): Employed, housewife/-man, pension, unemployed, in training, and unknown.

Table 6
Variable selection for LCA, income (IEA, n = 938)

Income	N	%	Income detailed	Overall (n = 983)	
Salary	330	35,2%	Salary	298	31,8%
Social benefits	219	23,3%	Social Benefits	54	5,8%
			Long-term Unemployment Benefit II	137	14,6%
Partners and parents	32	3,4%	Partner	13	1,4%
			Parents	22	2,3%
			Training salary	58	6,2%
			Savings	1	0,1%
Unemployment benefits	18	1,9%	Unemployment benefits I	18	1,9%
Early retirement benefits	139	14,8%	Early retirement benefits	139	14,8%
Retirement pension	112	11,9%	Old-age pension	112	11,9%

Note. Income items categorized by subcategories of the LCA for all participants (IEA, n = 938): Salary, social benefits, partners and parents, unemployment benefits, early retirement pension, retirement pension.

In order to also capture seasonal characteristics, the respective month of the suicide attempt or admission due to acute suicidality was evaluated. This item was included in the descriptive analyses, but not in the LCA (see *Interrupted time series*, chapter 4.7).

Stressful Life Events (SLE)

We followed existing studies (14) for the selection of SLE and added additional stressors identified by the investigators to the list. Acute stressful life events (aSLE) were closely related to the period of the current crisis-like development and to events that patients associated with the triggering situation. Past events that were life-historically important but not considered relevant in the context of the investigator or the patient were not included in the survey. In this respect, our survey differs from other studies assessing SLE life-historical.

However, certain SLEs, such as sexual abuse, were also assessed by us as relevant to life history, so they were recorded even without a direct connection to the current situation.

Table 7
Variable selection for LCA, SLE and SLE categories (SIC, n = 1,080)

SLE Categories	N	%	Stressful life events (SLE)	N	%
Serious Illness or Injury [1]	313	29,0	Serious illness/injury/assault to yourself	205	19,0
			Serious illness/injury/assault to close relative	47	4,4
			Severe Chronic Pain	91	8,4
Personal Loss [2]	153	14,2	Death of an immediate family member	139	12,9
			Death of a close family friend/other relative	21	1,9
Interpersonal Conflict [3]	478	44,3	Partner Conflict	207	19,2
			Separation due to marital difficulties/divorce etc.	156	14,4
			Serious problem with close friend/neighbor/relative	214	19,8
Financial Crisis [4]	116	19,7	Major financial crisis	15	1,4
			Being made redundant or sacked from your job	46	4,3
			Looking for work without success for more than one month	37	3,4
PTSD Interpersonal Abuse [5]	141	13,1	Bullying	30	2,8
			Violence at work	2	0,2
			Violence in the home	47	4,4
			Sexual abuse	64	5,9
			Other trauma	28	2,6
			Traumatic witness situation	10	0,9
Minor Life Stressors [6]	137	12,7	Problem with police involving court appearance	34	3,1
			Something you valued being lost or stolen	3	0,3
Refugees [7]	66	6,1	Detention	12	1,1
			Threatened deportation	14	1,3
			Flight implications	45	4,2
			Living in Asylum camp	14	1,3
Other SLE [8]	113	10,5	Running away from home	3	0,3
			Being expelled from school	3	0,3
			(Fear of) being homeless	36	3,3
			Minor financial crisis	73	6,8
			LSTIQ	17	1,6

We adopted McFeeters' suggestion and grouped aSLE and SLE under eight items, which allowed multiple responses. Each of them was coded with [1] *yes current* or [2] *not recent*: *injury or illness* (to self or others), *Personal Loss* (death of a family member or close relative), *interpersonal conflict* (divorce or separation, problems with friends/neighbors), *financial crisis* (e.g., job loss, significant financial crisis, unsuccessful job search), *interpersonal*

abuse (sexual abuse – also past events, violence at home or work, bullying), *minor life stress* (loss or theft of a valuable item, problems with the police) and *other SLE*. Due to the newly added migration issue in 2015 in Germany, we added the category of *refugees*.

In addition, patients described experiencing certain psychopathological and somatic disorders or situations as triggers or motivations for their acute suicidal crisis. An overview of these can be found in Table 8. Severe depression, hallucinations/delusion, NSSI, alcohol or drug abuse, chronic pain, fear of somatic disorder, and sleep disturbance were coded dichotomously (yes or no).

Motivational moderators (MM)

All physicians or psychotherapists were trained to ask about psychological symptoms of current suicidality, but they did not use a structured checklist or give patients self-assessment questionnaires. Therefore, when asked about the primary motivation for their suicide attempt, patients were more likely to mention, for example, separation from their partner or problems with the loss of a loved one. However, they did not mention a possible related feeling of loneliness or lack of perspective. This lack of differentiation is undoubtedly a problem of the retrospective nature of this study and should be taken into account in future studies.

We coded the *psychological stressors* as the patients mentioned them and did not ask dichotomously, e.g., "Do you suffer from loneliness? Yes or no." However, this also resulted in new response options, such as "I feel overwhelmed by my studies," which we included in the response catalog. The terms "perspectivelessness" and "hopelessness" were used equivalently by the patients and were recorded by the investigators in combination.

Psychological Stressors were coded with nine options ([1] fear of physical illness, [2] loneliness, [3] shame/embarrassment, [4] loss of honor, [5] altruism, [6] realization of severe mental illness, [7] perspectivelessness/hopelessness, [8] burdensomeness, [9] feeling overwhelmed). To record the *psychopathological* items, the investigators reviewed the patients' statements, the recording of psychopathological findings, or the primary investigators' descriptions of the patient's admission situation. The single items depression, hallucinations, delusions, sleep disturbances, and NSSI were recorded dichotomously. Other symptoms such as panic, obsessive-compulsive, or cognitive impairment were classified infrequently and were grouped under the item "other".

Table 8
Variable selection for LCA, psychological stressors (SIC, n = 1,080)

	N	%
Fear of physical illness	45	4,2
Fear of loneliness	4	0,4
Isolation /Loneliness	85	7,9
Shame/Embarrassment	15	1,4
Loss of honor	5	0,5
Altruism	5	0,5
Realization of a severe mental illness	14	1,3
Perspectivelessness/hopelessness	151	14
Burdensomeness	30	2,8
Excessive demands on profession studies	29	2,7

Note. Acute psychological stressors reported by patients in an open interview as the reason for the current suicidal crisis. Multiple responses were possible, and only a few patients provided information on each item in their records. Percentage based on all cases studied (SIC, n = 1,080).

Table 9
Variable selection for LCA, psychopathological symptoms (SIC, n = 1,080)

Psychopathological symptoms	N	%
Hallucinations/Delusions	185	17,1
Depression	602	55,7
Sleep Disturbance	435	40,3
Nonsuicidal Self-Injury	126	11,7
Other Symptoms	32	3,0

Note. Acute psychological stressors reported by patients in free interview as causative for current suicidal crisis. Percentage based on all cases studied (SIC, n = 1,080).

Clinical factors

Substance abuse. We recorded a current intoxication with alcohol or illegal substances when the patient was admitted to the hospital. A history of long-term alcohol abuse or long-term substance abuse was also recorded, irrespective of the treatment diagnosis recorded. These items were coded dichotomously (yes or no).

Mental illness. A significant clinical interest was the correlation between acute suicidality and existing *psychiatric diagnosis*. Due to the necessity of inpatient treatment and the asso-

ciated cost coverage, all patients had at least one diagnosis from chapter V(F) of the International Classification of Diseases (ICD-10). Patients admitted to inpatient treatment for an acute suicidality crisis or after a suicide attempt without an identifiable underlying mental illness, such as depression or psychosis, were generally classified as acute stress reaction F43.0.

Table 10
Variable selection for LCA, alcohol and drug consumption data (SIC, n = 1,080)

Addictions	N	%
Intoxication of alcohol or illegal drugs	160	14,8
Long-term abuse of illegal drugs	106	9,8
Long-term abuse of alcohol	137	12,7

Note. Intoxication was classified in patients who showed symptoms of alcohol or drug intoxication on admission, or in whom an elevated blood alcohol level was detected, associated with the patient's interview information. The information on long-term drug or alcohol use was provided by the patient.

Mental illness was measured by the primary psychiatric diagnosis and all secondary diagnoses, including somatic diagnoses, from the digital patient file. The coding was done according to the criteria of the ICD-10. Due to the retrospective nature of the study, it was not possible to verify the accuracy of the diagnosis. No structured interviews (e.g., Mini-International Neuropsychiatric Interview, M.I.N.I.) were used in the clinic to establish the diagnosis. We evaluated the individual Adapted Diagnostic Subgroups according to the meaningful main chapters of Psychosis (ICD-10 F2), Major Depression (ICD-10 F32-F34), Personality Disorders (ICD-10 F60) and Adjustment Disorders (ICD-10 F43).

Psychological Stressors were coded with nine options ([1] fear of physical illness, [2] loneliness, [3] shame/embarrassment, [4] loss of honor, [5] altruism, [6] realization of severe mental illness, [7] perspectivelessness/hopelessness, [8] burdensomeness, [9] feeling overwhelmed).

Type of admission. If a patient was admitted outside regular admission hours or in an acute crisis, or if the admission was initiated by a general practitioner, specialist or ambulance service, we coded this as *emergency* [1]. Any admission of a patient with a *regular* appointment was coded as *regular* [2]. *Transfers from other hospitals* [3] always followed an emergency admission, monitoring or medical care. Only a few patients were originally

seen at HFKH and transferred to an external hospital because of intoxication or other somatic treatment needs. We coded this as [4] after *transfer back from the hospital*.

Legal status at admission. The medical records contained further clinical factors that were relevant to the research question of the study. We were interested in whether the patients were admitted voluntarily or initiated their treatment in the clinic themselves, or whether they were admitted against their will. We have differentiated between placement in accordance with the German Civil Code (BGB), which contains regulations on guardianship, and the Thuringian Act for the Mentally Ill (ThürPsychKG), which regulates involuntary admission to psychiatric hospitals. We coded *legal status* with four options ([1] *voluntary*, [2] *BGB*, [3] Thür*PsychKG,* and *Prisoner [4]*).

Pretreatment. Furthermore, it seemed important whether patients were already undergoing psychiatric or psychotherapeutic treatment and whether they were receiving medication for treating the underlying disease. Therefore, we documented the item *pretreatment* with three options ([1] treated only by a general practitioner (GP), [2] by the outpatient clinic of the hospital, or by a [3] specialist in private practice.

We also recorded the number of inpatient and day-care treatment episodes in the Helios FKH. We classified them as [1] *first admittance*, [2] *1-2 former stays*, [3] *3-10 former stays*, and [4] *more than ten inpatient treatments*.

Psychotropic drugs were documented according to the respective class, *antidepressants* (AD), *antipsychotics* (AP), and *hypnotics* (HYP), as well as according to the separate subclasses *SSRI, SNRI NaSSA, AAP (atypical antipsychotics), typical antipsychotics (TAP)*. Multiple entries were thus possible, and we recorded the *number of psychotropic drugs* and classified them into four options ([1] 0 none, [2] 1 mono-therapy, [3] 1-3, [4] more than three psychotropic drugs).

Suicide specific factors

With regard to specific information on the suicide attempt, we documented whether the suicide attempt took place under the influence of alcohol, the location chosen, and the method used. For past history, we recorded whether there had been one or more previous suicide attempts and, if so, in which year, and whether there had been any reported suicides in the family. As number of suicide attempts is a non-categorical variable, we recoded the

item SA-Type with four options ([1] SI, no past or future suicide attempt, [2] SSA, [3] SRA, [4] MSA). Family suicide and suicide attempts with alcohol were coded dichotomously (yes or no).

In line with previous descriptions of violent suicide methods, such as the Åspergs criteria (279), we define violent suicide as suicide by one or more of the following means: hanging, the use of firearms, jumping from a height, deep lacerations, vehicular impact, burning, poisoning by gas, drowning, electrocution, and jumping under a train. We consider drug overdose to be a [2] nonviolent method.

Place of suicide attempt. In more than half of the SAs, the location of the suicide attempt could not be deduced from the information provided by the investigators (n = 174, 59.0%) and was coded as *unknown*. It would be possible to deduce the location of the suicide attempt from the choice of means of suicide. However, without valid information from the investigators, this remains an assumption and therefore hypothetical.

The vast majority of patients for whom valid information was available attempted suicide at home, or at a friend, a partner's home, only a few deliberately went to a remote location or chose a random location.

Table 11
Place of Suicide Attempt by gender (SIC), n = 339

	Gender				Total		Statistics		
	Male		Female						
Suicide place	N	%	N	%	N	%	χ^2	df	p
At home	49	32,0	49	34,5	98	33,2	7,223	5	0,205
At a friend/partner's home	8	5,2	2	1,4	10	3,4			
Random place	2	1,3	1	0,7	3	1,0			
Deliberately remote place	5	3,3	1	0,7	6	2,0			
Different place, detention room	3	2,0	1	0,7	4	1,4			
Unknown	86	56,2	88	62,0	174	59,0			
Total	176	100,0	163	100,0	339	100,0			

Note. Information from the admission examination, documented by the investigator.

3.4 Statistical Analysis

Statistical analyses were conducted using SPSS Version 28.0.1.1 (https://www.ibm.com/de-de/analytics/spss-statistics-software) and R 4.1.3

To investigate differences in categorical variables, i.e., in sociodemographic factors, motives, and triggers of the current suicide attempt, the non-parametric $\chi 2$-test was used, followed by a post-hoc examination of significant within-test comparisons using corrected residuals. It was assumed that residuals smaller than -1.96 and larger than 1.96 with corrected alpha levels for multiple testing indicated significant differences between variable categories. The Mann-Whitney U-test was used for non-Gaussian distributed measures. To examine hypothesized differences in clinical risk factors (e.g., suicidal ideation, hopelessness, depression), Student's t-tests were calculated for continuous variables based on data from clinical questionnaires. In addition, we used logistic regression to explain single attempts vs. reattempts by the binarized motives/triggers of the current suicide attempt and sociodemographic factors.

3.4.1 General Descriptive Analysis

This section details the statistical methods we use to analyze our data, including frequency analysis, averages, chi-square tests, and t-tests. These methods are essential to deriving meaningful insights and drawing valid conclusions from our research. Frequency analysis allowed us to examine the distribution of categorical data within our data set. We calculated the frequencies of certain variables by counting the occurrences of each category. This method provided a comprehensive understanding of the prevalence of various categorical outcomes, which is essential to answering our research questions. Means allowed us to summarize continuous data by calculating the average value of a variable. We obtained the mean by summing the values and dividing by the number of observations. This statistical measure allowed us to gain insight into our data's central tendency and understand the typical values within our data set. The values of each item and scale were expressed as absolute and relative frequencies (N, %), mean (M), and standard deviation (SD).

The chi-square test was used to assess the association between categorical variables. We formulated research hypotheses and constructed a contingency table that cross-tabulated the

variables. Expected frequencies were calculated, and the chi-square test statistic was determined using the observed and expected frequencies. We evaluated the significance of the relationship between variables by comparing the test statistic to critical values and considering degrees of freedom. All p-values reported are from two-tailed tests, and the significance level was set at $p < 0.05$.

We used t-tests to compare the means between different groups. We performed either independent t-tests or paired t-tests, depending on our design. We assessed the statistical significance of the mean differences by calculating the t-test statistic and the degree of freedom. The results of these tests provided insight into whether observed differences were likely due to chance or whether they represented true population differences.

We used the Bonferroni correction method to address the issue of controlling for Type I errors associated with conducting multiple hypothesis tests. The Bonferroni correction is a well-established technique that adjusts the significance threshold for each hypothesis test to maintain a desired overall significance level across all tests. The Bonferroni correction divides the desired overall significance level (alpha) by the number of individual tests performed. This adjusted significance level, denoted α_adj, is then used as the new threshold for determining statistical significance for each test: mathematically, $\alpha\_adj = \alpha / n$, where α is the nominal significance level (e.g., 0.05) and n is the total number of tests.

Frequency analysis, mean calculation, chi-square tests, and t-tests contributed to our understanding of the data. These methods uncovered patterns, relationships, and differences essential to concluding our research objectives.

3.4.2 Latent Class Analysis (LCA)

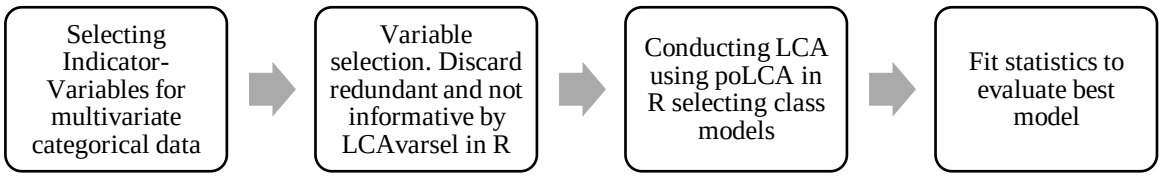
The R package LCAvarsel (280) provides an approach for testing the different indicator variables in a forward or backward procedure. We used the backward option. The function's output was also given an optimal number of classes based on the fit criteria. We calculated the appropriate indices for class solutions from one to 5 classes separately through the R package poLCA (281) with 30 repetitions. Based on the BIC, we decided which was the best class solution for the dataset. We then determined the conditional probabilities for the class fits using the package poLCA and saved the class assignment.

Overall, we performed these calculations on three different data sets: On a dataset containing only those patients who were inpatients due to a current suicide attempt, a dataset of patients who had expressed suicidal ideation but had not made a current suicide attempt, and on the overall dataset with the addition of the variable *sa_current_class* (suicidality) which indicated whether or not there had been a current suicide attempt.

LCA is a statistical technique used to identify qualitatively distinct subgroups within populations with specific external characteristics (282). The subgroups are called latent groups (or classes). The Latent Class Analysis (LCA) technique employs the responses of study participants to categorical indicator variables in order to identify the latent groups. LCA detects samples' latent (or unobserved) heterogeneity (282). A specific instance of person-centered mixture modeling is employed to identify latent subpopulations within a sample based on patterns of responses to observed variables (30,283).

The LCA is predicated on the assumption that latent classes do indeed exist and that they can be used to explain patterns of observed outcomes across cases (30). Because the analysis variables in LCA are categorical, cross-tabulations are used as input information (284). Probabilities of class membership are obtained, not unique assignments (30). The primary concerns of LCA pertain to the selection of indicator variables, the determination of the optimal final class model, and the choice of how to incorporate covariates and which statistics to report in studies. Sample Size is an essential criterion for LCA. Nylund-Gibson and Choi (2018) propose that a minimum of 300 cases is desirable (285). Therefore, we had to collect cases over two years to reach nearly 300 SA. At present, there is no consensus regarding the optimal number of indicator variables to include in a model. However, it is generally accepted that including a greater number of indicator variables will lead to more accurate results (286).

Figure 3
Flowchart of LCA-Analysis



After determining the sufficient sample size, we selected possible indicator variables. In contrast to cluster analyses, only categorical variables are used. After selection, we decide

whether to keep them in their original form or recategorize them. Missing values are recoded into a numerical value outside the range of response options. After that, we reselect indicator variables, excluding redundant and non-informative variables. We use the function LCAvarsel in R for this purpose (287). This forms the improved variable structure, which can be used for the actual LCA.

We chose LCA as an exploratory statistical approach, and the selection of indicator variables was guided by the theoretical considerations of O'Connor's IMV. We assumed that this sound theoretical rationale for using certain indicator variables would facilitate identifying the classes at the end, help interpret the results, and reach class solutions applicable in practice.

For the LCA, we use poLCA in R (281). Because the selection is based on a range of criteria, we used the default estimators of poLCA.

Starting with a 1-class model, further classes are added and compared with others. For this, it is necessary to use different combinations of indicator variables. Afterward, the different classes are statistically evaluated to select the best possible model. There is no consensus on the best criteria for class comparison. Still, there is some agreement that several goodness-of-fit statistics should be used and that the Bayesian information criterion (BIC) is probably the most reliable goodness-of-fit statistic and is therefore always used alongside the Akaike information criterion (AIC), the sample-size adjusted BIC (aBIC)(288) and the consistent AIC (cAIC). In addition, we create elbow plots for visual interpretation. To select a final class, we further report log-likelihood (LL), consistent Akaike information criterion (cAIC), Likelihood ratio/deviance statistic (G^2), and chi-square goodness of fit (Chi^2) (281).

In order to review the classification diagnostics, we present the average latent class posterior probability in the form of a matrix, with the diagonals representing the average probability of a person being assigned to a class. Higher diagonal values are desirable. A cutoff for acceptable diagnosis probabilities could be 0.80 or higher, even because the model is theoretically supported. As another diagnostic statistic, we add the entropy, which indicates how accurately the model defines the classes. A value close to 1 is ideal. Overall, it is recommended to report classes with more than 50 cases. In this respect, we also report the respective class sizes.

An increasingly relevant topic in the scientific consideration of LCA is the inclusion of covariates in the models. Typically, this allows us to say whether certain sociodemographic

features are observable in the composition of vanishing classes. Here, there is undoubtedly overlap with primary variable selection, which, according to the basic idea, uses sociodemographic variables. Covariates should not have been used in primary model development. After each model is defined and tested and classes are developed, they are interpreted. Class solutions are typologies that can help understand commonalities and differences of individuals and, from that, explain the effects on practice. The final step in applying LCA is to evaluate the chosen class solution. It includes whether the class assignment is related to the relevant outcomes as expected.

3.4.3 Modeling interrupted time-series

In order to model changes in suicide occurrence before and during the COVID-19 pandemic, two interrupted time-series Poisson regression models were applied (238). The first model considered the impact of a pandemic, a time trend, and the interaction of both factors. The second model examined the periodic pattern of seasonality and its interaction with the pandemic. This method is a common approach for modeling count time series (289,290).

In order to model the seasonality, the Fourier series was applied with sine and cosine functions, with an interval of four seasons each year on a monthly fixed interval from January 1, 2017, until the end of December 31, 2021. Prior to the commencement of the statistical analyses, the autocorrelation and partial autocorrelation of the count time series were examined. The results indicated that the monthly SA occurrence across years was not random but followed a seasonal pattern, a frequently observed phenomenon (291). Furthermore, in consideration of the potential for overdispersion, the quasi-Poisson regression model was also applied. The results produced by the Poisson and quasi-Poisson regression models were found to be similar, and thus, the findings of the Poisson regression model are reported here.

To further examine the impact of the pandemic on SA within specific subgroups of patients, we conducted separate Poisson regressions for gender and for the three defined age groups (292). The age groups were defined as follows: young adults (aged 18 to 35 years), middle-aged adults (aged 35 to 55 years), and older adults (aged over 55 years).

4 Results

Statistical analyses of epidemiological factors are provided for the total sample (IEA, n = 938), for the sample of patients with suicidal ideation (n = 642) and for the sample of patients with suicide attempts prior to hospitalization (n = 296). We compare these with the respective data available for the total population of the region from the 2011 Mikrozensus database and the respective year-related data from the Thuringian State Office for Statistics (TLS). Specific clinical aspects are analyzed on a case-by-case basis for the entire SIC sample (n = 1,080), as well as for its subpopulations of cases with suicidal ideation (n = 741) and for the sample of cases with suicide attempts (n = 339). Chi-square tests were used to compare the subgroups. Post hoc, corrected residuals were used to compare significant differences within categories.

4.1 Research Aim #1: General Epidemiologic Data

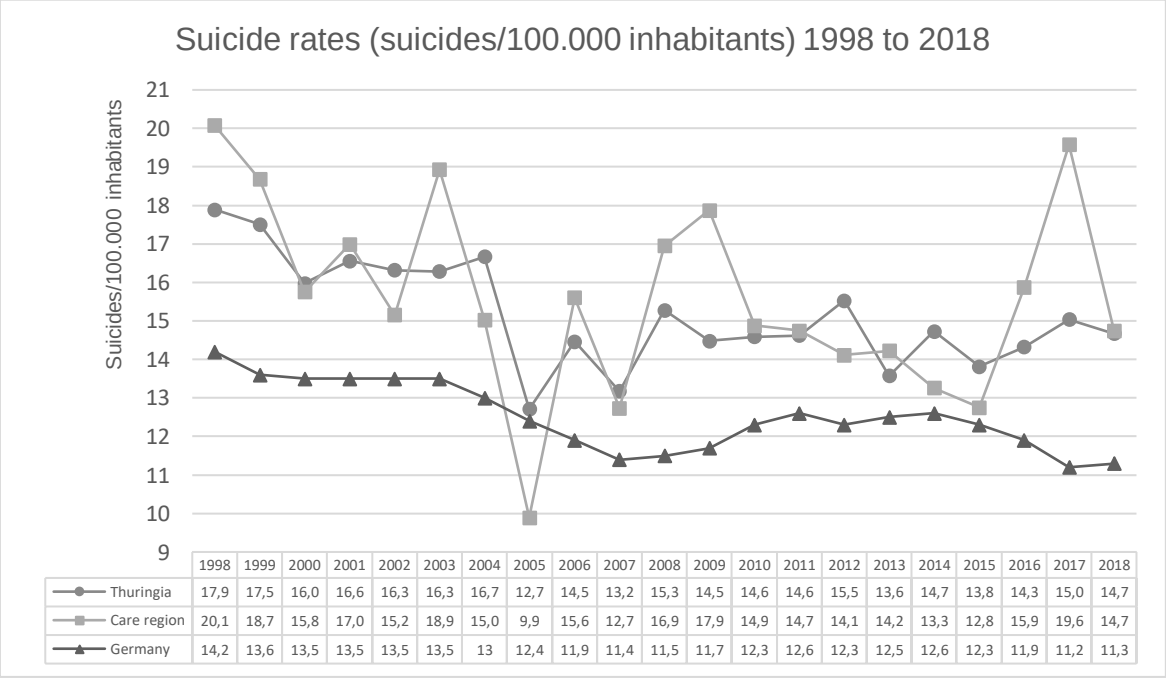
Research Aim 1: Analysis of epidemiological characteristics of patients admitted to Helios FKH between in 2017 and 2018 regarding general suicidality, gender, age, region, and URT.

First we are going to present region-specific data on suicidality (4.1.1), old-age dependency ratio (4.1.2), and inpatient admissions to the Department of Psychiatry and Psychotherapy at the Helios FKH (4.1.3) for TAC (n = 6,459). Then an overview of regional differences in subregions and gender-specific characteristics (4.2.1) is provided.

4.1.1 General Suicide Rates for Thuringia and Care Region

Suicide rates in Thuringia decreased significantly in the years up to about 2000 and are considered stable since then, with a discreet increase since 2013. The trend for Germany as a whole has been consistently downward over the last 20 years. Due to the relatively rare occurrence of suicide, the regional analysis of the care region shows stronger fluctuations, with a significant decrease in 2005 and an increased suicide rate in 2017.

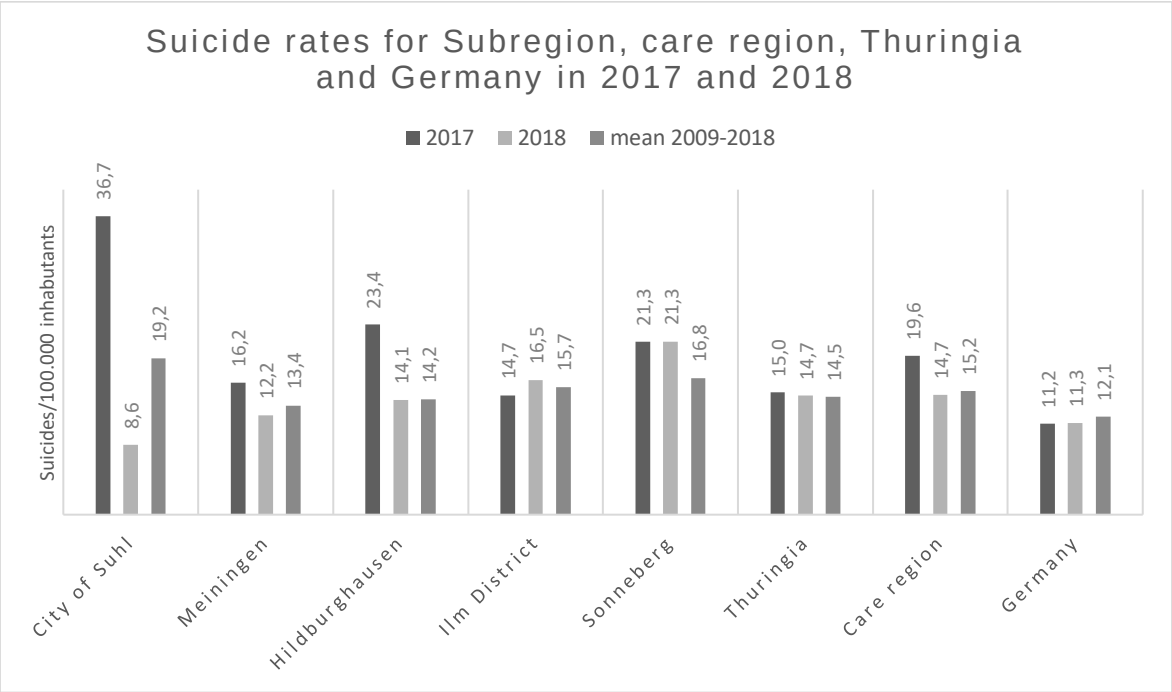
Figure 4
Suicide rates for care region, Thuringia, and Germany from 1998 to 2018



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Thuringia	17,9	17,5	16,0	16,6	16,3	16,3	16,7	12,7	14,5	13,2	15,3	14,5	14,6	14,6	15,5	13,6	14,7	13,8	14,3	15,0	14,7
Care region	20,1	18,7	15,8	17,0	15,2	18,9	15,0	9,9	15,6	12,7	16,9	17,9	14,9	14,7	14,1	14,2	13,3	12,8	15,9	19,6	14,7
Germany	14,2	13,6	13,5	13,5	13,5	13,5	13	12,4	11,9	11,4	11,5	11,7	12,3	12,6	12,3	12,5	12,6	12,3	11,9	11,2	11,3

Note: Thuringian State Office for Statistics (245).

Figure 5
Suicide rates for subregion, care region, Thuringia, and Germany in 2017 and 2018

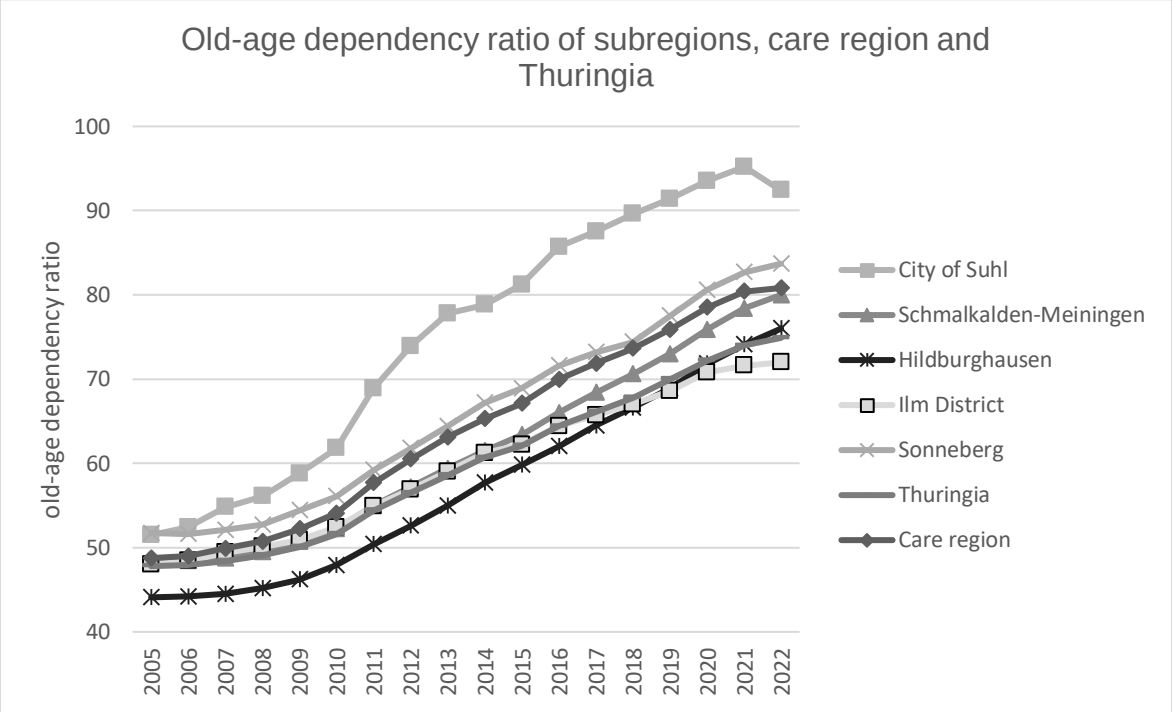


Note. Mean values of period from 2009 to 2018.

4.1.2 Old-age Dependency Ratio for Thuringia and Care Region

"Old-age dependency ratio" is a demographic indicator that measures the ratio of the elderly population (typically people aged 65 and older) to the working-age population (usually people aged 15 to 64) in a specific region or country. It is calculated by dividing the number of people aged 65 and older by the number of people aged 15 to 64 and then multiplying by 100 to express it as a percentage. The Thuringian State Office for Statistics uses the age groups 20 to 60 and over 60 for this purpose. Figure 6 shows an increasing age quotient over the years for all subregions, but most strongly in the city of Suhl. Overall, the care region shows a higher increase in the age quotient compared to Thuringia as a whole.

Figure 6
Old-age dependency ratio of study subregions, the study care region, and the federal state of Thuringia



Note: The data on the old age dependency ratio is published by the Thuringian State Office for Statistics (245).

4.1.3 Total Admissions of Helios FKH

Between 2017 and 2018, the Department of Psychiatry and Psychotherapy at Helios FKH admitted n = 6459 adult patients (TAC). Comparing the structure of the general population with that of the psychiatric inpatients in 2017-2018, significant differences can be seen in the range of age groups (see Table 12).

In the case of psychiatric inpatients, the younger age groups are overrepresented overall, while the population group 65 years and older is significantly underrepresented compared to the overall population (see Table 12). This trend also exists in comparing suicidal to non-suicidal patients within the group of psychiatric patients for the study period. However, in addition to the younger ones, the age group of 40-50 years is also more represented, but without significance. In conclusion, we could observe that mentally ill patients, especially those with suicidal crises, were overrepresented in the younger cohorts.

Table 12

Age distribution of care region, comparison of the general population data (Thuringian State Office for Statistics, TLS) and the patients admitted to the Helios FKH in study period (TAC, n = 6,459)

	General Population				Inpatient Psychiatry		Comparison between the general Population and inpatients
Age groups	2017		2018				
15 to 20	10860_a	4,3%	10430_a	4,4%	**224_b**	**3,4%**	χ^2 = 688,388 *df* = 22, *p* = <,001
20 to 25	9694_a	3,9%	8190_b	3,4%	**341_c**	**5,3%**	difference in all age groups despite 45 to 50 and 50 to 55
25 to 30	13954_a	5,6%	11448_b	4,8%	**525_c**	**8,1%**	
30 to 35	16956_a	6,7%	15693_b	6,6%	**619_c**	**9,6%**	
35 to 40	17189_a	6,8%	16657_b	7,0%	**558_c**	**8,6%**	
40 to 45	14722_a	5,9%	**14383_b**	**6,0%**	337_c	5,2%	
45 to 50	19533_a	7,8%	18538_a	7,8%	483_a	7,5%	
50 to 55	23685_a	9,4%	22588_a	9,5%	640_a	9,9%	
55 to 60	25515_a	10,2%	**24961_b**	**10,5%**	607_c	9,4%	
60 to 65	23793_a	9,5%	**23075_b**	**9,7%**	440_c	6,8%	
65 to 75	35599_a	14,2%	**34439_b**	**14,5%**	596_c	9,2%	
Over 75	39758_a	15,8%	37477_a	15,8%	**1089_b**	**16,9%**	
Total	251258	100%	237879	100%	6459	100%	

Note. Based on different incorporations in this period there is no significant real population decline if adjusted for area reform. Bold font indicates statistical significance. Each subscript letter denotes a subset of population categories whose column proportions do not differ significantly from each other at the ,05 level.

In total, 257 patients of the population IEA (n = 938) were readmitted in the study period 2017/2018, some of them several times, in 142 cases also in the context of a further suicidal crisis. The TAC was treated 1648 times in the study period in the Helios FKH, not only for suicidal crises. 62 patients subsequently attempted suicide after a first admission as a SI or SA in the period from 2017 to 2022 (see Chapter 4.5.3, “Prospective Suicide Re-Attempts”).

Considering all documented admissions between 1998 and 2018, n=383 (40,8%) patients were admitted once (single admissions), n=160 (17,1%) for another stay and n=216 (23,0%) 2 to 5 times in this period; in total, n=179 (19,2%) patients had more than 5 admissions over 20 years (see Table 14).

Table 13

Age distribution of suicidal (SIC, n = 1,080) and non-suicidal cases (n = 5,379), based on total number of cases admitted to Helios FKH in study period (TAC, n = 6,549).

Age groups >15 years	Suicidal Inpatients 2017/2018		Non-suicidal Inpatients 2017/2018		Comparison between suicidal and non-suicidal Cases
	N	%	N	%	
15 to 20	**85$_a$**	**7,9%**	139$_b$	2,5%	χ^2 = 249.658, df=11, p <.001
20 to 25	**100$_a$**	**9,3%**	241$_b$	4,5%	differences in age group 15 to 20, 20
25 to 30	**121$_a$**	**11,2%**	404$_b$	7,5%	to 25, 25 to 30, 40 to 45, 45 to 50, 65
30 to 35	108$_a$	10,0%	511$_a$	9,5%	to 75 and over 75
35 to 40	92$_a$	8,5%	466$_a$	8,7%	
40 to 45	**75$_a$**	**6,9%**	262$_b$	4,9%	
45 to 50	**100$_a$**	**9,3%**	383$_b$	7,1%	
50 to 55	111$_a$	10,3%	529$_a$	9,8%	
55 to 60	87$_a$	8,1%	520$_a$	9,7%	
60 to 65	74$_a$	6,9%	366$_a$	6,8%	
65 to 75	59$_a$	5,5%	**537$_b$**	**10,0%**	
Over 75	68$_a$	6,3%	**1021$_b$**	**19,0%**	
Total	1080	100,0%	5379	100,0%	

Note. Differences between the study population and non-suicidal population admitted 2017/2018, TAC, n = 6,459. Admission to the Department of Psychiatry and Psychotherapy of Helios FKH. Subgroups of patients with and without suicidal crisis, adjusted to the classes of the Thuringian State Office for Statistics (TLS). Bold font indicates statistical significance. Each subscript letter denotes a subset of population categories whose column proportions do not differ significantly from each other at the ,05 level.

No significant gender differences were found (see supplement Table 7). In terms of age groups, both the youngest and oldest patient groups had a significantly higher number of first admissions. Patients with multiple events during the observation period are mainly from the large group of 30–70-year-olds, with particular attention to the group over 70. In the case of younger patients, it is not possible to predict prospectively how often they will use the assistance system in the future. However, old age does not automatically mean more frequent stays in psychiatric wards; it is obvious that many older people come into contact with the help system for the first time in the context of a suicidal crisis.

Table 14

Age distribution and number of readmissions from 1998 to 2018 (IEA, n = 938)

	Age groups				
	<30, n=384	30 to 70, n=575	>70, n=89	Total, n=938	Statistics

	N	%	N	%	N	%	N	%	χ^2	df	p
Single admission	**148_a**	**54,0%**	188_b	32,7%	**47_a**	**52,8%**	383	40,8%	76,781	12	<.001
1 readmission	56_a	20,4%	90_a	15,7%	14_a	15,7%	160	17,1%			
2-5 readmissions	52_a	19,0%	145_a	25,2%	19_a	21,3%	216	23,0%			
6-10 readmissions	13_a	4,7%	**81_b**	**14,1%**	$7_{a, b}$	7,9%	101	10,8%			
11-15 readmissions	5_a	1,8%	**32_b**	**5,6%**	$1_{a, b}$	1,1%	38	4,1%			
16-20 readmissions	0_a	0,0%	**17_b**	**3,0%**	$0_{a, b}$	0,0%	17	1,8%			
Over 20 readmissions	0_a	0,0%	**22_b**	**3,8%**	$1_{a, b}$	1,1%	23	2,5%			
Total	384	100,0%	575	100%	89	100%	938	100%			

Note. Total admissions (1998-2018) of all patients who were admitted by suicidal crisis in 2017-2018 at Helios FKH as inpatient. Bold font indicates statistical significance. Each subscript letter denotes a subset of age categories whose column proportions do not differ significantly from each other at the ,05 level.

Table 15

Admission mode of all patients admitted in study period to Helios FKH (TAC, n = 6,459)

	Gender				Total				
	Male (53,9%)		Female (46,1%)		n = 6,459		Statistics		
Admission type	N	%	N	%	N	%	χ^2	df	P
Emergency	**1347^a**	**38,7%**	816^b	27,4%	2163	33,5%	95,836	5	<.001
Regular	1572^a	45,2%	**1603^b**	**53,9%**	3175	49,2%			
Transfer from ext. Hospital	482^a	13,8%	462^a	15,5%	944	14,6%			
Return from ext. Hospital*	79^a	2,3%	**96^b**	**3,2%**	175	2,7%			
Total	3482	100,0%	2977	100,0%	6459	100,0%			

*Note. Bold font indicates statistical significance. Admissions in the study period to Helios FKH, Department of Psychiatry and Psychotherapy for Adults. *After initial admission to the psychiatric ward, three patients had to be transferred to a somatic hospital due to medical complications and then returned after stabilization.*

4.2 Research Aim #1: Analysis of Epidemiologic Data and Specific Characteristics of subgroups gender and region for 2017-2018

All epidemiological data are presented for the IEA population (n = 938), for clinical data we used the case-related population SIC (n = 1,080), grouped by gender (4.2.1) and for the regional subgroups (4.2.2) of the districts of Hildburghausen, Ilm-district, Meiningen and Sonneberg, as well as for the city of Suhl.

As shown in Table 16 47.3% of the entire sample was female, and almost half of the population was younger than 40. The age range in our study varied from 17 years to 96 years (M: 43.63 years, SD: 17.79 years). Males were younger (M: 42.01 years, SD: 17,50 years) than females (M: 45,04 years, SD: 18.81 years).

Across the entire group (IEA, n = 938), we observed no differences in regional origin, which is essential for further results to make comparisons between the regions of origin. Overall, it has already been shown above that the age groups of younger people are overrepresented. 52.8% were never married, 24.3 were married, and 11.1% were divorced (see Table 17). Table 18 shows that 26.0% are full-time employed, and over 26.6% are in retirement (14.7% early retirement, 11.9% old-age retirement). Most patients have no children (43.2%) or one to two children (46.2%). The level of education is in the low (33.9%) to middle range (42.2%), typical of a rural region. 20.9% had a higher education level; however, this variable also had many missing (27.7%).

Most participants live on their incomes (35.4%), with higher age 26.9% from their old age pension or from granted early retirement due to illness. Patients work at activity mainly full-time (26.0%) but primarily also part-time (3.8%). 16.6% of the total collective was unemployed.

Comparing the data on marital status with the results for the general population in southern Thuringia, the disproportionately high proportion of single (χ^2= 48,9798, p <.001) and divorced people (χ^2= 20.0206, p <.001) and the lower proportion of married people (χ^2= 62,0608, p <.001) in the group comparison are striking.

4.2.1 Research Aim #1A: Gender Subgroup Differences for 2017-2018

About gender, there were significant differences in nationality, income, living situation, marital status or number of children; men were more often of non-German nationality (8.7%), were more often single (62.6%), more often had no children (49.2%), usually lived alone (36.4%) or with their mother (5.3%), or were homeless (1.8%) or lived in an asylum camp (6.3%). Overall, men received a higher proportion of benefits from social assistance (7.7%), were more often diagnosed with an addictive disorder (33.2%) or acute stress disorder (14.2%) and were more often in treatment by a practicing psychiatric specialist (13.8%) compared to women (9.9%). Later, it was not statistically significant (p = 0.120).

Table 16
Descriptive statistics of subgroup gender, age, region, and German nationality (IEA, n = 938)

		Suicidality				Total (n = 938)		Statistics		
		Male n = 494 (52,7%)		Female n = 444 (47,3%)						
		N	%		%	N	%	χ^2	df	p
Age class	10 to 19 years	45_a	9,1%	34_a	7,7%	79	8,4%	12,118	8	,146
	20 to 29 years	115	23,3%	80_b	18,0%	195	20,8%	No differences		
	30 to 39 years	92_a	18,6%	89_a	20,0%	181	19,3%			
	40 to 49 years	84_a	17,0%	63_a	14,2%	147	15,7%			
	50 to 59 years	78_a	15,8%	79_a	17,8%	157	16,7%			
	60 to 69 years	41_a	8,3%	49_a	11,0%	90	9,6%			
	70 to 79 years	24_a	4,9%	24_a	5,4%	48	5,1%			
	80 to 89 years	13_a	2,6%	21_a	4,7%	34	3,6%			
	> 90 years	2_a	0,4%	5_a	1,1%	7	0,7%			
Region	North. Bavaria	18_a	3,6%	28_a	6,3%	46	4,9%	7,625	6	,267
	Hildburghausen	91_a	18,4%	82_a	18,5%	173	18,4%			
	Ilm District	63_a	12,8%	65_a	14,6%	128	13,6%			
	Meiningen	118_a	23,9%	107_a	24,1%	225	24,0%			
	Sonneberg	99_a	20,0%	86_a	19,4%	185	19,7%			
	Stadt Suhl	78_a	15,8%	50_b	11,3%	128	13,6%			
	Other region	27_a	5,5%	26_a	5,9%	53	5,7%			
German nationality	yes	449	90,9%	**429_b**	**96,6%**	878	93,6%	12,915	2	,002
	no	**43_a**	**8,7%**	14_b	3,2%	57	6,1%			

Note. Bold font indicates statistical significance.

Accordingly, women were more often of German nationality (96.6%), were more often married (28.6%), divorced and remarried (2.9%), or widowed (8.8%). By the predominant marital status, women also lived to a higher degree with their spouse (23.2%) or another partner (14.2%) or with their children and partner (4.5%). On the other hand, there was a higher proportion of single-parent women (9.5%). In general, women had significantly more children to care for (2 children 26.4%, three children 9.7%), were more likely than men to live off the support of their partners (2.7%), were more likely to be in part-time employment (5.2%), or were more likely to be housewife (2.7%). Regarding clinical data, women showed higher levels of NSSI (16.2%), were significantly more likely to have depression (65.8%) or personality disorder (11.3%), or met criteria for posttraumatic stress disorder (PTSD, 4.2%). In our population, the women were more often attended by the hospital outpatient department before admission (16.2%).

The focus of the presentation is on situational suicide-specific factors, above all, motivational variables such as stressful life events, or suicide-specific information such as certain suicide methods or prior treatment with medication before the respective inpatient admissions.

Patient-reported motives for suicide in response to the question about SLE were evaluated as motivational factors. Significant differences were found in the gender-specific analysis. We documented more SLE for males in the categories of financial crisis (12,7%), refugees (8,5%), and minor stressors (16,3%). For females, SLE was more often documented for interpersonal abuse (19,4%).

No significant differences in gender were found for severe illness, personal loss, or interpersonal conflict.

Table 17

Descriptive statistics of subgroup gender, marital status, living, and children (IEA, n = 938)

		Gender				Total (n = 938)		Statistics		
		Male n = 494 (52,7%)		Female n = 444 (47,3%)						
		N	%		%	N	%	χ^2	df	p
Marital status	Single	**309$_a$**	**62,6%**	187$_b$	42,1%	496	52,9%	46,437	6	<,001
	Married	101$_a$	20,4%	**127$_b$**	**28,6%**	228	24,3%	difference in never married, married, widowed and divorced and remarried		
	Widowed	16$_a$	3,2%	**39$_b$**	**8,8%**	55	5,9%			
	Divorced	46$_a$	9,3%	58$_a$	13,1%	104	11,1%			
	Divorced and remarried	4$_a$	0,8%	**13$_b$**	**2,9%**	17	1,8%			
	Married and live apart	16$_a$	3,2%	17$_a$	3,8%	33	3,5%			
	unknown	2$_a$	0,4%	3$_a$	0,7%	5	0,5%			
Living	Alone	**180$_a$**	**36,4%**	119$_b$	26,8%	299	31,9%	85,485	17	<,001
	Mother	**26$_a$**	**5,3%**	11$_b$	2,5%	37	3,9%	difference in living alone, married partner, heterosex. Partner, children and partner, only children, homeless and asylum camp		
	Father	4$_a$	0,8%	1$_a$	0,2%	5	0,5%			
	Parents	27$_a$	5,5%	16$_a$	3,6%	43	4,6%			
	Married partner	83$_a$	16,8%	**103$_b$**	**23,2%**	186	19,8%			
	Heterosex. partner	43$_a$	8,7%	**57$_b$**	**12,8%**	100	10,7%			
	Homosex. partner	1$_a$	0,2%	**6$_b$**	**1,4%**	7	0,7%			
	Children and partner	22$_a$	4,5%	**41$_b$**	**9,2%**	63	6,7%			
	Only children	9$_a$	1,8%	**42$_b$**	**9,5%**	51	5,4%			
	Other family members	7$_a$	1,4%	7$_a$	1,6%	14	1,5%			
	3-generation	2$_a$	0,4%	3$_a$	0,7%	5	0,5%			
	Other household	13$_a$	2,6%	5$_a$	1,1%	18	1,9%			
	Residential care	32$_a$	6,5%	21$_a$	4,7%	53	5,7%			
	Prison	3$_a$	0,6%	0$_a$	0,0%	3	0,3%			
	hospital	0$_a$	0,0%	1$_a$	0,2%	1	0,1%			
	homeless	**9$_a$**	**1,8%**	1$_b$	0,2%	10	1,1%			
	Homeless shelter	2$_a$	0,4%	2$_a$	0,5%	4	0,4%			
	Asylum camp	31$_a$	6,3%	8$_b$	1,8%	39	4,2%			
Number of children	none	**243$_a$**	**49,2%**	131$_b$	29,5%	374	39,9%	62,706	6	<,001
	1	101$_a$	20,4%	111$_a$	25,0%	212	22,6%	difference in no children, 2 or 3 children		
	2	71$_a$	14,4%	**117$_b$**	**26,4%**	188	20,0%			
	3	19$_a$	3,8%	**43$_b$**	**9,7%**	62	6,6%			
	4	8$_a$	1,6%	11$_a$	2,5%	19	2,0%			
	More than 5	3$_a$	0,6%	7$_a$	1,6%	10	1,1%			

Note. Bold font indicates statistical significance.

Table 18

Descriptive statistics of subgroup gender, education, income, and employment (IEA, n = 938)

		Gender				Total (n = 938)		Gender		
		Male n = 494 (52,7%)		Female n = 444 (47,3%)						
		N	%		%	N	%	χ^2	df	p
Education level	Low	117_a	23,7%	112_a	25,2%	229	24,4%	2,391	4	,664
	Medium	143_a	28,9%	143_a	32,2%	286	30,5%			
	High	81_a	16,4%	62_a	14,0%	143	15,2%			
	In training	11_a	2,2%	9_a	2,0%	20	2,1%			
	Unknown	142_a	28,7%	118_a	26,6%	260	27,7%			
Income	Salary	164_a	33,2%	134_a	30,2%	298	31,8%	31,128	10	<,001
	Social Benefits	**38_a**	**7,7%**	16_b	3,6%	54	5,8%	difference in social benefits, long term unemployment benefit, partner, pension, unknown		
	Partner	0_a	0,0%	**13_b**	**2,9%**	13	1,4%			
	Unemployment benefit	9_a	1,8%	9_a	2,0%	18	1,9%			
	Training salary	27_a	5,5%	31_a	7,0%	58	6,2%			
	Savings	1_a	0,2%	0_a	0,0%	1	0,1%			
	Long term unemployment benefit	81_a	16,4%	56_a	12,6%	137	14,6%			
	Parents	10_a	2,0%	12_a	2,7%	22	2,3%			
	Early retirement pension	69_a	14,0%	68_a	15,3%	137	14,6%			
	Pension	48_a	9,7%	**64_b**	**14,4%**	112	11,9%			
	unknown	47_a	9,5%	41_a	9,2%	88	9,4%			
Employment	Full-time	140_a	28,3%	105_a	23,6%	245	26,1%	30,871	12	,002
	Part-time	12_a	2,4%	**23_b**	**5,2%**	35	3,7%	difference in housewife, old-age retirement and others		
	Housewife/-man	2_a	0,4%	**12_b**	**2,7%**	14	1,5%			
	Protected employed	10_a	2,0%	6_a	1,4%	16	1,7%			
	Early retirement	69_a	14,0%	68_a	15,3%	137	14,6%			
	Old-age Retirement	48_a	9,7%	**64_b**	**14,4%**	112	11,9%			
	Federal army forces	1_a	0,2%	0_a	0,0%	1	0,1%			
	Retraining	27_a	5,5%	31_a	7,0%	58	6,2%			
	Unemployment	89_a	18,0%	63_a	14,2%	152	16,2%			
	Highschool Student	5_a	1,0%	6_a	1,4%	11	1,2%			
	College Student	5_a	1,0%	5_a	1,1%	10	1,1%			
	Others	**39_a**	**7,9%**	17_b	3,8%	56	6,0%			
	unknown	47_a	9,5%	44_a	9,9%	91	9,7%			

Note. Bold font indicates statistical significance.

Table 19

Descriptive statistics of subgroup gender, cumulative diagnoses by ICD group (IEA, n = 938)

ICD-10 Chapter V Mental and behavior al disorders		Gender				Total (n = 938)		Gender		
		Male n = 494 (52,7%)		Female n = 444 (47,3%)						
		N	%		%	N	%	χ^2	df	p
F0	Organic mental disorders	38_a	3,2%	33_a	3,5%	71	3,3%	157,660[a]	15	<,001
F10	Mental and behavior al disorders due to use of alcohol	**383_a**	**31,9%**	190_b	20,2%	573	26,8%	difference in F10, F12-19, F32-34, F43.1, F5, F60-62, F8-9		
F12-19	Mental and behavior al disorders due to use of other drugs	**190_a**	**15,8%**	90_b	9,6%	280	13,1%			
F2	Schizophrenia	63_a	5,2%	41_a	4,4%	104	4,9%			
F30-31	Manic episodes and Bipolar affective disorder	23_a	1,9%	29_a	3,1%	52	2,4%			
F32-34	Depressive episodes and Recurrent depressive disorder	250_a	20,8%	**320_b**	**34,1%**	570	26,6%			
F40-42	Phobic and other anxiety disorders, Obsessive-compulsive disorder	20_a	1,7%	22_a	2,3%	42	2,0%			
F43.0	Acute stress reaction	33_a	2,7%	20_a	2,1%	53	2,5%			
F43.1	Post-traumatic stress disorder	11_a	0,9%	**29_b**	**3,1%**	40	1,9%			
F43.2	Adjustment disorders (AdD)	**112_a**	**9,3%**	44_b	4,7%	156	7,3%			
F44-45	Dissociative disorders and somatoform disorders	14_a	1,2%	21_a	2,2%	35	1,6%			
F5	Behavioral syndromes associated with physiological disturbances and physical factors	1_a	0,1%	**7_b**	**0,7%**	8	0,4%			
F60-62	Personality disorders	30_a	2,5%	**71_b**	**7,6%**	101	4,7%			
F63-68	Habit and impulse disorders	9_a	0,7%	4_a	0,4%	13	0,6%			
F7	Mental retardation	11_a	0,9%	15_a	1,6%	26	1,2%			
F8-9	Disorders of psychological development and Hyperkinetic disorders	**13_a**	**1,1%**	3_b	0,3%	16	0,7%			

Note. Bold font indicates statistical significance.

Table 20

Descriptive statistics of clinical variables, difference by gender in suicidal patients (IEA, n = 938)

		Gender				Total		Statistics		
		Male n = 494 (52,7%)		Female n = 444 (47,3%)		n = 938				
		N	%		%	N	%	χ^2	df	p
NSSI	Yes	29_a	5,9%	**72_b**	**16,2%**	101	10,8%	26,049	1	<,001
Schizo*	Yes	45_a	9,1%	29_a	6,5%	74	7,9%	2,138	1	,144
Depr*	Yes	227_a	46,0%	**292_b**	**65,8%**	519	55,3%	37,144	1	<,001
Addic*	Yes	**164_a**	**33,2%**	92_b	20,7%	256	27,3%	18,347	1	<,001
PD*	Yes	33_a	6,7%	39_a	8,8%	72	7,7%	1,460	1	,227
AdD*	Yes	**70_a**	**14,2%**	20_b	4,5%	90	9,6%	25,184	1	<,001
Personal-	Yes	25_a	5,1%	**50_b**	**11,3%**	75	8,0%	19,263	3	<,001
ity disor-	Suspect	27_a	5,5%	**42_b**	**9,5%**	69	7,4%			
der	Unclear	3_a	0,6%	3_a	0,7%	6	0,6%			
PTSD	Yes	10_a	2,0%	**29_b**	**6,5%**	39	4,2%	15,261	3	<,001
	Suspect	4_a	0,8%	9_a	2,0%	13	1,4%			
	Unclear	1_a	0,2%	2_a	0,5%	3	0,3%			
Pretreat-	Specialist	68_a	13,8%	44_a	9,9%	112	11,9%	5,239	3	,155
ment	PIA	65_a	13,2%	72_a	16,2%	137	14,6%			
	GP and psychotherapist	9_a	1,8%	5_a	1,1%	14	1,5%			
	Only GP	352_a	71,3%	323_a	72,7%	675	72,0%			
Admis-	Emergency	**326_a**	**66,5%**	247_b	56,0%	573	61,5%	14,353	3	,002
sion Type	Regular	80_a	16,3%	80_a	18,1%	160	17,2%			
	Transfer from ext. Hospital	84_a	17,1%	**112_b**	**25,4%**	196	21,1%			
	Return from ext. Hospital	0_a	0,0%	2_a	0,5%	2	0,2%			
Legal sta-	Voluntary	357_a	72,3%	**358_b**	**80,6%**	715	76,2%	11,523	4	0,021
tus	Thür PsychKG	**122_a**	**24,7%**	78_b	17,6%	200	21,3%			
	BGB	2_a	0,4%	0_a	0,0%	2	0,2%			
	Prisoner	2_a	0,4%	0_a	0,0%	2	0,2%			

*Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of gender categories whose column proportions do not differ significantly from each other at the ,05 level. *Main diagnosis. Comparable significant differences were found by analyzing the basic population of cases (SIC, see supplement Table S 1)*

Table 21
Duration of inpatient hospitalization of suicidal patients (IEA, n = 938)

	Gender				Total (n = 938)		Statistics		
	Male n = 494 (52,7%)		Female n = 444 (47,3%)						
	M	SD	M	SD	M	SD	t	df	p
Duration (days)	23,38	31,258	**28,52**	30,282	25,81	30,89	-2,554	936	,011
Time since first admission (years)	2,445	4,9411	**3,071**	5,4861	2,741	5,2128	-1,839	936	,066

Note. Bold font indicates statistical significance. Period between first inpatient admission to Helios FKH and time of admission during the study period.

Table 22
Descriptive statistics of subgroup gender, SLE categories (SIC, n = 1,080)

	Gender				Total (n = 1,080)		Statistics		
	Male n = 576 (53,5%)		Female n = 504 (46,7%)						
	N	%		%	N	%	χ^2	df	p
1 Severe illness	158	27,4%	155	30,8%	313	29,0%	1,442	1	,230
2 Personal Loss	78	13,5%	75	14,9%	153	14,2%	,397	1	,529
3 Interpersonal conflict	254	44,1%	224	44,4%	478	44,3%	,013	1	,909
4 Financial crisis	73	12,7%	43	8,5%	116	10,7%	4,810	1	,028
5 Interpersonal abuse	43	7,5%	**98**	**19,4%**	141	13,1%	33,982	1	<,001
6 Minor stressors	**94**	**16,3%**	43	8,5%	137	12,7%	14,718	1	<,001
7 Refugees	**49**	**8,5%**	17	3,4%	66	6,1%	12,348	1	<,001

Note. Bold font indicates statistical significance.

4.2.2 Research Aim #1B: Regional Subgroup Differences for 2017-2018

Research Aim #1: Description of regional differences of patients with suicidality admitted at Helios FKH in 2017 and 2018.

We conducted two different analyses, firstly differences at the level of regional affiliation, independent of place of residence size. Secondly, differences based on the size of the place

of residence according to the URT, to describe possible differences between the rural population and the more urban population. A further differentiation of the individual sub-regions based on the URT did not yield meaningful results due to the size of the groups.

Table 23
Marital status of the total region (Mikrozensus 2011), study population 2017/2018 (IEA, n = 938).

	Single		Married		Widowed		Divorced		Total
	N	%	N	%	N	%	N	%	N
Hildburghausen*	24880	37,49%	31555	47,54%	5511	8,30%	4402	6,63%	66369
City of Suhl*	12188	32,98%	18002	48,71%	3092	8,37%	3566	9,65%	36960
Ilm District*	41813	37,89%	50751	45,99%	9216	8,35%	8458	7,66%	110361
Sonneberg*	19548	33,16%	29048	49,28%	5658	9,60%	4686	7,95%	58943
Schmalkalden-Meiningen*	45339	35,53%	62717	49,14%	10837	8,49%	8551	6,70%	127622
Care region*	143768	35,92%	192073	47,99%	34314	8,57%	29663	7,41%	400255
Thuringia 2011	824320	37,79%	1013320	46,45%	177892	8,15%	165285	7,58%	2181603
Thuringia 2018	855555	39,92%	943396	44,02%	173502	8,10%	169245	7,90%	2143145
Study population	496	52,88%	228	24,31%	55	5,86%	104	11,09%	938
SA	133	44,93%	81	27,36%	23	7,77%	29	9,80%	296
SI	363	56,54%	147	22,90%	32	4,98%	75	11,68%	642

Note. Data of Mikrozensus 2011

Clinical characteristics of subgroup region residence

Analyzing the specialist therapeutic care available to patients at the time of admission was considered a key factor. We distinguished between regular medical care by a specialist or general practitioner (GP) in the patient's local area and additional treatment by a psychotherapist. In Germany there is the special situation of care in a hospital-based psychiatric outpatient clinic (Psychiatrische Institutsambulanz, PIA) with the possibility of long-term care treated by a multi-professional team. A total of n = 675 patients (72.0%) were treated exclusively by a GP, n = 112 (11.9%) by a specialist and n = 137 (14.6%) by the PIA. Only a few patients reported that they had previously been treated by a psychotherapist (n = 14, 1.5%). In the regional analysis, there was a significant underuse of specialists in ILD (n = 7, 5.5%), with correspondingly higher levels of care provided by GPs alone (see Table 24). There were significant differences between the regions when analyzing the distribution of patients according to voluntary or involuntary admission.

Table 24

Descriptive statistics of pre-treatment, grouped by region (IEA, n = 938)

	Specialist pre-treatment												
	Specialist n=112		PIA n = 137		Psychothera-pist n = 14		Only GP n = 675		Total n = 938		Statistics		
Region	N	%	N	%	N	%	N	%	N	%	χ^2	df	p
Hildburghausen	23_a	13,3%	36_a	20,8%	0_a	0,0%	114_a	65,9%	173	100,0%	40,669	18	,002
Ilm District	**7_a**	**5,5%**	27_b	21,1%	$0_{a,b}$	0,0%	$94_{a,b}$	73,4%	128	100,0%	Differences in Ilm		
Meiningen	31_a	13,8%	33_a	14,7%	4_a	1,8%	157_a	69,8%	225	100,0%	district		
Sonneberg	22_a	11,9%	16_a	8,6%	4_a	2,2%	143_a	77,3%	285	100,0%			
City of Suhl	18_a	14,1%	16_a	12,5%	5_a	3,9%	89_a	69,8%	128	100,0%			
Other	11	11,1%	9	9,1%	3	1,0%	78	78,8%	99	100,0%			
Total	112	11,9%	137	14,6%	14	1,5%	675	72,0%	938	100,0%			

*Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of pre-treatment categories whose column proportions do not differ significantly from each other at the ,05 level. * Missing data for patients registered outside the care region or without permanent residence at the time of the study.*

Table 25

Descriptive statistics of legal status by admission grouped by region (SIC, n = 1,080)

	Legal status by admission						Statistics		
	voluntary n = 827		Non-voluntary n = 225		Total* n = 1080				
	N	%	N	%	N	%	χ^2	df	p
North. Bavaria	45_a	90,0%	5_a	10,0%	50	100,0%	69,649	12	<.001
Hildburghausen	165_a	82,1%	31_a	15,4%	196	100,0%	Differences in Meiningen and		
Ilm District	106_a	70,2%	**38_a**	**25,2%**	144	100,0%	city of Suhl		
Meiningen	**219_b**	**85,5%**	34_a	13,3%	253	100,0%			
Sonneberg	164_a	74,9%	52_a	23,7%	216	100,0%			
City of Suhl	83_b	57,2%	**61_a**	**42,1%**	144	100,0%			
Other regions	45_a	77,6%	10_a	21,4%	55	100,0%			
Total	827	76,6%	231	21,4%	1080	100,0%			

*Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of legal status at admission categories whose column proportions do not differ significantly from each other at the ,05 level. *Missing: no documented information in 22 cases.*

Patients from the ILD region (n = 38, 25.2%) and the city of Suhl (n = 61, 42.1%) were significantly more likely to be admitted involuntarily, whereas patients from the MGN (n = 219, 85%) were more likely to be admitted voluntarily (see Table 25). There were no significant differences for admission type (see Table S 2)

Urban-Rural Typology (URT)

The URT is applied to NUTS level 3 regions. These regions are classified according to the proportion of rural inhabitants, resulting in three distinct types: predominantly rural regions, intermediate regions and predominantly urban regions. The care region of this study is predominantly rural, with 6 cities over 10.000 Inhabitants in the different regions: 3.7% of participants live in villages under 1500 inhabitants, 15.7% in small towns between 1500 and 3,000 inhabitants, 20.9% in cities between 3,000 and 10,000 inhabitants, 35.4% in cities between 10,000 and 30,000 inhabitants, 24.3% in cities over 30,000 inhabitants (see Table 26). There were no differences between SA and SI, or between genders.

Table 26
Main diagnosis depression grouped by URT (IEA, n = 938)

	Depression								
	yes		no		Total		Statistics		
Inhabitants	N	%	N	%	N	%	χ^2	df	p
Under 1.500	24_a	4,6%	11_a	2,6%	35	3,7%	23,066[a]	4	<,001
1.500 to 3.000	89_a	17,1%	58_a	13,8%	147	15,7%			
3.000 to 10.000	**128_a**	**24,7%**	68_b	16,2%	196	20,9%			
10.000 to 30.000	176_a	33,9%	156_a	37,2%	332	35,4%			
Over 30.000	102_a	19,7%	**126_b**	**30,1%**	228	24,3%			
Total	519	100,0%	419	100,0%	938	100,0%			

Note. Each subscript letter denotes a subset of URT categories whose proportions do not differ significantly from each other at the ,05 level.

Focusing on different diagnosis types, there was a significant clustering of depression in communities of 3.000 to 10.000 residents and a reduction in communities over 30.000 residents. Dependency disorders were significantly lower in small communities and tended to be more common in larger communities. With regard to epidemiological factors, a higher proportion of singles and, conversely, a lower proportion of married persons were found with increasing community size. Significantly more people in asylum homes were found in larger communities. Widowed people were found more often in municipalities of 1.500 to 3.000 and increased unemployment in municipalities with more than 30.000 inhabitants. There were no significant differences in gender, between SA and SI, or for main diagnosis of schizophrenia and adjustment disorders (see supplement Table S 3 - Table S 6).

Table 27
Main diagnosis addiction grouped by URT (IEA, n = 938)

	Addiction								
	yes		no		Total		Statistics		
Inhabitants	N	%	N	%	N	%	χ^2	df	p
Under 1.500	6_a	2,3%	29_a	4,3%	35	3,7%	13,294	4	,010
1.500 to 3.000	25_a	9,8%	**122_b**	**17,9%**	147	15,7%			
3.000 to 10.000	53_a	20,7%	143_a	21,0%	196	20,9%			
10.000 to 30.000	99_a	38,7%	233_a	34,2%	332	35,4%			
Over 30.000	73_a	28,5%	155_a	22,7%	228	24,3%			
Total	256	100,0%	682	100,0%	938	100,0%			

Note. Each subscript letter denotes a subset of URT categories whose proportions do not differ significantly from each other at the ,05 level.

Table 28
Marital status grouped by URT (IEA, n = 938)

	Marital status											
	Single		married		widowed		divorced		Total	Statistics		
Inhabitants	N	%	N	%	N	%	N	%	N	χ^2	df	p
14_a	14_a	40,0%	12_a	34,3%	2_a	5,7%	5_a	14,3%	35	56,472[a]	24	<,001
68_a	68_a	46,3%	$41_{a,b}$	27,9%	**17_b**	**11,6%**	$12_{a,b}$	8,2%	147	Main differences in wid-		
94_a	94_a	48,0%	52_a	26,5%	10_a	5,1%	19_a	9,7%	196	owed		
186_a	186_a	56,0%	$80_{a,b}$	24,1%	9_b	0,6%	46_a	13,9%	332			
134_a	134_a	58,8%	43_a	18,9%	17_a	0,9%	22_a	9,6%	228			
496	496	52,9%	228	24,3%	55	5,9%	104	11,1%	938			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of marital status categories whose column proportions do not differ significantly from each other at the ,05 level. Missing because of no differences divorced and remarried (n = 17, 1.8%), married and live apart (33, 3.5%).

Table 29
Employment grouped by URT (IEA, n = 938)

	Employment										
	employed		pension		unemployed		unknown		Statistics		
Inhabitants	N	%	N	%	N	%	N	%	χ^2	df	p
under 1.500	11_a	31,4%	12_a	34,3%	7_a	20,0%	4_a	2,9%	47,333[a]	20	<,001
1.500 to 3.000	48_a	32,7%	47_a	32,0%	26_a	17,7%	8_a	12,2%	Main differences in un-		
3.000 to 10.000	76_a	38,8%	51_a	26,0%	37_a	18,9%	10_a	10,2%	known, unemployed		
10.000 to 30.000	108_a	32,5%	80_a	24,1%	73_a	22,0%	$39_{a,b}$	6,3%			
over 30.000	54_a	23,7%	$59_{a,b}$	25,9%	**65_b**	**28,5%**	**30_b**	**8,3%**			

Total	297	31,7%	249	1,5%	208	26,5%	91	8,4%					

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of employment categories whose column proportions do not differ significantly from each other at the ,05 level. Missing by no differences: housewife (n = 14, 1.5%) and in training (n = 79, 8.4%).

Table 30
Living situation grouped by URT (IEA, n = 938)

	Living												
	alone		partner or family		residential care		asylum camp		Total		Statistics		
Inhabitants	N	%	N	%	N	%	N	%	N	%	χ^2	df	p
under 1.500	12_a	34,3%	22_a	62,9%	0_a	0,0%	1_a	2,9%	35	100,0%	$51,872^a$	12	<,001
1.500 to 3.000	54_a	36,7%	87_a	59,2%	4_a	2,7%	2_a	1,4%	147	100,0%	Differences in asylum		
3.000 to 10.000	65_a	33,2%	114_a	58,2%	14_a	7,1%	3_a	1,5%	196	100,0%	camp		
10.000 to 30.000	143_a	43,1%	155_a	46,7%	24_a	7,2%	10_a	3,0%	332	100,0%			
over 30.000	91_a	39,9%	100_a	43,9%	11_a	4,8%	**26_b**	**11,4%**	228	100,0%			
Total	365	38,9%	478	51,0%	53	5,7%	42	4,5%	938	100,0%			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of living categories whose column proportions do not differ significantly from each other at the ,05 level.

4.3 Research Aim #2A: SA and SI Differences for 2017-2018

Comparison of epidemiological and specific characteristics of SA and SI admitted to Helios FKH in 2017 and 2018, such as family status, employment, mental disorder, former suicidal behavior, or stressful life events. We refer to these as the suicidality subgroup.

Table 31
Admission mode of suicidality subgroup, entire population (SIC, n = 1,080).

	Suicidality								
	SA		SI		Total				
Admission type	N	%	N	%	N	%	χ^2	df	p
Emergency	119_a	35,1%	**495_b**	**66,8%**	614	56,9%	236,212	3	<.001
Regular	30_a	8,8%	**156_b**	**21,1%**	186	17,2%			
Transfer from ext. Hospital	**187_a**	**55,2%**	86_b	11,6%	273	25,3%			
Return from ext. Hospital*	3_a	0,9%	4_a	0,5%	7	0,6%			
Total	339	100,0%	741	100,0%	1080	100,0%			

*Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of suicidality categories whose column proportions do not differ significantly from each other at the ,05 level. *After initial admission to the psychiatric ward, three patients had to be transferred to a somatic hospital due to medical complications and then returned after stabilization.*

The results of the person-related descriptive statistics refer to the population of patients with the first admission in the study period.

4.3.1 Age Distribution of Suicidality Subgroup

As Table 32 shows, differences were found mainly in the age structure, with the age group 70 to 89 years dominating among the SA (9.8%) compared to the SI (3.0%). These patients were also more often of non-German nationality (10.1%), divorced, and remarried (4.1%). Due to the higher age group, these patients were in the state of old-age pension (18.9%). SI were more often of German nationality (95.3%), more often single (56,5%), and showed frequent symptoms of a dependence disorder (34.1%). Regarding work activity, the group of SI was significantly more often unemployed (18.8%).

Table 32

Descriptive statistics of suicidality subgroup, gender, age, region and nationality (IEA, n = 938)

		Suicidality				Total (n = 938)		Statistics		
		SA (n = 296)		SI (n = 642)						
		N	%		%	N	%	χ^2	df	p
Gender	male	21_a	7,1%	58_a	9,0%	79	8,4%	,299	1	.584
	female	67_a	22,6%	128_a	19,9%	195	20,8%			
Age class	10 to 19 years	51_a	17,2%	130_a	20,2%	181	19,3%	29,125[a]	8	<,001
	20 to 29 years	45_a	15,2%	102_a	15,9%	147	15,7%	difference in age class 70		
	30 to 39 years	42_a	14,2%	115_a	17,9%	157	16,7%	to 79 years and 80 to 89		
	40 to 49 years	22_a	7,4%	68_a	10,6%	90	9,6%	years		
	50 to 59 years	**29_a**	**9,8%**	19_b	3,0%	48	5,1%			
	60 to 69 years	**16_a**	**5,4%**	18_b	2,8%	34	3,6%			
	70 to 79 years	3_a	1,0%	4_a	0,6%	7	0,7%			
	80 to 89 years	14_a	4,7%	32_a	5,0%	46	4,9%			
	> 90 years	55_a	18,6%	118_a	18,4%	173	18,4%			
Region	North. Bavaria	45_a	15,2%	83_a	12,9%	128	13,6%	6,493[a]	6	, 370
	Hildburghausen	59_a	19,9%	166_b	25,9%	225	24,0%			
	Ilm District	58_a	19,6%	127_a	19,8%	185	19,7%			
	Meiningen	49_a	16,6%	79_a	12,3%	128	13,6%			
	Sonneberg	16_a	5,4%	37_a	5,8%	53	5,7%			
	Stadt Suhl	266_a	89,9%	**612_b**	**95,3%**	878	93,6%			
	Other region	**30_a**	**10,1%**	27_b	4,2%	57	6,1%			
German nationality	yes	21_a	7,1%	58_a	9,0%	79	8,4%	13,751[a]	2	,001
	no	67_a	22,6%	128_a	19,9%	195	20,8%			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of suicidality categories whose column proportions do not differ significantly from each other at the ,05 level.

4.3.2 Epidemiological Characteristics of Suicidality Subgroup

As Table 33 shows, there were significant differences in the marital status category. SI were more likely to be single (56,5%), while the SA group had a higher proportion of divorced and remarried people (4,1%), but only as a smaller subgroup. SA were more likely to be retired (18,9%), while SI were more likely to be unemployed (18,8%).

Table 33
Descriptive statistics of suicidality subgroup, marital status and employment (IEA, n = 938)

		Suicidality				Total (n = 938)		Statistics		
		SA (n = 296)		SI (n = 642)						
		N	%		%	N	%	χ^2	df	p
Marital status	Single	133_a	44,9%	**363_b**	**56,5%**	496	52,9%	26,974[a]	6	<,001
	Married	81_a	27,4%	147_a	22,9%	228	24,3%	difference in never married and divorced and remarried		
	Widowed	23_a	7,8%	32_a	5,0%	55	5,9%			
	Divorced	29_a	9,8%	75_a	11,7%	104	11,1%			
	Divorced and remarried	**12_a**	**4,1%**	5_b	0,8%	17	1,8%			
	Married and live apart	15_a	5,1%	18_a	2,8%	33	3,5%			
	Unknown	3_a	1,0%	2_a	0,3%	5	0,5%			
Employ-ment	Full-time	69_a	23,3%	176_a	27,4%	245	26,1%	57,881[a]	12	<,001
	Part-time	11_a	3,7%	24_a	3,7%	35	3,7%	difference in old-age retirement, unemployment, others and unknown		
	Housewife/-man	5_a	1,7%	9_a	1,4%	14	1,5%			
	Protected employed	4_a	1,4%	12_a	1,9%	16	1,7%			
	Early retirement	43_a	14,5%	94_a	14,6%	137	14,6%			
	Old-age Retirement	**56_a**	**18,9%**	56_b	8,7%	112	11,9%			
	Federal army forces	1_a	0,3%	0_a	0,0%	1	0,1%			
	Retraining	18_a	6,1%	40_a	6,2%	58	6,2%			
	Unemployment	31_a	10,5%	**121_b**	**18,8%**	152	16,2%			
	Highschool Student	3_a	1,0%	8_a	1,2%	11	1,2%			
	College Student	2_a	0,7%	8_a	1,2%	10	1,1%			
	Others	**34_a**	**11,5%**	22_b	3,4%	56	6,0%			
	unknown	19_a	6,4%	**72_b**	**11,2%**	91	9,7%			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of suicidality categories whose column proportions do not differ significantly from each other at the ,05 level.

4.3.3 Clinical Characteristics of Suicidality Subgroup

The detailed diagnosis spectrum can be seen in Table 34. Over 55% of patients suffer from depression, 27.2% have a dependence disorder (alcohol or illegal drugs), and 21.1% have an acute stress disorder. 7.4% of all patients show signs of a personality disorder, and 4.7 % of the patients fulfilled the criteria of post-traumatic stress disorder (PTSD). The number of psychiatric diagnoses ranged from 0 to 4, with a mean of 1.56 (SD = .66). There were no significant differences in diagnoses, especially borderline-personality disorder, depression or acute stress disorders, or in pre-medication with antidepressants or benzodiazepines.

Table 34
Descriptive statistics of suicidality subgroup, cumulative diagnoses (n = 2140)

ICD-10 Chapter V Mental and behavioral disorders		Suicidality				Total n = 1,080		Statistics		
		SA n = 339		SI n = 741						
		N	%		%	N	%	χ^2	df	p
F0	Organic mental disorders	18_a	3,2%	53_a	3,3%	71	3,3%	63,824[a]	15	<,001
F10	Mental and behavioral disorders due to use of alcohol	115_a	20,8%	**458_b**	**28,9%**	573	26,8%	difference in F10, F12-19, F32-34, F40-42, F5, F7		
F12-19	Mental and behavioral disorders due to use of other drugs	51_a	9,2%	**229_b**	**14,4%**	280	13,1%			
F2	Schizophrenia	26_a	4,7%	78_a	4,9%	104	4,9%			
F30-31	Manic episodes and Bipolar affective disorder	15_a	2,7%	37_a	2,3%	52	2,4%			
F32-34	Depressive episodes and Recurrent depressive disorder	**192_a**	**34,7 %**	378_b	23,8%	570	26,6%			
F40-42	Phobic and other anxiety disorders, Obsessive-compulsive disorder	4_a	0,7%	**38_b**	**2,4%**	42	2,0%			
F430	Acute stress reaction	18_a	3,2%	35_a	2,2%	53	2,5%			
F431	Post-traumatic stress disorder	8_a	1,4%	32_a	2,0%	40	1,9%			
F43.2	Adjustment disorders (AdD)	50_a	9,0%	106_a	6,7%	156	7,3%			
F44-45	Dissociative disorders and somatoform disorders	7_a	1,3%	28_a	1,8%	35	1,6%			
F5	Behavioral syndromes associated with physiological disturbances and physical factors	**5_a**	**0,9%**	3_b	0,2%	8	0,4%			
F60-62	Personality disorders	32_a	5,8%	69_a	4,4%	101	4,7%			
F63-68	Habit and impulse disorders	4_a	0,7%	9_a	0,6%	13	0,6%			
F7	Mental retardation	2_a	0,4%	**24_b**	**1,5%**	26	1,2%			
F8-9	Disorders of psychological development and Hyperkinetic disorders	7_a	1,3%	9_a	0,6%	16	0,7%			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of suicidality categories whose column proportions do not differ significantly from each other at the ,05 level.

From a clinical perspective, it is important to note that SI were significantly more likely to be in pre-treatment by a specialist (30.2% vs. 21.8%, χ^2=8.215, df=1, p=0.004), which could certainly mean that specialized treatment is a protective factor for suicide attempts (OR=0.733, 95% CI [.588, .914]), or timely referral would occur in acute crises. Due to the

statistical error of overestimating person-specific epidemiological factors in case analysis, these are not presented for population of all cases.

We found that 10.7% of the patients show self-injurious behavior; almost 75% had no special psychiatric or psychotherapeutic pre-treatment before admission and were cared for by their general practitioner (GP) alone (72.4%).

Table 35
Descriptive statistics of suicidality subgroup, psychopathology (SIC, n = 1,080)

	Entire Sample				Total		Statistics		
	SA (n = 339)		SI (n = 741)		(n = 1,080)				
	N	%		%	N	%	χ^2	df	p
Hallucinations/Delusion	29	8,6%	**156**	**21,1%**	185	17,1%	25,594a	1	<,001
Symptoms of Depression	144	42,5%	**458**	**61,8%**	602	55,7%	35,229a	1	<,001
Sleep disturbances	34	10,0%	**401**	**54,1%**	435	40,3%	187,93a	1	<,001
NSSI	9	2,7%	**150**	**20,2%**	159	14,7%	57,309a	1	<,001
Long term drugs	24	7,1%	82	11,1%	106	9,8%	4,176a	1	,041
Long term alcohol	16	4,7%	**121**	**16,3%**	137	12,7%	28,303a	1	<,001

Note. Bold font indicates statistical significance.

Table 36
Descriptive statistics of suicidality subgroup, psychopathological (SIC, n = 1,080)

	Entire Sample				Total		Statistics		
	SA (n = 339)		SI (n = 741)		(n = 1,080)				
	N	%		%	N	%	χ^2	df	p
Fear of physical illness	**25**	**7,4%**	20	2,7%	45	4,2%	12,734a	1	<,001
Isolation /Loneliness	27	8,0%	58	7,8%	85	7,9%	,006a	1	,938
Shame/Embarrassment	7	2,1%	8	1,1%	15	1,4%	1,649a	1	,199
Realization of a severe mental illness	8	2,4%	6	0,8%	14	1,3%	4,368a	1	,037
Perspectivelessness/ hopelessness	**99**	**29,2%**	52	7,0%	151	14,0%	95,193a	1	<,001
Burdensomeness	**26**	**7,7%**	4	0,5%	30	2,8%	43,781a	1	<,001
Excessive demands on profession, studies	8	2,4%	21	2,8%	29	2,7%	,200a	1	,655

Note. Bold font indicates statistical significance.

The comparison of different psychopathological symptoms yielded similar results, with SI showing higher values than SA, both categorically and in the median (χ^2=128.071, df=15, p<.001). In contrast, SA showed significantly more often psychological symptoms, such as hopelessness, lack of perspective, embarrassment, and realization of severe illnesses (χ^2=65,846, df=9, p<.001). About the number of SLEs, however, we found no significant differences between genders or SA typologies.

Considering psychopathological symptoms, there was a significantly higher symptom burden between SA and SI in most categories. SA showed statistically significant more often fear of physical illness (7.4%), realizing of severe mental illness (2.4%), perspectivelessness or hopelessness (29.2%), and burdensomeness (7.7%).

Table 37
Descriptive statistics of suicidality subgroup, main diagnosis (IEA, n = 938)

		Suicidality				Total				
		SA (n = 296)		SI (n = 642)		(n = 938)		Statistics		
		N	%		%	N	%	χ^2	df	p
NSSI	yes	29_a	9,8%	72_a	11,2%	101	10,8%	,424[a]	1	,515
Schizo*	yes	20_a	6,8%	54_a	8,4%	74	7,9%	,763[a]	1	,382
Depr*	yes	177_a	59,8%	342_a	53,3%	519	55,3%	3,491[a]	1	,062
Addiction*	yes	37_a	12,5%	**219_b**	**34,1%**	256	27,3%	47,687[a]	1	<,001
PD*	yes	25_a	8,4%	47_a	7,3%	72	7,7%	,362[a]	1	,547
AdD*	yes	28_a	9,5%	62_a	9,7%	90	9,6%	,009[a]	1	,924
PTSD	No	284_a	95,9%	599_a	93,3%	883	94,1%	12,287[a]	3	,006
	Yes	8_a	2,7%	31_a	4,8%	39	4,2%			
	Suspect	1_a	0,3%	12_a	1,9%	13	1,4%			
	Unclear	3_a	1,0%	0_b	0,0%	3	0,3%			

*Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of suicidality categories whose column proportions do not differ significantly from each other at the ,05 level. *Main diagnosis*

4.3.4 Stressful Life Events of Suicidality Subgroup

We found differences between SI and SA in SLE. People with suicidal ideation more likely reported personal loss (31,4%) or interpersonal abuse (15,4%), SA more about interpersonal conflicts (48,1%), financial crisis (13,0%), consequences of flight from foreign countries (7,7%) or psychological stressors. We found no differences in severe illness or minor stressors.

Table 38
Descriptive statistics of suicidality subgroup, SLE (SIC, n = 1,080)

	Entire Sample				Total (n = 1,080)		Statistics		
	SA (n = 339)		SI (n = 741)						
	N	%		%	N	%	χ^2	df	p

Severe illness	80	23,6%	233	31,4%	313	29,0%	6,955a	1	,008
Personal Loss	23	6,8%	**130**	**17,5%**	153	14,2%	22,143a	1	<,001
Interpersonal conflict	163	48,1%	315	42,5%	478	44,3%	2,928a	1	,087
Financial crisis	44	13,0%	72	9,7%	116	10,7%	2,583a	1	,108
Interpersonal abuse	27	8,0%	**114**	**15,4%**	141	13,1%	11,281a	1	<,001
Minor stressors	45	13,3%	92	12,4%	137	12,7%	,155a	1	,694
Refugees	26	7,7%	40	5,4%	66	6,1%	2,092a	1	,148

Note. Bold font indicates statistical significance.

4.3.5 Suicidality in the Lifetime

One limitation of the study is that patients with exclusive suicidal ideation are incorrectly grouped as non-SA. However, they may have already attempted suicide shortly before the study period or more recently. Therefore, we performed the descriptive analyses with the information of a past suicide attempt in the patient's medical history. However, this way of looking at the data also introduces further biases, as some patients had attempted suicide within the last 1.2 years before the study period, while others had attempted suicide more than ten years earlier.

Other patients had multiple suicide attempts in their medical history, while others had only one, but this may have been in adolescence or young adulthood. In addition, specific parameters are situational, such as an older patient's coping with a severe illness or the recent loss of a family member or close friend. We, therefore, list here only the significant results.

Accordingly, there was a clear age group differentiation with a higher proportion of younger patients exclusively with suicidal ideation. However, this is not surprising due to the expectation that the life span for the occurrence of a critical event such as a suicide attempt is correspondingly shorter. Suicidal attempters are more likely to live with their spouse, while SI are more likely to still live with their parents. Both statements may be related to age group. The only parameter that showed an abnormality was the burden of severe illness, also a presumed age-dependent correlation.

Table 39

Descriptive statistics of age, marital status, living and SLE category severe illness/personal loss for life-time Suicide Attempter (ltSA) and Suicide Ideators (ltSI) (IEA, n = 938)

	Lifetime Suicide Attempt		Total	Statistics
	ltSA (n = 443)	ltSI (n = 495)	n = 938	

		N	%		%	N	%	χ^2	df	p
Age class	10 to 19 years	31_a	7,0%	48_a	9,7%	79	8,4%	16,704[a]	8	,033
	20 to 29 years	98_a	22,1%	97_a	19,6%	195	20,8%			
	30 to 39 years	74_a	16,7%	107_a	21,6%	181	19,3%			
	40 to 49 years	72_a	16,3%	75_a	15,2%	147	15,7%			
	50 to 59 years	77_a	17,4%	80_a	16,2%	157	16,7%			
	60 to 69 years	37_a	8,4%	53_a	10,7%	90	9,6%			
	70 to 79 years	**33_a**	**7,4%**	15_b	3,0%	48	5,1%			
	80 to 89 years	17_a	3,8%	17_a	3,4%	34	3,6%			
	> 90 years	4_a	0,9%	3_a	0,6%	7	0,7%			
Marital status	single	219_a	49,4%	**277_b**	**56,0%**	496	52,9%	12,656	6	,049
living	Partner or family	209	47,2%	**269**	**54,3%**	478	51,0%	8,190	3	0,042
	Asylum camp	**27**	**6,1%**	15	3,0%	42	4,5%			
Stressful life	Severe Illness	114_a	25,7%	**164_b**	**33,1%**	278	29,6%	6,135[a]	1	,013
events	Personal Loss	45	10,2%	**89**	**18,0%**	134	14,3%	11,681	1	<,001

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of lifetime suicide attempt categories whose column proportions do not differ significantly from each other at the ,05 level.

4.4 Research Aim #2B: Subgroup Suicide-Types

Defining patients as SA who had at least one suicide attempt during the study period or a documented suicide attempt in the individual history or who had at least one suicide attempt documented during follow-up from 2019 to 2022, n = 443 of 938 participants met the criteria for an SSA or RA

Patients with no history of suicide attempt, no suicide attempt during the study period, and no suicide attempt during the follow-up period were excluded and assigned to the SI group.

For the definition of multiple attempts, we defined >3 suicide attempts in the medical history, regardless of the time period. In addition, we distinguished between patients who attempted suicide in a relatively short period of time and those who attempted suicide over a longer period of time (persistent vs. intermittent suicidal crisis). Statistical analyses were not possible because the groups to be studied were too small. An overview of the different suicide types is shown in Table 40.

Table 40
Types of suicidality entire population 2017-2021 (n = 938)

			Males n = 494			Female n = 444			Total n = 938	
			N	%	Age M±SD	N	%	Age M±SD	N	%
sa = 0			266	53,8	40,91±16,59	229	51,6	42,74±18,74	495	52,8
SA sa >0	SSA, sa =1		167	33,8	41,53±19,13	157	35,4	47,04±19,19	324	34,5
	RA sa >1	SRA sa = 2	52	10,5	44,38±17,45	51	11,5	44,61±17,0	103	11,0
		MSA sa >2	9	1,8	42,56±10,64	7	1,6	47,43±21,07	16	1,7

Note. SA Suicide Attempter, SSA Single Suicide Attempter, RA Reattempter, SRA Suicide Reattempter, MSA Multi Suicide Attempter. Inclusion of prospective data 2019-2021.

In total, 443 patients with at least one suicide attempt were found in the study group of 938 patients, including previous suicide attempts and suicide attempts in the further follow-up. We identified n = 324 (73,14%) patients as single attempters (SSA), of whom n = 200 (61,73%) were younger than 50 years. At least we found one other suicide attempt in the medical history or prospective for 103 patients (re-attempters, 23,25 %); more than two suicide attempts were found in 16 patients (multi-attempters, 3,61%).

Significant differences were found only with regard to nationality when comparing the types of suicide attempts. SSAs were significantly more likely to have a nationality other than German (9,9% vs. 2,9%), while SRAs were comparatively more likely to have German nationality (95,1% vs. 90,1%). Otherwise, no significant differences were found between the individual subtypes (see supplement Table S 8).

4.4.1 Diagnostic Spectrum of Suicide Type Subgroup

Diagnoses are reported on the basis of the case analyses (SIC, n = 1,080), as the diagnosis may change for different cases; no 'lifetime diagnosis' was defined for the participants. No statistically significant differences were found between the different suicide attempt types, apart from the small group of dissociative disorders and somatoform disorders.

There were no significant differences in NSSI, violence of suicide attempt or pre-treatment by specialists before suicide attempt. MSAs were more likely to report financial problems or interpersonal abuse in their life history, while more refugees were found in the SSA group.

Table 41
Descriptive statistics of cumulative diagnoses by ICD group, difference by SA-Type

ICD-10 Chapter V Mental and behavioral disorders		SA-Types n = 461						Statistics		
		SSA n = 324		SRA n = 103		MSA n = 16				
		N	%		%	N	%	χ^2	df	p
F0	Organic mental disorders	16_a	2,4%	14_a	4,9%	1_a	1,4%	55,705[a]	30	,003
F10	Mental and behavioral disorders due to use of alcohol	168_a	24,9%	65_a	23,0%	26_a	36,1%			
F12-19	Mental and behavioral disorders due to use of other drugs	75_a	11,1%	28_a	9,9%	4_a	5,6%			
F2	Schizophrenia	41_a	6,1%	17_a	6,0%	1_a	1,4%			
F30-31	Manic episodes and Bipolar affective disorder	14_a	2,1%	12_a	4,2%	4_a	5,6%			
F32-34	Depressive episodes and Recurrent depressive disorder	194_a	28,8%	82_a	29,0%	21_a	29,2%			
F40-42	Phobic and other anxiety disorders, Obsessive-compulsive disorder	9_a	1,3%	2_a	0,7%	2_a	2,8%			
F43.0	Acute stress reaction	**20_a**	**3,0%**	3_a	1,1%	0_a	0,0%			
F43.1	Post-traumatic stress disorder	18_a	2,7%	5_a	1,8%	1_a	1,4%			
F43.2	Adjustment disorders (AdD)	55_a	8,2%	11_a	3,9%	1_a	1,4%			

F44-45	Dissociative disorders and somatoform disorders	8_a	1,2%	**10_b**	**3,5%**	$0_{a,b}$	0,0%
F5	Behavioral syndromes associated with physiological disturbances and physical factors	4_a	0,6%	4_a	1,4%	0_a	0,0%
F60-62	Personality disorders	37_a	5,5%	21_a	7,4%	8_a	11,1%
F63-68	Habit and impulse disorders	4_a	0,6%	2_a	0,7%	2_a	2,8%
F7	Mental retardation	7_a	1,0%	3_a	1,1%	0_a	0,0%
F8-9	Disorders of psychological development and Hyperkinetic disorders	4_a	0,6%	4_a	1,4%	1_a	1,4%

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of suicide-type categories whose column proportions do not differ significantly from each other at the ,05 level.

Table 42
Descriptive statistics of clinical variables, difference by SA-Type

		SA-Types						Total (n = 542)		Statistics		
		SSA (n=367)		SRA (n=140)		MSA (n= 35)						
		N	%		%			N	%	χ^2	df	p
NSSI	yes	44_a	12,0%	17_a	12,1%	7_a	20,0%	68	12,5%	$1,897^a$	2	,387
SA violent	yes	61_a	27,0%	34_a	37,4%	5_a	22,7%	100	29,5%	$4,933^a$	4	,294
Pre treatment	Specialist	39_a	10,6%	12_a	8,6%	7_a	20,0%	58_a	10,7%	7,062	6	,315
	PIA	58_a	15,8%	15_a	10,7%	3_a	8,6%	76_a	14,0%			
	Psychotherapist	2_a	0,5%	1_a	0,7%	0_a	0,0%	3_a	0,6%			
	Only GP	268	73,0%	112	80,0%	25	71,4%	405	74,7%			
Financial crisis	yes	37_a	10,1%	$22_{a,b}$	15,7%	**9_b**	**25,7 %**	68	12,5%	$8,843_a$	2	,012
Interpersonal abuse	yes	42_a	11,4%	14_a	10,0%	**10_b**	**28,6 %**	66	12,2%	$9,601_a$	2	,008
Refugees	Yes	**36_a**	**9,8%**	4_b	2,9%	$0_{a,b}$	0,0%	40	7,4%	$10,147_a$	2	,006

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of suicide-type categories whose column proportions do not differ significantly from each other at the ,05 level.

4.4.2 Stressful Life Events of Suicide Type Subgroup

Regarding SLE categories, there were significant differences between different suicide attempt types in financial crisis and interpersonal abuse, no significant differences in the other categories.

There were no differences in pain, hopelessness, or lack of perspective and no differences between the suicide-Types for mean age (see supplement Table S 9).

4.4.3 Psychopathology of Suicide Type Subgroup

SI show a significantly higher symptom burden in the clinical population than SSA (82,0% vs. 68,1%, χ^2= 29,261, df=3, p <.001), but also than SRA, MSA, or the group of patients with suicide attempts in their life history. Women also had a higher symptom burden here than men (79.4% vs. 70.8%, χ^2=10.384, df=1, p=.001).

There were no significantly differences between SSA and RA in the presence of psychiatric symptoms (see supplement S10)

4.5 Research Aim #2C: Suicide-specific Results

4.5.1 Unmasking Concealed Suicide Attempts in Patient Records

It is well known that patients do not report information about past suicide attempts because of shame or fear of the consequences. We therefore examined individual medical records for past suicide attempts rSA ("retrospective SA") when available; data were available in electronic form up to 1998.

Table 43
Honest and hidden information about past suicide attempts (IEA, n = 938)

		Information about past SA								
		Hidden/Lier n = 240		Honest n = 698		Total n = 938		Statistics		
		N	%	N	%	N	%	χ^2	df	p
Gender	male	132	55,0%	362	51,9%	494	52,7%	,705	1	,401
	female	108	45,0%	336	48,1%	444	47,3%			
Age class	20 to 29	**63**	**26,3%**	123	18,9%	195	20,8%	24,213	8	,002
	70 to 79	**20**	**8,3%**	28	4,0%	48	5,1%			
	80 to 89	**14**	**5,8%**	20	2,9%	34	3,6%			
LCA 938	Younger	**43**	**17,9%**	77	11,0%			8,254	2	,016
Region	Meiningen	43	17,9%	**182**	**26,1%**	225	24,0%	12,174	6	,058
	City of Suhl	**43**	**17,9%**	85	12,2%	128	13,6%			
Admission ward	B1 (HIC, 18-65 years)	57	23,8%	**220**	**31,5%**	227	29,5%	15,925	4	,003
	C1 (HIC, over 65years)	**24**	**10,0%**	32	4,6%	56	6,0%			
Admission type	Emergency	129	54,0%	**444**	**64,2%**	573	61,5%	47,283	3	<,001
	Regular	24	10,0%	**136**	**19,7%**	160	17,2%			
	Transfer from other hospital	**86**	**36,0%**	110	15,9%	196	21,1%			
Legal status at admission	Voluntary	184	76,7%	531	76,1%	715	76,2%	1,502	4	,826
	Involuntary	52	21,6%	152	21,7%	204	21,7%			
	C3	**125**	**52,1%**	310	44,4%	435	46,4	4,226	1	0,040
	C5	18	7,5%	**109**	**15,6%**	127	13,5	10,049	1	0.002
	Addic	37	15,4%	**219**	**31,4%**	256	27,3	22,921	1	<.001
	AdD	**30**	**12,5%**	60	8,6	90	9,6	3,138	1	0,076

Note. Bold font indicates statistical significance. HIC: High Intensive Care, closed ward, C3 = Interpersonal Conflict, C5 = Interpersonal trauma, Addic = Addiction, AdD = adjustment disorders

The physicians' letters were searched for the search terms "suicide attempt," "suicide," or "suicidal act," and the references were subsequently validated for the description of an actual

suicide attempt. In addition, the recorded ICD10 codes of the treatment diagnoses were available; here, Z91.8 was generally coded for an anamnestic suicide attempt and X84.9 for a current suicidal act. Primarily, n = 191 (20.4%) patients reported a past suicide attempt. Retrospective analysis of the past 20 years revealed additional cases, increasing the number of past suicide attempts to n = 432 (43.1%).

Without assessing motivation, we referred to patients who provided actual information about past suicide attempts as "honest rSA" and those who withheld information or for whom information was missing as "hidden rSA".

In both groups, the youngest patients (n = 63, 26.3%) and the oldest group of patients (n = 34, 14.1%, χ^2=24.213, df=8, p=0.002), there were significantly more patients who had a higher number of unreported suicide attempts in their personal history. Accordingly, there were more younger patients (n = 43, 17.9%, χ^2=8.254, df=2 p=0.016), patients admitted to the protected geriatric psychiatric ward (n = 24, X=10.0%, χ^2=15.925, df=8 p=0.003) and patients transferred from other hospitals (n = 86, X=36.0%, χ^2=47.283, df=3 p=<.001). We expected that patients admitted against their will might be more likely to conceal previous suicide attempts, but the legal mode of assignment showed no significant group difference. The odds ratio for another suicide attempt in the prospective course with the addition of the 2019-2022 observation course was OR=2.307 (95% CI [2.112, 2.520]), and the group difference was highly significant (χ^2=76.765, df=1 p=<.001).

4.5.2 Means of Suicide Attempts

In some cases, the means of suicide attempts were not fully documented in the medical records. Occasionally, there were only notations indicating a suicide attempt, possibly specified as "by intoxication." When considering various methods of suicide attempts, a preference for low-lethality methods (66.8%) was observed when the means were known. Patients after a jump from a height or with an aborted suicide attempt found their way into the study despite high lethality because of the study design, whereas railroad accidents, firearm use, or burns were underrepresented or not represented at all because of high lethality compared with studies of suicide. We have only limited knowledge of the different suicide methods in the past, since only current the suicide attempts were documented in detail. For those who had already attempted suicide in the past (n = 206), there was usually no information available in the records.

Table 44
Violent and nonviolent means of suicide attempts (subgroup SA, n = 339)

	Gender				Total				
	Males		Females						
	N	%	N	%	N	%	χ^2	df	p
Violent	**72_a**	**40,9%**	28_b	17,2%	100	29,5%	27,933	2	<.001
Non-violent	95_a	54,0%	**132_b**	**81,0%**	227	67,0%			
Unknown in population	9_a	5,1%	3_a	1,8%	12	3,5%			
Total	176	100,0%	163	100,0%	339	100,0%			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of sex categories whose column proportions do not differ significantly from each other at the ,05 level.

4.5.3 Prospective Suicide Re-Attempts

Based on the population of 938 participants, we examined whether they were readmitted to the hospital for a suicidal or a non-suicidal crisis between 2019 and 2022. Overall, this scenario applied for n = 297 (31.7%) of patients. Of these, n = 118 (39.3%) were readmitted once, n = 144 (48.8%) were readmitted up to 5 times, and n = 35 (11.9%) were readmitted more than 5 times, related to both suicidal and non-suicidal crises.

N = 68 patients (7,25%) were readmitted after a suicide attempt in the during the prospective observation period until Dec. 31, 2022. Of the patients primarily admitted with suicidal ideation in the primarily study period, n = 41 (60,3%) made a following suicide attempt within this period, as well as n = 15 (48,4%) of those already readmitted with a suicide attempt during the study period (2017 to 2018).

Of the 68 patients who attempted suicide during the prospective period 2017/2022, 27 did so as a re-attempt and 41 were admitted for SI during the 2017/18 study period.

The mean time between admission during the study period and a subsequent suicide attempt was 614.31 days (SD 428 days). 37.3% attempted suicide within 1 year, 61.0% within 2 years, and 39.0% after more than 1 year.

Table 45

Prospective data of suicide reattempts for Patients admitted in study period for 2017-2022

	Prospective Study Period				Total	
	2017 to 2018		2019 to 2022		2017 to 2022	
	N	%	N	%	N	%
SA	16	51,6%	11	29,7%	27	39,7%
SI	15	48,4%	26	70,3%	41	60,3%
Total	31	100,0%	37	100,0%	68	100,0%

Table 46

Interval between first admission in study period and re-attempt 2017-2022

	SA (n = 27)		SI (n = 41)		Total (n = 68)		Statistics		
	N	%	N	%	N	%	χ^2	df	p
0 to 1 month	2	50,0%	2	50,0%	4	100,0%	9,317	4	,054
1 to 6 months	8	57,1%	6	42,9%	14	100,0%			
0.5 to 1 year	7	46,7%	8	53,3%	15	100,0%			
1 to 2 years	4	28,6%	**10**	**71,4%**	14	100,0%			
over 2 years	6	28,6%	**15**	**71,4%**	21	100,0%			
	M	SD	M	SD	M	SD	F	df	p
Duration in days	443,52	478,364	598,63	435,590	537,04	455,986	1,909	1	,172
Duration in years	1,22	1,31	1,64	1,19	1,47	1,25	1,905	1	,172

Note. Bold font indicates statistical significance.

4.6 Research Aim #3: Latent Class Analysis (LCA)

We conducted separate analyses for relevant variables per LCAvarsel for each subpopulation. Some variables separated the different latent classes in most subpopulations; some were only relevant in specific subpopulations. Table 47 gives an overview of the variables selected for the latent class examination. A graphical overview of the conditional item response probabilities can be found in chapter 5.1 and figures 21A-C.

Table 47
Pre-Selection of Variables for LCA

		IEA, n = 938			SIC, n = 1,080		
	Accepted	SA	SI	all	SA	SI	all
Epidemiological	Gender	x	x				
	Age class	x	x	x	x		x
	Marital status	x	x	x			
	Education level	x					
	Living	x	x				
	Income	x		x			
	Numbers of children	x	x	x			
Stressful life events	Severe Illness or Injury	x	x	x	x		x
	Personal Loss						x
	Interpersonal Conflict	x			x	x	x
	Financial Crisis	x					
	Interpersonal Abuse	x		x			x
	Minor Life Stressors	x			x		x
	Refugees				x		x
Clinical	Insomnia	x				x	x
	Hopelessness					x	
	Burdensomeness	x		x	x		x
Diagnosis	Depression F3	x			x		x
	Schizophrenia F2					x	
	Addiction F1x.2					x	
	Adjustment Disorder, Acute Stress Disorder					x	
	addiction						x
	Personality Disorder F6						x
Medication	SSRI					x	
	SNRI				x	x	
	NaSSa				x	x	x
	Sum of psychotropic medication before admittance				x	x	

others	NSSI	x

Note. Rejected in each Model: employment, pain, depressive symptoms

4.6.1 Latent classes, Epidemiological Data

Latent classes based on epidemiological data, subgroup SA, n = 296

The variable selection process yielded the following indicator variables that were statistically significant for latent class formation: age class, number of children, education level, marital status, income, living situation, injury or illness, interpersonal conflicts, financial problems, interpersonal trauma, minor life stressors, insomnia, and burdensomeness.

The fit indices of different class solutions are shown in Table 48. Based on the Bayesian information criterion (BIC) recommended by Weller et al. (2020), we decided to use a 3-class solution. The conditional item response probabilities by outcome variable for each class are shown in Table 49.

The *first class* consists of older adults in their seventies who are married or widowed. There are slightly more women, almost all retired. This group could be described as "(lonely) retirees with physical problems." They live on their pension, state that they are burdened by serious illnesses, suffer more frequently from insomnia, and feel like a burden to others. They describe no financial problems, no trauma, and fewer interpersonal conflicts.

The *second class* consists of slightly more middle-aged female patients, most of whom are married or divorced and living on an income or receiving a pension from early retirement. The proportion of interpersonal conflicts was higher than in class 1, and financial problems were reported as a burden, as were insomnia and the feeling of being a burden to others. This class could be described as "middle-aged patients with more interpersonal or financial problems (middle-aged)."

Class 3 is characterized by young people, mostly in their twenties, somewhat younger men, who are neither married nor employed, and slightly more often described interpersonal problems. In addition, financial problems were more common than in the other groups, as were statements about interpersonal trauma. This group could be described as unstable, "young patients with interpersonal problems (younger)."

Figure 7
Elbow-Plot of aBIC, AIC, BIC and cAIC indicators, showing the parsimony and goodness-of-fit for models with varying number of classes, subgroup SA, n = 296 (IEA, n = 938)

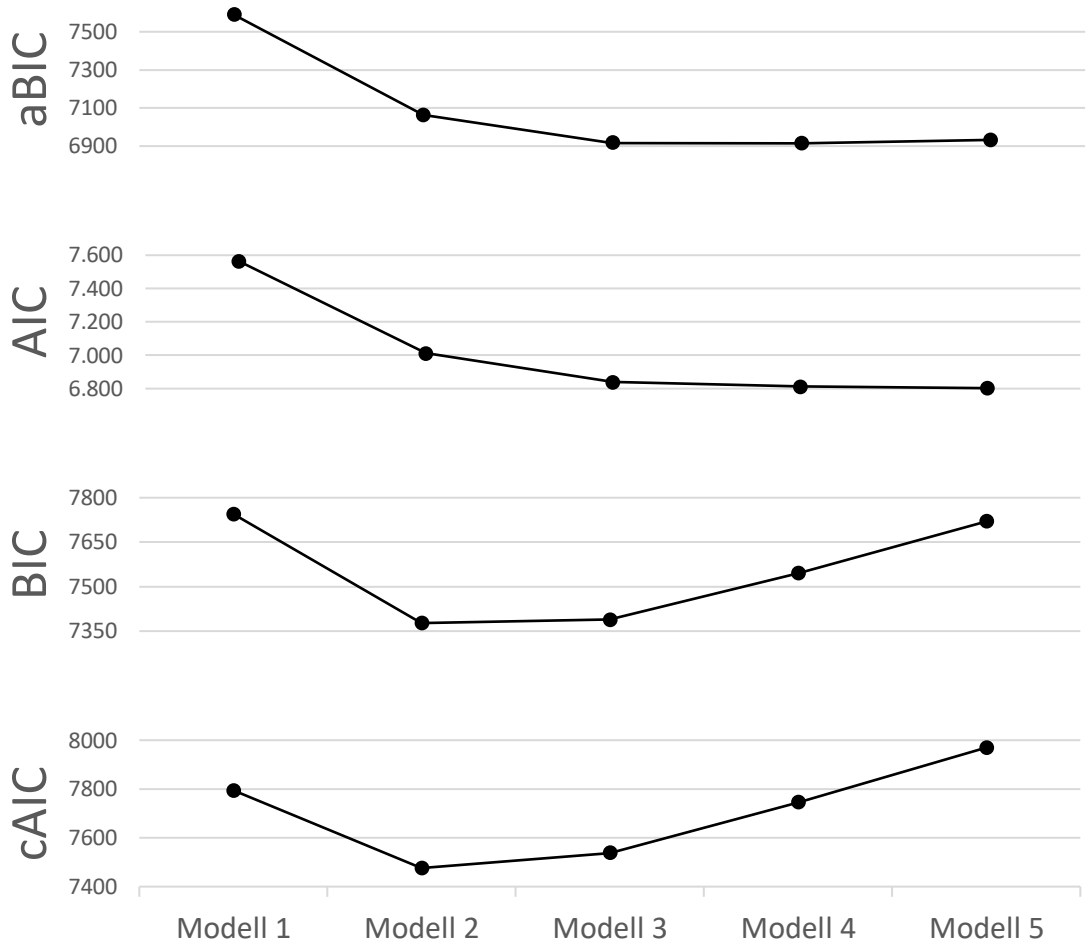


Table 48
Evaluating class solutions, model fit criteria for different classes, subgroup SA, n = 296 (IEA, n = 938)

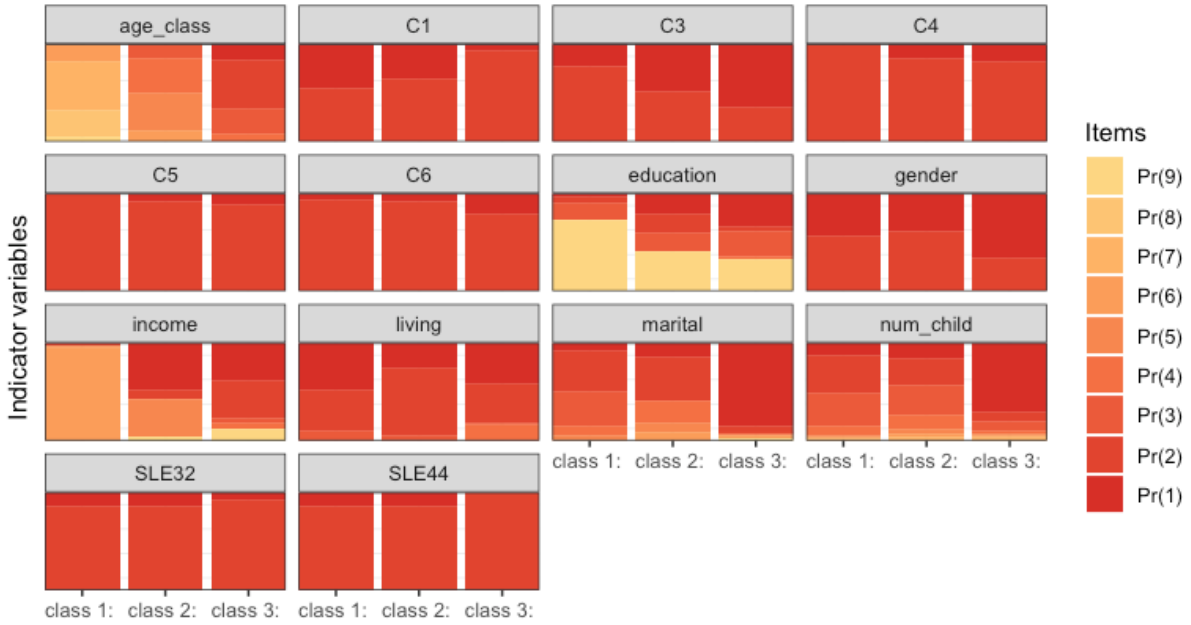
	A) Model fit criteria					
Models	LL	resid.df	AIC	cAIC	BIC	aBIC
1 Class	-3733.000	246	7564.000	7793.662	7744.662	7589.269
2 Class	-3407.036	196	7012.073	7476.083	7377.083	7063.125
3 Class	-3270.512	146	6839.024	7537.384	7388.384	6915.860
4 Class	-3206.921	96	6811.842	7744.550	7545.550	6914.462
5 Class	-3152.298	46	6802.596	7969.653	7720.653	6931.000

Models	B) Diagnostic criteria				
	Smallest class count (n)	Smallest class size (%)	G^2	Chi2	Entropy
1 Class	296	100,0%	4155.046	16098012	-
2 Class	137	46,28%	3503.119	10337667	0.828
3 Class	58	19,59%	3230.070	5655721	0.974
4 Class	24	8,11%	3102.888	2802613	NaN
5 Class	24	8,11%	2993.642	2508555	0.903

Note. n = 296, LL = log-likelihood; AIC = Akaike information criterion; BIC = Bayesian information criterion; cAIC = consistent Akaike information criterion; cBIC = consistent Bayesian information criterion, G^2 = Likelihood ratio/deviance statistic; Chi^2 = Chi-square goodness of fit.

Figure 8

Conditional item probabilities of three classes, subgroup SA, n = 296 (IEA, n = 938)



Note. class1 = retirees, class2 = middle aged, class3 = younger, C1 = Severe Illness or Injury, C3 = Interpersonal Conflict, C4 = Financial crisis, C5 = Interpersonal trauma, C6 = Minor Life Stressors, SLE32 = Insomnia, SLE44 = Burdensomeness)

Table 49
Conditional item response probabilities, subgroup SA, n = 296 (IEA, n = 938)

		Retirees	Middle-aged	Younger
	Predicted class membership	0.1966	0.3593	0.4441
Gender	male	0.4281	0.3845	0.6632
	female	0.5719	0.6155	0.3368
Age class	10 to 19 years			0.1581
	20 to 29 years			0.5043
	30 to 39 years		0.1512	0.2584
	40 to 49 years		0.3426	0.0792
	50 to 59 years		0.3959	
	60 to 69 years	0.1805	0.1103	
	70 to 79 years	0.4951		
	80 to 89 years	0.2732		
	> 90 years	0.0512		
Number of children	0	0.1195	0.1565	0.6984
	1	0.3957	0.2724	0.1025
	2	0.3302	0.3003	0.0945
	3	0.1024	0.1529	0.0238
	4	0.0171	0.0477	0.0155
	more than 4	0.0171	0.0270	0.0166
	missing	0.0181	0.0433	0.0486
Education	Low	0.0345	0.2092	0.3410
	Middle	0.0515	0.1941	0.0443
	High	0.1761	0.1874	0.2580
	In training			0.0226
Marital status	single	0.0683	0.1419	0.8528
	married	0.4183	0.4475	0.0689
	widowed	0.3585		0.0075
	divorced	0.1037	0.2187	0.0171
	divorced and remarried	0.0341	0.0966	
	married and separated	0.0171	0.0954	0.0310
	missing			0.0226
Living	living alone	0.4780	0.2552	0.4183
	living with partner	0.4183	0.6876	0.3935
	residential care	0.1037	0.0572	0.0151
	asylum camp			0.1731
Income	salary		0.4775	0.3729
	social benefits	0.0209	0.0930	0.3850

	partners/parents			0.0527
	unemployment benefits			0.0753
	early retirement	0.0230	0.3925	
	retirement pension	0.9561		
	missing		0.0370	0.1142
Severe Illness or Injury	Yes	0.4504	0.3451	0.0668
	No	0.5496	0.6549	0.9332
Interpersonal Conflict	Yes	0.2220	0.4751	0.6458
	No	0.7780	0.5249	0.3542
Financial crisis	Yes		0.1463	0.1720
	No	1.0000	0.8537	0.8280
Interpersonal abuse	Yes		0.0746	0.1074
	No	1.0000	0.9254	0.8926
Minor life stressors	yes	0.0683	0.0836	0.1982
	no	0.9317	0.9164	0.8018
Insomnia	yes	0.1407	0.1349	0.0661
	no	0.8593	0.8651	0.9339
Burdensomeness	yes	0.1406	0.1426	
	no	0.8594	0.8574	1.0000

Note. Outcome variable for each class (3-class-solution), subgroup SA n = 296 (IEA, n = 938)

Latent classes based on epidemiological data, subgroup SI, n = 642

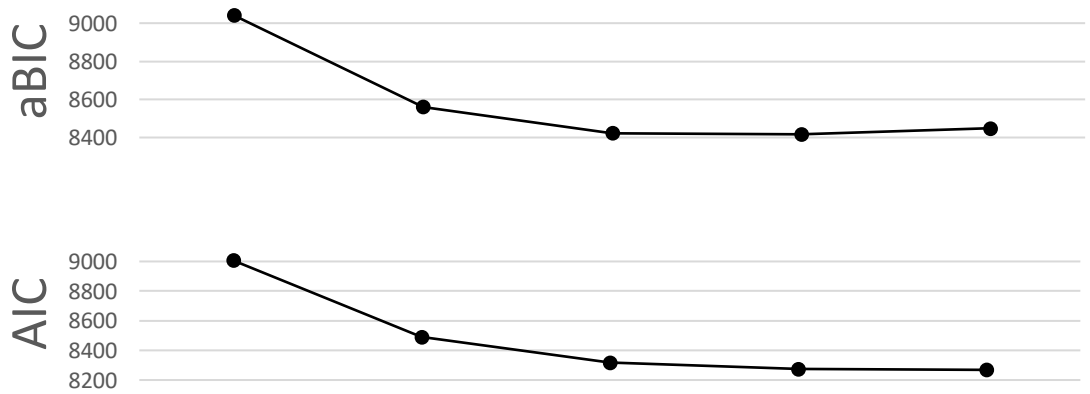
After variable selection, the following indicator variables remained statistically significant in the model for determining the latent class solution: gender, *age class, number of children, marital status, living situation, severe illness, or injury.* The fit indices for different model solutions are shown in Table 50. Again, the 3-class solution offered the best model fit according to BIC. The solutions of the classes differ from those of the SA. Interestingly, in addition to age class, gender, and, to an even greater extent, marital status are now significant indicators of latent classes. The other stressors and epidemiological factors were no longer critical.

The *first class* showed significantly more men, especially in the younger age groups, and the other two classes showed no less significant age differentiation. This group could be described as young people living alone. Those in class 1 were predominantly childless, unmarried, and single and lived in equal numbers alone and with a steady partner.

The *second class* tended to include women aged 30 to 60 with 1-2 children and a much higher proportion of divorced people; these people lived predominantly alone. This group can, therefore, be referred to as divorcees living alone.

In the *third class*, the gender distribution was more balanced, with a tendency toward older people. This group was predominantly married and more likely to live with a partner with a severe illness or injury burden. This group could be described as "middle-aged married people with physical problems."

Figure 9
Elbow-Plot of aBIC, AIC, BIC and cAIC indicators, showing the parsimony and goodness-of-fit for models with varying number of classes, subgroup SI, n = 642 (IEA, n = 938)



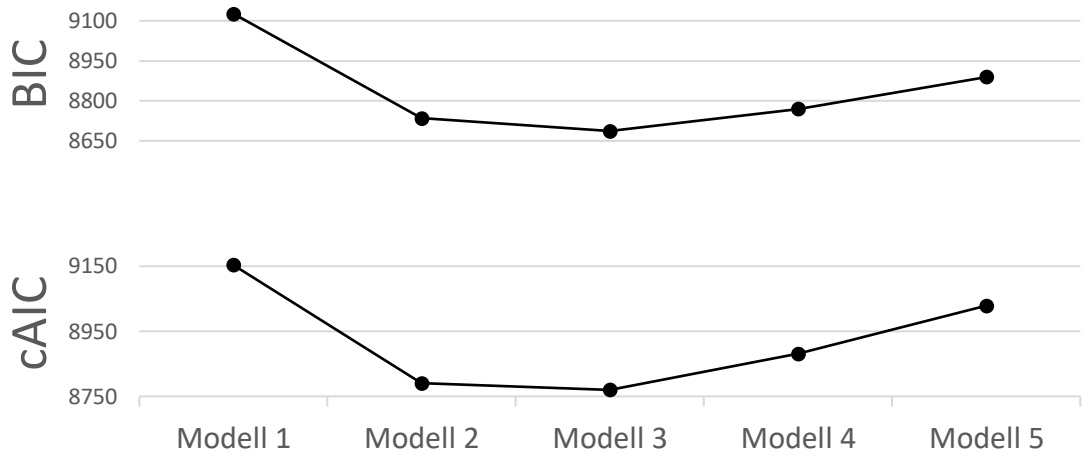


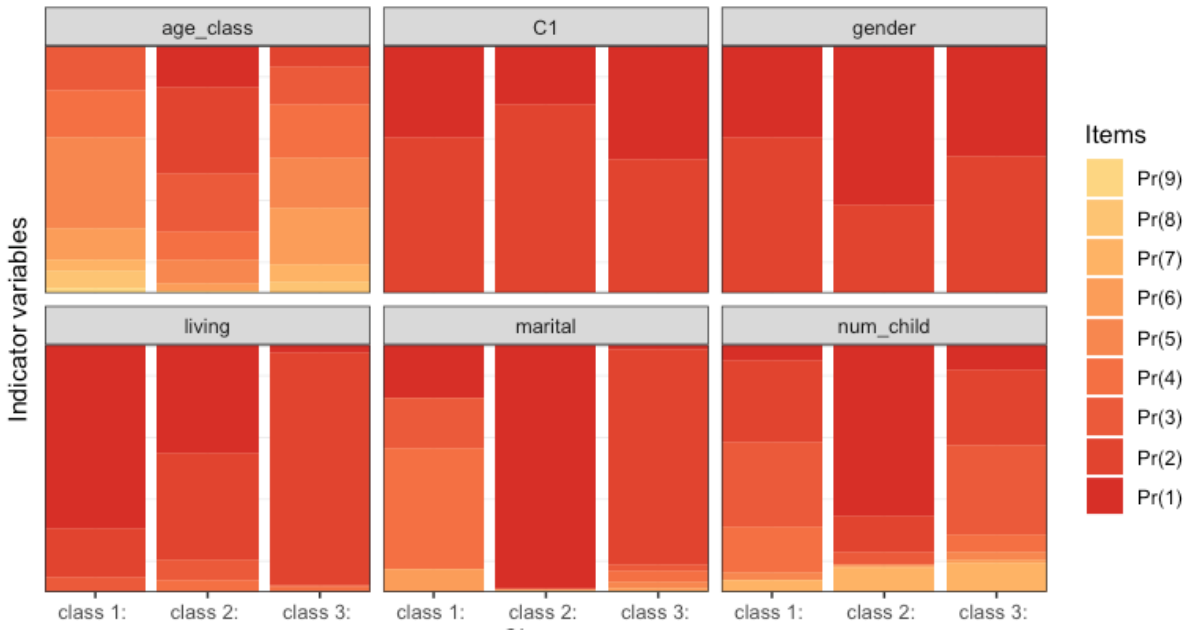
Table 50

Evaluating class solutions, model fit criteria for different classes, subgroup SI, n = 642 (IEA, n = 938)

	Model fit criteria					
Models	LL	resid.df	AIC	cAIC	BIC	aBIC
1 Class	-4475.957	616	9005.914	9153.500	9126.500	9040.776
2 Class	-4189.873	588	8489.745	8790.383	8735.383	8560.761
3 Class	-4075.098	560	8316.196	8769.886	8686.886	8423.366
4 Class	-4025.753	532	8273.506	8880.248	8769.248	8416.828
5 Class	-3995.210	504	8268.419	9028.213	8889.213	8447.896
	Diagnostic criteria					
Models	Smallest class count (n)		Smallest class size (%)	G^2	Chi2	Entropy
1 Class	642		100,0%	1894.9270	8309.763	-
2 Class	278		43,23%	1322.7583	5126.752	0.835
3 Class	151		23,48%	1093.2097	4125.559	0.885
4 Class	46		7,15%	994.5189	3052.361	0.843
5 Class	46		7,15%	933.4326	2624.093	0.806

Note. n = 642, LL = log-likelihood; AIC = Akaike information criterion; BIC = Bayesian information criterion; cAIC = consistent Akaike information criterion; cBIC = consistent Bayesian information criterion, G^2 = Likelihood ratio/deviance statistic; Chi^2 = Chi-square goodness of fit.

Figure 10
Conditional item probabilities of three classes, subgroup SI, n = 642 (IEA, n = 938)



Note. class1 = younger, class2 = divorces, class3 = married, C1 = severe illness or injury)

Table 51
Conditional item response probabilities, subgroup SI, n = 642 (IEA = 938)

		Younger	Divorces	Married
	Predicted class membership	0.5226	0.2426	0.2348
Gender	male	0.6520	0.3522	0.4534
	female	0.3480	0.6478	0.5466
Age class	10 to 19 years	0.1688		
	20 to 29 years	0.3533		0.0857
	30 to 39 years	0.2290	0.2088	0.1422
	40 to 49 years	0.1122	0.2103	0.1989
	50 to 59 years	0.0924	0.3352	0.2081
	60 to 69 years	0.0369	0.1279	0.2346
	70 to 79 years	0.0047	0.0367	0.0771
	80 to 89 years		0.0619	0.0534
	> 90 years	0.0027	0.0192	
Number of children	0	0.7030	0.0570	0.1042
	1	0.1417	0.3334	0.3081
	2	0.0472	0.3455	0.3574
	3	0.0000	0.1691	0.0644
	4	0.0062	0.0246	0.0332
	More than 4	0.0000	0.0247	0.0000

	missing	0.1019	0.0456	0.1327
Marital status	single	0.9801	0.2342	0.0000
	married	0.0111	0.0226	0.9414
	widowed	0.0000	0.1807	0.0251
	divorced	0.0000	0.4571	0.0000
	divorced and remarried	0.0000	0.0000	0.0335
	married and separated	0.0088	0.0931	0.0000
	missing	0.9801	0.2342	0.0000
Living	living alone	0.4288	0.6903	0.0000
	living with partner	0.4380	0.2527	0.9758
	residential care	0.0871	0.0516	0.0052
	asylum camp	0.0461	0.0055	0.0190
Severe Illness or Injury	Yes	0.2396	0.3652	0.4577
	No	0.7604	0.6348	0.5423

Note. Outcome variable for each class (3-class-solution), subgroup SI, n = 642 (IEA = 1080)

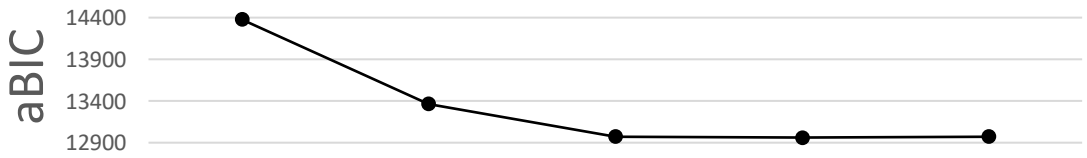
Latent classes based on epidemiological data, entire population IEA, n = 938

For the overall data set, variable selection yielded the following indicator variables for latent group membership: age group, number of children, marital status, income, severe injury or illness, interpersonal conflict, interpersonal trauma, and resilience. For this data set, we included the variable *current_suicide_attempt* as a separation between SA and SI, but no significance emerged for this factor for latent group membership.

The classes of the 3-class solution are like the keys of the sample of SA. The conditional item response probabilities are shown in Table 53.

Gender is no longer a significant factor, nor is education level or living situation.

Figure 11
Elbow-Plot of aBIC, AIC, BIC and cAIC indicators, showing the parsimony and goodness-of-fit for models with varying number of classes, entire population (IEA, n = 938)



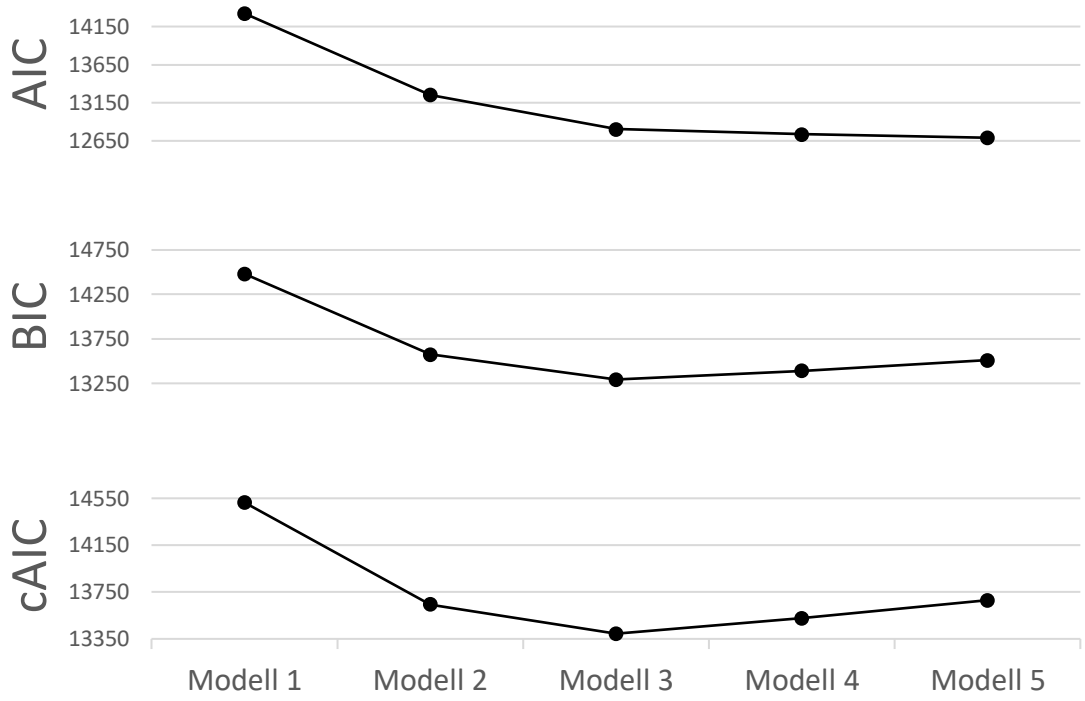
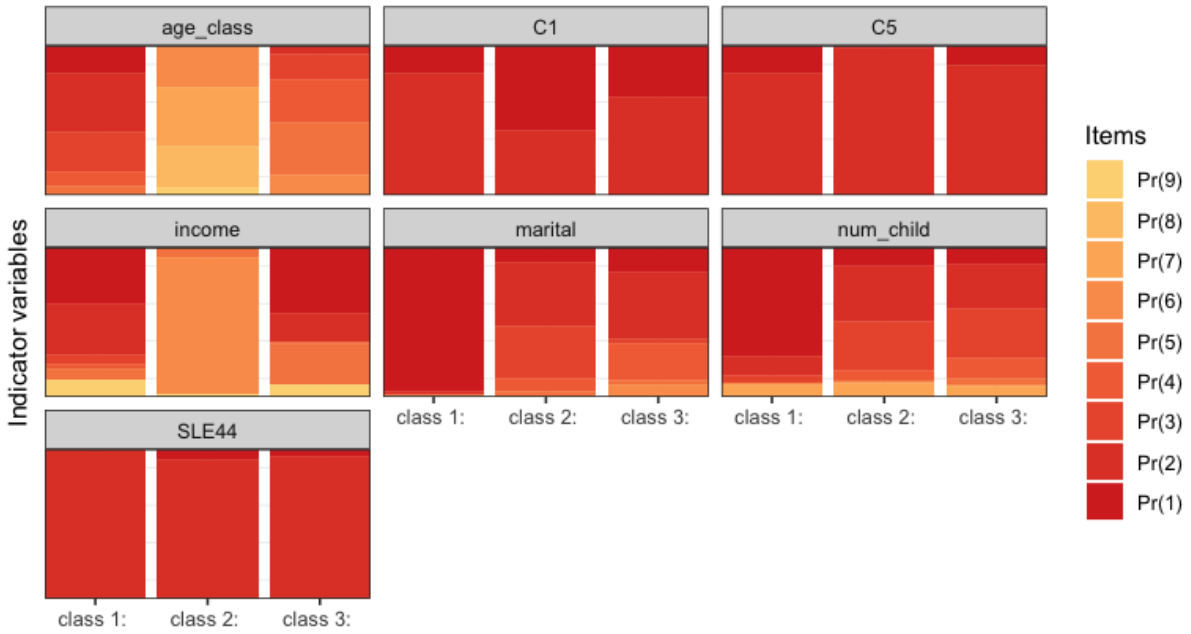


Table 52
Evaluating class solutions, model fit criteria for different classes, entire population (IEA, n = 938)

	A) Model fit criteria					
Models	LL	resid.df	AIC	cAIC	BIC	aBIC
1 Class	-7127.985	905	14321.97	14514.81	14481.81	14377.01
2 Class	-6558.799	871	13251.60	13643.13	13576.13	13363.34
3 Class	-6301.124	837	12804.25	13394.47	13293.47	12972.70
4 Class	-6233.339	803	12736.68	13525.58	13390.58	12961.84
5 Class	-6176.425	769	12690.85	13678.44	13509.44	12972.71
	B) Diagnostic criteria					
Models	Smallest class count (n)		Smallest class size (%)	G^2	Chi2	Entropy
1 Class	938		100	3475.808	106121.66	-
2 Class	418		44,56	2337.438	23051.91	0.821
3 Class	120		12,97	1822.087	14134.46	0.858
4 Class	120		12,79	1686.518	10700.76	0.862
5 Class	120		12,79	1572.689	9570.80	0.917

Note. n = 938, LL = log-likelihood; AIC = Akaike information criterion; BIC = Bayesian information criterion; cAIC = consistent Akaike information criterion; cBIC = consistent Bayesian information criterion, G^2 = Likelihood ratio/deviance statistic; Chi^2 = Chi-square goodness of fit.

Figure 12
Conditional item probabilities of three classes of the entire population (IEA, n = 938)



Note. class1 = younger, class2 = retirees, class3 = middle-aged, C1 = Severe Illness or Injury, C5 = Inter-personal trauma, SLE_44 = Burdensomeness

Table 53
Conditional item response probabilities for entire population (IEA, n = 938)

		Younger	Retirees	Middle-aged
	Predicted class membership	0.4733	0.1279	0.3987
Age class	10 to 19 years	0.175		
	20 to 29 years	0.4031		0.0524
	30 to 39 years	0.2665		0.1699
	40 to 49 years	0.0910		0.2853
	50 to 59 years	0.0533		0.3561
	60 to 69 years	0.0111	0.2765	0.1363
	70 to 79 years		0.3902	
	80 to 89 years		0.2764	
	> 90 years		0.0569	
Number of children	0	0.7248	0.1179	0.1083
	1	0.1271	0.3692	0.2951
	2	0.0495	0.3377	0.3324
	3	0.0040	0.0664	0.1389
	4	0.0068	0.0081	0.0401
	More then 4	0.0084	0.0081	0.0142

	missing	0.0795	0.0925	0.0710
Marital status	single	0.9558	0.1016	0.1653
	married	0.0268	0.4171	0.4397
	widowed		0.3562	0.0298
	divorced	0.0035	0.0836	0.2484
	divorced and remarried		0.0333	0.0344
	married and separated	0.0026	0.0081	0.0823
	missing	0.0114		
Income	salary	0.3778		0.4394
	social benefits	0.3319		0.1919
	partners/parents	0.0682		
	unemployment benefits	0.0361		0.0057
	early retirement	0.0676	0.0645	0.2782
	retirement pension		0.9105	
	missing	0.1185	0.0250	0.0847
Severe Illness or Injury	Yes	0.1832	0.5620	0.3421
	No	0.8168	0.4380	0.6579
Interpersonal trauma	Yes	0.1765	0.0082	0.1289
	No	0.8235	0.9918	0.8711
Burdensomeness	yes		0.0661	0.0476
	no	1.0000	0.9339	0.9524

Note. Outcome variable for each class (3-class-solution), the entire population IEA, n = 938

To summarize epidemiologic and clinical determinants, we combined clinical data from the case series for the three classes of refugees: young males and middle-aged. The limitation was that only the first case in the study period was evaluated; statistical bias is therefore possible.

The group of predominantly young male patients showed a lowered rate of depression, more interpersonal conflicts, and minor stressors and belonged more often to the refugee group. Hopelessness was found mainly in elderly pensioners, also the burden of severe illness. Sleep disturbances were present in all groups, but treatment with NaSSa was most prevalent in the elderly group. Self-injurious behavior was found in the younger group.

4.6.2 Latent Classes of Clinical Data

In addition to the epidemiological factors, we also examined the significance of clinical factors for latent class membership. We again linked this to the stress factors and age and gender, which are often also clinically imposing. In contrast to the epidemiological factors, however, we used the entire group of cases examined in the study period (n = 1,080) as the population.

Latent classes based on clinical characteristics, subgroup SA, n = 339

Variable selection yielded the following indicator variables that were statistically significant for latent class formation: Age class, principal diagnosis of depression, prior medication with psychotropic drugs, but especially SNRI or NaSSa, as well as severe illness or injury, interpersonal conflict, minor life stressors, status as a refugee, or being a burden to others.

The fit indices of the different class solutions are shown in Table 54.

Based on the Bayesian information criterion (BIC) recommended by Weller et al. (2020), we decided to use a 2-class solution (30). The conditional item response probabilities by outcome variable for each class are shown in Table 55.

The *first class* consisted of older people with depression, preloading with antidepressants, severe illness or injury, and feeling a burden to others. This group could be called "depressed".

The *second class* consisted of younger people with interpersonal conflicts, probably without significant psychiatric background, and with less antidepressant medication before admission after a suicide attempt. In this group, there was a significantly higher proportion of refugees. This group could also be described as people in acute conflict situations without preconception and diagnosis.

Figure 13
Elbow-Plot of aBIC, AIC, BIC and cAIC indicators, showing the parsimony and goodness-of-fit for models with varying number of classes, subgroup SA, n= 339 (SIC, n = 1,080)

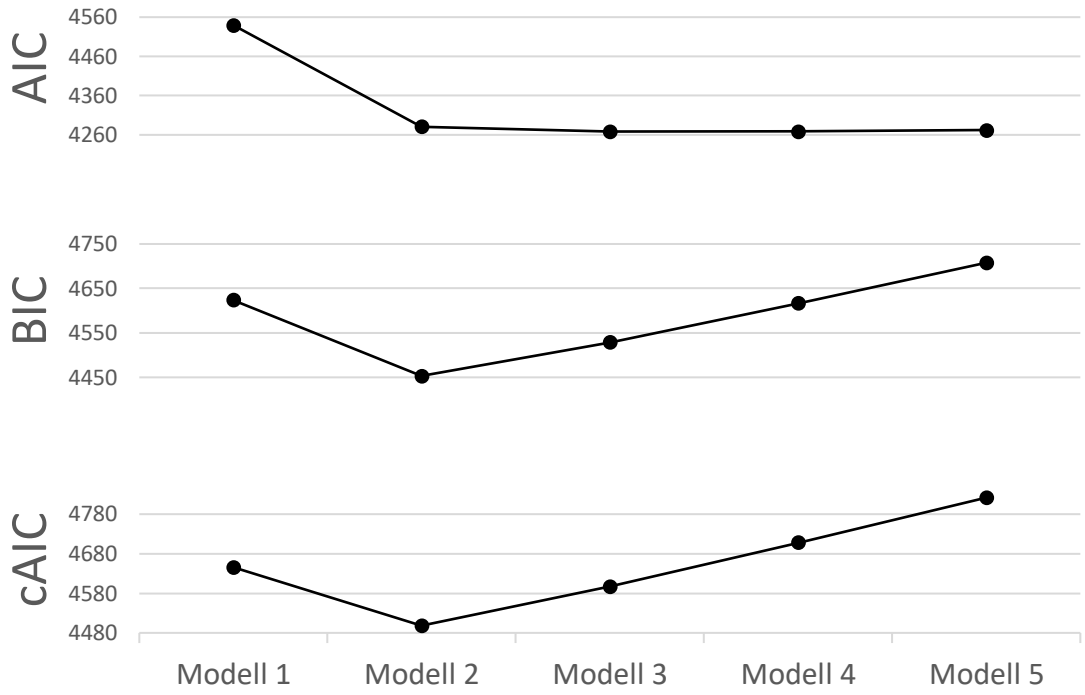


Table 54
Evaluating class solutions, model fit criteria for different classes, subgroup SA, n= 339 (SIC, n = 1,080)

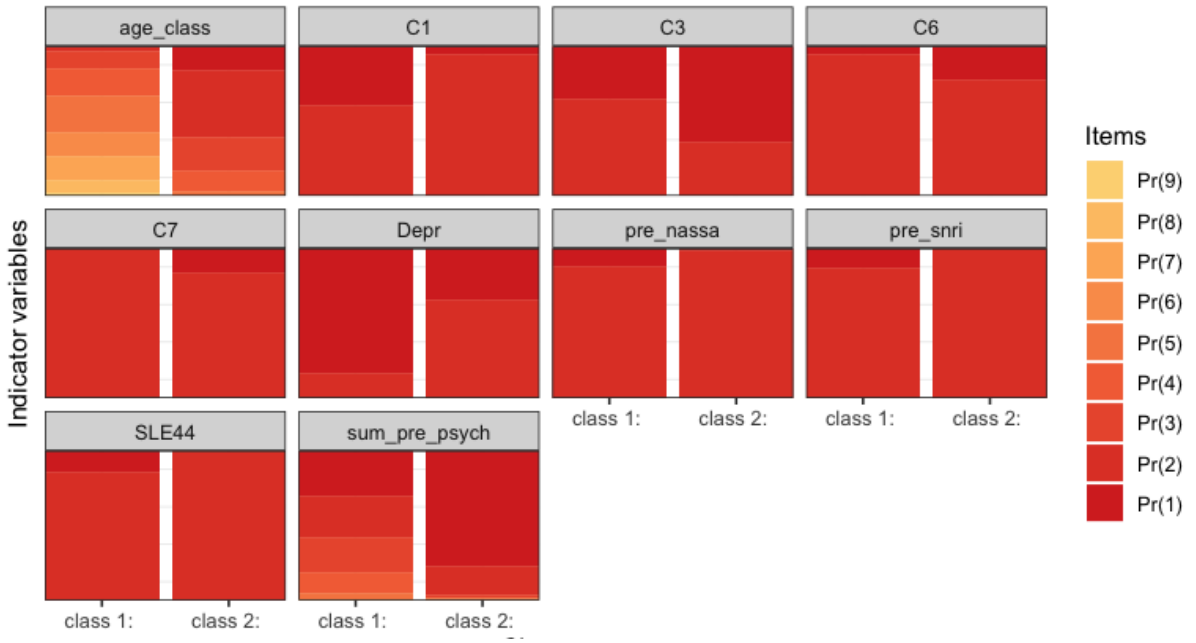
	A) Model fit criteria					
Models	LL	resid.df	AIC	cAIC	BIC	aBIC
1 Class	-2247.689	317	4539.378	4645.550	4623.550	4553.763
2 Class	-2095.555	294	4281.109	4498.279	4453.279	4310.532
3 Class	-2066.247	271	4268.493	4596.661	4528.661	4312.954
4 Class	-2043.268	248	4268.535	4707.701	4616.701	4328.034
5 Class	-2021.802	225	4271.603	4821.767	4707.767	4346.140

	B) Diagnostic criteria				
Models	Smallest class count (n)	Smallest class size (%)	G^2	Chi2	Entropy
1 Class	339	100	1073.5601	14415.459	-
2 Class	161	47,49	769.2911	15058.718	0.795
3 Class	74	21,83	710.6750	12196.071	0.776
4 Class	62	18,29	664.7169	13751.645	0.703
5 Class	33	9,73	621.7851	6195.529	0.616

Note. n = 339, LL = log-likelihood; AIC = Akaike information criterion; BIC = Bayesian information criterion; cAIC = consistent Akaike information criterion; cBIC = consistent Bayesian information criterion, G² = Likelihood ratio/deviance statistic; Chi² = Chi-square goodness of fit.

Figure 14

Conditional item probabilities of two classes, subgroup SA, n= 339 (SIC, n = 1,080)



Note. class1 = depressed patients, class2 = patients with conflicts, C1 = severe illness or injury, C3 = interpersonal conflict, C6 = minor life stressors, C7 = refugees, Depr = depression, pre_nassa = premedication with NaSSa (noradrenergic and specific serotonergic antidepressant), pre_snri = premedication with SNRI (serotonin and norepinephrine reuptake inhibitors), sum_pre_psych = sum of premedicated psychotropic drugs, SLE_44 = burdensomeness)

Table 55

Conditional item response probabilities, subgroup SA, n= 339 (SIC, n = 1,080)

		Depressed	Conflicts
	Predicted class membership	0.5251	0.4749
Age class	10 to 19 years		0.1639
	20 to 29 years	0.0260	0.4432
	30 to 39 years	0.1226	0.2199
	40 to 49 years	0.1752	0.1412
	50 to 59 years	0.2548	0.0319
	60 to 69 years	0.1497	
	70 to 79 years	0.1664	
	80 to 89 years	0.0887	
	> 90 years	0.0166	

Depression	Yes	0.8269	0.3395
	No	0.1731	0.6605
SNRI	Yes	0.1331	
	No	0.8669	1.0000
NaSSa	Yes	0.1140	0.0091
	No	0.8860	0.9909
Sum_pre_psych	0	0.2967	0.7720
	1	0.2832	0.1886
	2	0.2324	0.0257
	3	0.1331	
	4	0.0490	0.0073
	5		0.0063
	over 5	0.0055	
Severe Illness or Injury	Yes	0.3962	0.0539
	No	0.6038	0.9461
Interpersonal Conflict	yes	0.3456	0.6345
	no	0.6544	0.3655
Minor life stressors	yes	0.0564	0.2195
	no	0.9436	0.7805
Refugees	yes	0.0060	0.1571
	no	0.9940	0.8429
Burdensomeness	yes	0.1442	
	no	0.8558	1.0000

Note. Outcome variable for each class (2-class-solution), subgroup SA, n= 339 (SIC, n = 1,080)

Latent classes based on clinical characteristics, subgroup SI, n = 741

After variable selection, the following indicator variables remained statistically significant in the latent class solution model: principal diagnosis of schizophrenia, depression or adjustment disorder, medication with antidepressants, insomnia, and hopelessness. Age group membership was no longer significant for latent class formation. A corresponding description is provided subsequently by the co-variable analysis.

The fit indices for different model solutions are shown in Table 56. Again, a 2-class solution offered the best model fit according to BIC.

In the *first class,* schizophrenic patients played a more significant role in latent class formation, whereas depression no longer allowed class differentiation. Also, in this class, the

proportions for antidepressant administration, supplemented by SSRI, played a more significant role in the number of medications before admission. People in this class had a more substantial symptom burden of sleep disturbance and feelings of hopelessness. The factor of burdensomeness was not significant. This class could be described as psychiatric patients.

The *second class* again had more people who suffered from adjustment disorders and were predominantly untreated with medication. Here, the factor of suspected substance dependence was also significantly more frequent. This group increasingly described interpersonal conflicts as a stress factor and could be described as people in conflict situations.

Figure 15
Elbow-Plot of aBIC, AIC, BIC and cAIC indicators, showing the parsimony and goodness-of-fit for models with varying number of classes, subgroup SI, n= 741I, (SIC, n = 1,080)

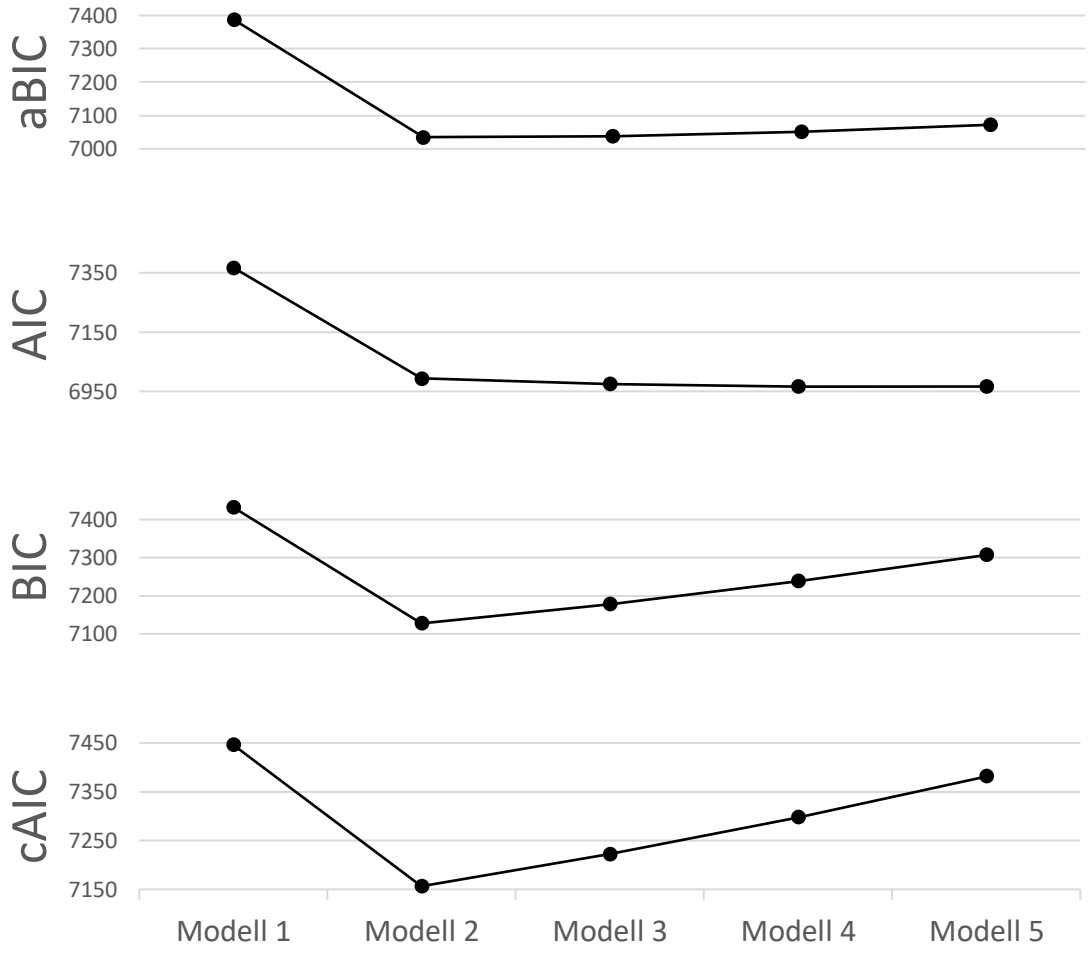


Table 56
Evaluating class solutions, model fit criteria for different classes, subgroup SI, n= 74I, (SIC, n = 1,080)

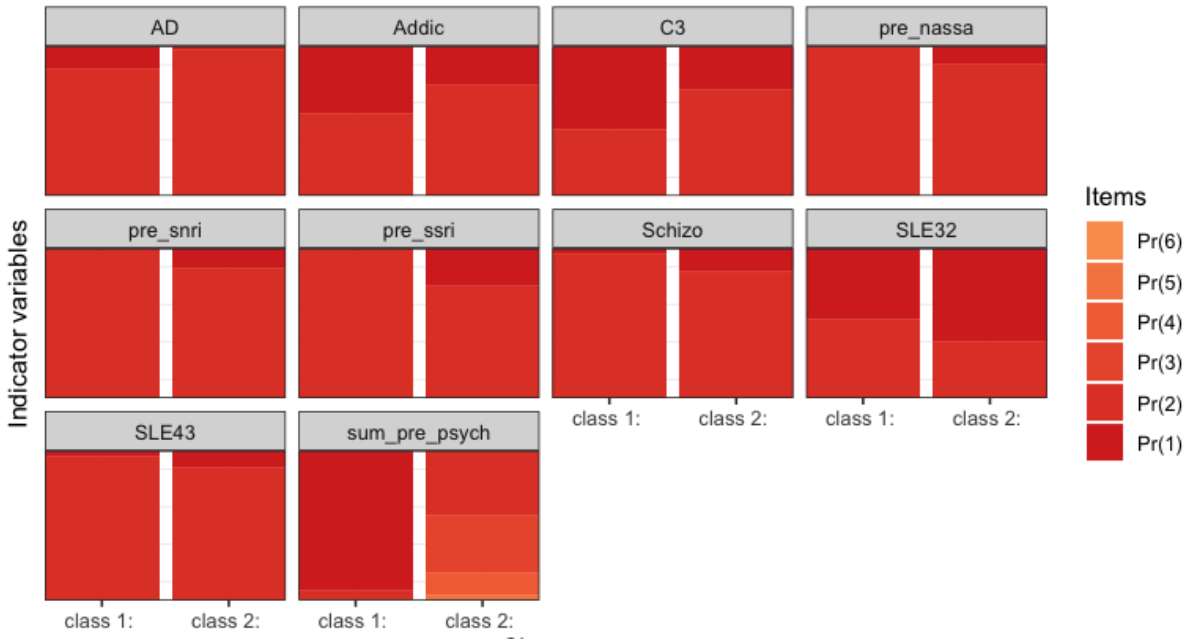
	A) Model fit criteria

Models	LL	resid.df	AIC	cAIC	BIC	aBIC
1 Class	-3669.623	727	7367.245	7445.757	7431.757	7387.302
2 Class	-3467.893	712	6993.786	7156.418	7127.418	7035.332
3 Class	-3443.562	697	6975.123	7221.875	7177.875	7038.159
4 Class	-3424.342	682	6966.685	7297.557	7238.557	7051.211
5 Class	-3409.171	667	6966.341	7381.333	7307.333	7072.357

Models	B) Diagnostic criteria				
	Smallest class count (n)	Smallest class size (%)	G^2	Chi2	Entropy
1 Class	741	100	912.3088	2436.487	-
2 Class	370	49,93	508.8490	1858.750	0.797
3 Class	56	7,56	460.1865	1948.451	0.88
4 Class	44	5,94	421.7482	1033.044	0.652
5 Class	43	5,80	391.4045	1090.202	0.491

Note. n = 741, LL = log-likelihood; AIC = Akaike information criterion; BIC = Bayesian information criterion; cAIC = consistent Akaike information criterion; cBIC = consistent Bayesian information criterion, G^2 = Likelihood ratio/deviance statistic; Chi^2 = Chi-square goodness of fit.

Figure 16
Conditional item probabilities of two classes, subgroup SI, n= 74I, (SIC, n = 1,080)



Note. class1 = psychiatric patients, class2 = patients with conflicts, C3 = interpersonal conflict, AdD = adjustment disorders, Addic = addiction, Schizo = schizophrenia, pre_nassa = premedication with NaSSA (noradrenergic and specific serotonergic antidepressant), pre_snri = premedication with SNRI (serotonin and

norepinephrine reuptake inhibitors), pre_ssri = premedication with SSRIs (selective serotonin reuptake inhibitors), SLE32 = insomnia, SLE43 = hopelessness, sum_pre_psych = sum of premedicated psychotropic drugs)

Table 57
Conditional item response probabilities of subgroup SI (SIC, n = 1,080)

		Psychiatrics	Conflicts
	Predicted class membership	0.4993	0.5007
Schizo	male	0.1495	0.0358
	female	0.8505	0.9642
Addic	Yes	0.2520	0.4501
	No	0.7480	0.5499
AdD	Yes	0.0183	0.1492
	No	0.9817	0.8508
SSRI	Yes	0.2444	
	No	0.7556	1.0000
SNRI	Yes	0.1236	
	No	0.8764	1.0000
NASSA	yes	0.1124	
	no	0.8876	1.0000
Sum_pre_psych	0		0.9245
	1	0.4299	0.0727
	2	0.3791	0.0002
	3	0.1517	
	4	0.0393	
	5		0.0026
	Over 5		0.9245
Interpersonal Conflict	yes	0.2831	0.5564
	no	0.7169	0.4436
Insomnia	yes	0.6153	0.4726
	no	0.3847	0.5274
Hopelessness	yes	0.1069	0.0363
	no	0.8931	0.9637

Note. Outcome variable for each class (2-class-solution), subgroup SI, n = 741 (SIC, n = 1,080)

Latent classes based on clinical characteristics, entire population SIC, n = 1,080

For the entire data set, variable selection yielded the following indicator variables for latent group membership: principal diagnosis of schizophrenia, depression, or adjustment disorder,

signs of substance dependence, prior medication with SSRI, SNI, NaSSa, the number of psychotropic drugs before admission, interpersonal conflict, sleep disturbance, and hopelessness. Age group membership was no longer significant for latent class formation. A corresponding description is provided by the covariate analysis.

Based on Bayesian information criterion (BIC), we opted for a 3-class solution here.

Class 2 of psychiatric patients with pretreatment, insomnia, and hopelessness resembles the group of SA and SI. The factors of addiction and NSSI distinguished the younger group. Thus, *class 1* can be described as patients with addiction, depression, self-injurious behavior, and interpersonal trauma, and *class 3* as a group of people with interpersonal conflicts.

Figure 17
Elbow-Plot of aBIC, AIC, BIC and cAIC indicators, showing the parsimony and goodness-of-fit for models with varying number of classes, entire population (SIC, n = 1,080)

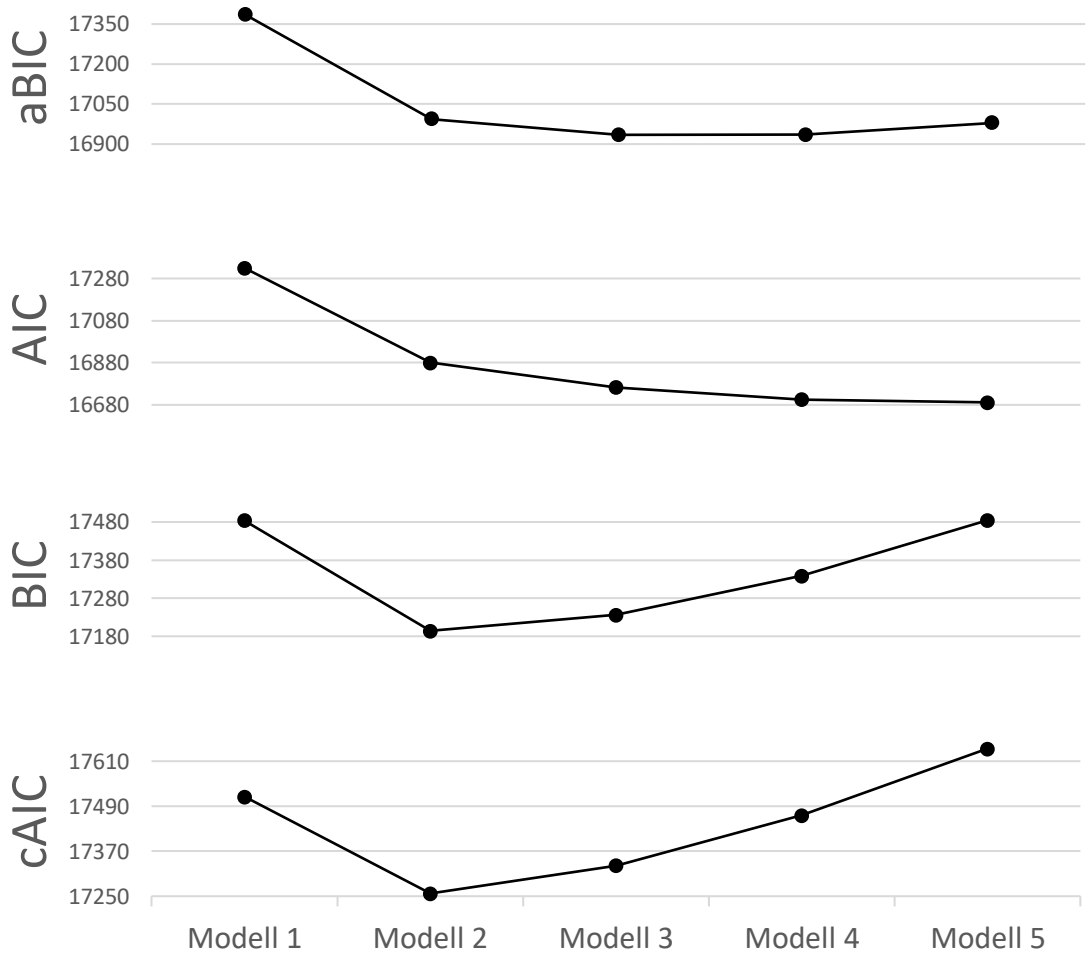


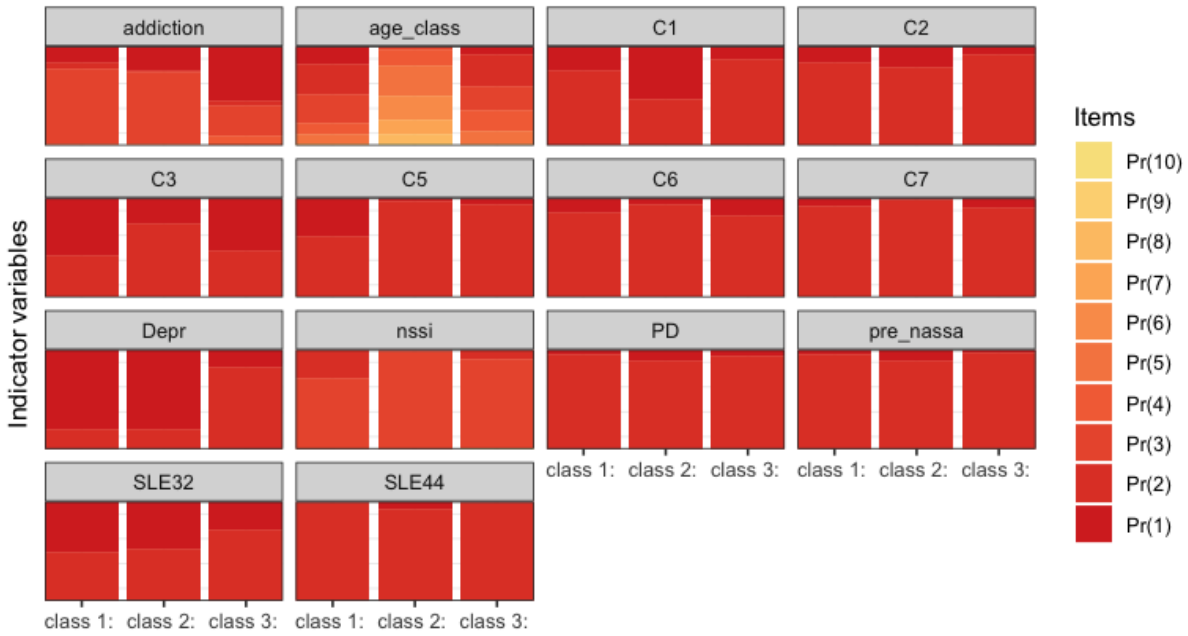
Table 58
Evaluating class solutions, model fit criteria for different classes (SIC, n = 1,080)

	A) Model fit criteria					
Models	LL	resid.df	AIC	cAIC	BIC	aBIC
1 Class	-8633.914	1049	17329.83	17515.35	17484.35	17385.89
2 Class	-8377.190	1017	16880.38	17257.42	17194.42	16994.32
3 Class	-8286.433	985	16762.87	17331.41	17236.41	16934.67
4 Class	-8225.791	953	16705.58	17465.64	17338.64	16935.26
5 Class	-8186.973	921	16691.95	17643.52	17484.52	16979.50

	B) Diagnostic criteria				
Models	Smallest class count (n)	Smallest class size (%)	G^2	Chi2	Entropy
1 Class	1080	100	3695.452	75997.94	-
2 Class	361	33,43	3182.006	84791.62	0.69
3 Class	270	25,0	3000.491	67599.08	0.637
4 Class	149	13,8	2879.208	82056.84	0.648
5 Class	151	13,98	2801.571	49874.57	0.607

Note. n = 1,080, LL = log-likelihood; AIC = Akaike information criterion; BIC = Bayesian information criterion; cAIC = consistent Akaike information criterion; cBIC = consistent Bayesian information criterion, G^2 = Likelihood ratio/deviance statistic; Chi^2 = Chi-square goodness of fit.

Figure 18
Conditional item probabilities of three classes of all cases (SIC, n = 1,080)



Note. class1 = addicted with nssi, class2 = psychiatric patients, class3 = patients with conflicts, C1 = severe illness or injury, C2 = personal loss, C3 = interpersonal conflict, C4 = financial crisis, C5 = interpersonal trauma, C6 = minor life stressors, C7 = refugees, Depr = depression, nssi = non-suicidal self-injury, PD = personality disorder, pre_nassa = premedication with NaSSA (noradrenergic and specific serotonergic anti-depressant), SLE32 = insomnia, SLE_44 = burdensomeness)

Table 59
Conditional item response probabilities of entire sample (SIC, n = 1,080)

		Addicted NSSI	Psychiatric	Conflicts
	Predicted class membership	0.2500	0.3435	0.4065
Age class	10 to 19 years	0.1798		0.0801
	20 to 29 years	0.2955		0.3212
	30 to 39 years	0.2918	0.0359	0.2437
	40 to 49 years	0.1122	0.1527	0.2028
	50 to 59 years	0.0974	0.3062	0.1339
	60 to 69 years	0.0185	0.2489	0.0183
	70 to 79 years		0.1462	
	80 to 89 years	0.0047	0.0911	
	> 90 years		0.0189	
NSSI	No	0.2762	0.0031	0.0981
	Yes	0.7238	0.9969	0.8996
Addiction	No	0.1582	0.2350	0.5400
	Yes	0.0677	0.0184	0.0562
	Suspect	0.7452	0.7237	0.2956
	Unclear	0.0288	0.0229	0.1082
Depression	Yes	0.8026	0.7984	0.1772
	No	0.1974	0.2016	0.8228
Personality Disorder	Yes	0.0447	0.1146	0.0655
	No	0.9553	0.8854	0.9345
NaSSa	Yes	0.0381	0.1110	0.0239
	No	0.9619	0.8890	0.9761
Severe Illness or Injury	Yes	0.2399	0.5228	0.1219
	No	0.7601	0.4772	0.8781
Personal Loss	Yes	0.1653	0.2030	0.0733
	No	0.8347	0.7970	0.9267
Interpersonal Conflict	Yes	0.5765	0.2520	0.5188
	No	0.4235	0.7480	0.4812
Minor Life Stressors	Yes	0.1346	0.0600	0.1793
	No	0.8654	0.9400	0.8207

Refugees	Yes	0.0832	0.0083	0.0921
	No	0.9168	0.9917	0.9079
Insomnia	Yes	0.5002	0.4736	0.2778
	No	0.4998	0.5264	0.7222
Burdensomeness	Yes	0.0129	0.0700	0.0012
	No	0.9871	0.9300	0.9988

Note. Outcome variables for each class (3-class-solution), entire sample, n = 1,080

4.6.3 Covariates Analysis

Consistent with previous research concerning regional variation in suicide rates, we included the following control variables: Gender, age groups, nationality, and region (Weller et al., 2019).

Covariate analysis of SA subgroup, n = 296

Since the age group was already identified as a significant variable in the latent class, this covariate analysis was not performed for the population of participants. The studies were performed for gender, region, and nationality. Here, it was found that the region of origin did not yield significant differences in any of the subpopulations in the individual classes. Men were significantly overrepresented in class 1, as were participants with non-German nationality.

Table 60
Covariate gender of subgroup SA, n = 296 (IEA, n = 938)

	SA (n = 296)										
	Younger n = 132		Retirees n = 58		Middle-aged n = 106		Total		Statistics		
	N	%	N	%	N	%			χ^2	df	p
Male	**88$_a$**	**66,7%**	25$_b$	43,1%	41$_b$	38,7%	153	51,9%	20,270	2	<.001
Female	44$_a$	33,3%	**33$_b$**	**56,9%**	65$_b$	61,3%	142	48,1%			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of class categories whose column proportions do not differ significantly from each other at the ,05 level.

In the SA group, the age group was not identified as a significant variable in the latent class, so this covariate analysis was completed for this subpopulation. Class 2 had a significantly higher proportion of males and a higher proportion of non-German participants. Among the age groups, younger participants were substantially more likely to be represented, while

class 1 was almost exclusively made up of participants of German nationality, most of whom were older. There were no differences for subregions.

Table 61
Covariate region of subgroup SA, n = 296 (IEA, n = 938)

	SA (n = 296)										
	Younger n = 132		Retirees n = 58		Middle-aged n = 106		Total		Statistics		
	N	%	N	%	N	%			χ^2	df	p
North. Bavaria	4_a	3,0%	3_a	5,2%	7_a	6,6%	14	4,7%	22,879	12	.029
Hildburghausen	22_a	16,7%	11_a	19,0%	22_a	20,8%	54	18,2%			
Ilm District	18_a	13,6%	13_a	22,4%	14_a	13,2%	45	15,2%			
Meiningen	25_a	18,9%	14_a	24,1%	19_a	17,9%	58	19,6%			
Sonneberg	21_a	15,9%	9_a	15,5%	29_a	27,4%	59	19,9%			
City of Suhl	31_b	23,5%	**$8_{a, b}$**	**13,8%**	10_a	9,4%	49	16,6%			
other	11_a	8,3%	0_a	0,0%	5_a	4,7%	16	5,4%			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of class categories whose column proportions do not differ significantly from each other at the ,05 level.

Table 62
Covariate nationality of subgroup SA, n = 296 (IEA, n = 938)

	SA (n = 296)										
	Younger n = 132		Retirees n = 58		Middle-aged n = 106		Total		Statistics		
	N	%	N	%	N	%			χ^2	df	p
German	104_a	78,8%	**58_b**	**100,0%**	103_b	97,2%	265	89,8%	28,449	4	<.001
Non-German	**28_a**	**21,2%**	0_b	0,0%	3_b	2,8%	30	10,2%			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of class categories whose column proportions do not differ significantly from each other at the ,05 level.

Covariate analysis of SI subgroup, n=642

Class 2 showed a significantly higher proportion of females, while class 3 showed a significantly higher proportion of males. In terms of nationality, class 3 showed a significantly higher proportion of non-Germans. There were no significantly differences for covariates region or nationality grouped by marital status (see supplement Table S 20 and Table S 21)

Table 63
Covariate gender of subgroup SI, n = 642

	SI (n = 642)										
	Married (n = 150)		Divorced (n = 156)		Younger (n = 337)		Total		Statistics		
	N	%	N	%	N	%			χ^2	df	p
Male	69_a	46,0%	49_b	31,4%	**223_c**	**66,2%**	341	53,0%	55,618	2	<.001
Female	**81_a**	**54,0%**	**107_b**	**68,6%**	114_c	33,8%	302	47,0%			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of class categories whose column proportions do not differ significantly from each other at the ,05 level.

In the suicidal group, the age group was not identified as a significant variable in the latent class, so this analysis of covariance was completed for this subpopulation.

Class 1 (“Younger”) had a significantly higher proportion of males, of very young (under 30), as well as a higher proportion of non-German participants. Class 2 (“Older”) had a significant representation of middle-aged (50-59) and very old (80-89) participants. There were no significant differences for the sub regions (see supplement Table S 22)

Covariate analysis of entire population IEA, n = 938

Class 3 (“Younger”) showed a significantly higher proportion of men. In terms of nationality, class 3 also showed a significantly higher proportion of non-Germans. A weakly significant difference was found in the regional analysis, with an underrepresentation of class 2 (“Retirees”) in Sonneberg and an overrepresentation in Suhl.

In the total group of cases, the age group was already identified as a significant variable in the latent class; for reasons of comparability, this covariate was again included in the analysis. Class 3 had a significantly higher proportion of men, class 2 of women, and both groups had a higher proportion of non-German participants.

Across the entire population, the group of young men showed a higher proportion of non-German nationality, and no regional differences were found except in the group of total cases (n = 1,080) (see supplement Table S 19). The regional differences are more likely due to the influence of a few participants who were admitted several times during the study period.

Table 64
Covariate nationality of entire population IEA, n = 938

	Entire population n = 938										
	Middle-aged n = 374		Retirees n = 120		Younger n = 444		Total		Statistics		
	N	%	N	%	N	%			χ^2	df	p
Male	164_a	43,9%	52_a	43,3%	**278_b**	**62,6%**	494	52,7%	33,473[a]	2	<.001
Female	**210_a**	**56,1%**	**68_a**	**56,7%**	166_b	37,4%	444	47,3%			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of class categories whose column proportions do not differ significantly from each other at the ,05 level.

Table 65
Covariate region of entire population IEA, n = 938

	Entire population n = 938									
	Middle-aged n = 374		Retirees n = 120		Younger n = 444		Total	Statistics		
	N	%	N	%	N	%		χ^2	df	p
North. Bavaria	25_a	39,1%	6_a	9,4%	33_a	51,6%	64	18,577	12	.099
Hildburghausen	73_a	42,2%	26_a	15,0%	74_a	42,8%	173			
Ilm District	48_a	37,5%	19_a	14,8%	61_a	47,7%	128			
Meiningen	94_a	41,8%	26_a	11,6%	105_a	46,7%	225			
Sonneberg	85_a	45,9%	17_b	9,2%	$83_{a,\ b}$	44,9%	185			
City of Suhl	38_a	29,7%	24_b	18,8%	66_b	51,6%	128			
Other	$11_{a,\ b}$	31,4%	2_b	5,7%	22_a	62,9%	35			

Note. Each subscript letter denotes a subset of class categories whose column proportions do not differ significantly from each other at the ,05 level.

Table 66
Covariate nationality of entire population IEA, n = 938

	Entire population n = 938										
	Middle-aged n = 374		Retirees n = 120		Younger n = 444		Total		Statistics		
	N	%	N	%	N	%			χ^2	df	p
German	**359_a**	**96,0%**	**120_b**	**100,0%**	399_c	89,9%	878	93,6%	22,222	4	<,001
Non-German	14_a	3,7%	0_b	0,0%	**43_c**	**9,7%**	57	6,1%			
Unknown	1_a	0,3%	0_a	0,0%	2_a	0,5%	3	0,3%			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of class categories whose column proportions do not differ significantly from each other at the ,05 level.

4.7 Research Aim #4: Modeled Interrupted Time Series for COVID-19 Pandemic

For the whole period from January 1, 2017, to December 31, 2021, 825 suicide attempts were registered with a mean age of 46.2 ± 19.7, including 380 (46.1 %) females and 445 (53.9 %) males (see Table 67) The average number of SA per month was 13.52, with a variance of 12.58.

Table 67
Demographic and clinical characteristics of the investigated sample (RASAC, n = 825).

	Prepandemic (*n* = 520)	Pandemic (*n* = 305)	Overall (*n* = 825)
Age Mean (SD)	45.8 (19.5)	47.1 (20.1)	46.2 (19.7)
Age Median	44.2	43.5	44.2
Females	247 (47.5 %)	133 (43.6 %)	380 (46.1 %)
Males	273 (52.5 %)	172 (56.4 %)	445 (53.9 %)
ICD-10 diagnoses			
F0	16 (3.1 %)	19 (6.2 %)	35 (4.2 %)
F1	76 (14.6 %)	44 (14.4 %)	120 (14.5 %)
F2	35 (6.7 %)	26 (8.5 %)	61 (7.4 %)
F3	319 (61.3 %)	172 (56.4 %)	491 (59.5 %)
F4	69 (13.3 %)	38 (12.5 %)	107 (13.0 %)
F6	5 (1.0 %)	0 (0 %)	5 (0.6 %)
F7	0 (0 %)	3 (1.0 %)	3 (0.4 %)
n.a.	0 (0 %)	3 (1.0 %)	3 (0.4 %)
Age categories			
<35	197 (37.9 %)	105 (34.4 %)	302 (36.6 %)
35–55	158 (30.4 %)	88 (28.9 %)	246 (29.8 %)
>55	165 (31.7 %)	112 (36.7 %)	277 (33.6 %)

As presented in Table 68, the average number of SA per month before and during the pandemic are nearly identical (before: mean ± variance: 13.33 ± 15.75, after: mean ± variance: 13.86 ± 7.26), but the variances significantly differed, indicating diminished monthly fluctuations in SA during the pandemic (Levene's test; F-value: 4.16, *p*-value: 0.046).

Table 68
Averaged number, variance of monthly suicide attempts before and during the pandemic, (RASAC, n = 825).

	Months	SA (n)	Mean	Variance	Min	Max
Overall	61	825	13.53	12.59	3	21
Prepandemic	39	520	13.333	15.75	3	21
Pandemic	22	305	13.86	7.266	5	18

4.7.1 Results of the Poisson Regression

The occurrence of SA was not found to be significantly impacted by the pandemic in the overall group, both unadjusted and adjusted for seasonality in the Poisson regression models. Furthermore, no significant trend was observed in the number of SA cases, nor was there a significant interaction between the pandemic and the trend (see figure 19). However, as demonstrated in Table S 24, the pandemic had a significant impact on the seasonal pattern, indicating a reduction in the periodic variation in SA during the pandemic (z-value = -2.239, p-value = 0.025). As illustrated in Figure 21, prior to the onset of the COVID-19 pandemic, SA exhibited a peak in October or November. However, this pattern underwent a significant shift during the pandemic.

However, as shown in Table S 24, a significant effect of the pandemic on the seasonal pattern was observed, indicating less periodic variation in SA during the pandemic (z-value = -2.239, p-value = 0.025). As shown in figure 19, before the COVID-19 pandemic, SA peaked around October/November, but this pattern changed significantly during the pandemic.

4.7.2 Subgroup Analyses of age and gender

Effects of the COVID-19 pandemic on specific age groups

With regard to the impact of the pandemic on age groups, the occurrence of SA was found to be unaffected by the pandemic in all three age groups, both unadjusted and adjusted for seasonality. No significant trends or interactions were observed for older and middle-aged adults (see supplement S 25 and S 29), although there was a more substantial increase in the

number of SA in older adults during the pandemic than before the pandemic, as illustrated in figure 19.

A significant overall decrease in SA was observed among younger adults (see supplement Table S 27) with a z-value of -2.189 (p-value = 0.029) and a significant effect of the pandemic on seasonality, as indicated by a z-value of -2.022 (p-value = 0.043).

As illustrated in figure 19, a comparison of time trends between older and younger adults revealed a significant interaction between both age groups. The time trend, as indicated in supplement Table S 31, exhibited a Z-value of 2.934 and a p-value of 0.003, indicating an increasing number of SA cases in older adults and a decreasing number in younger adults as the pandemic progressed.

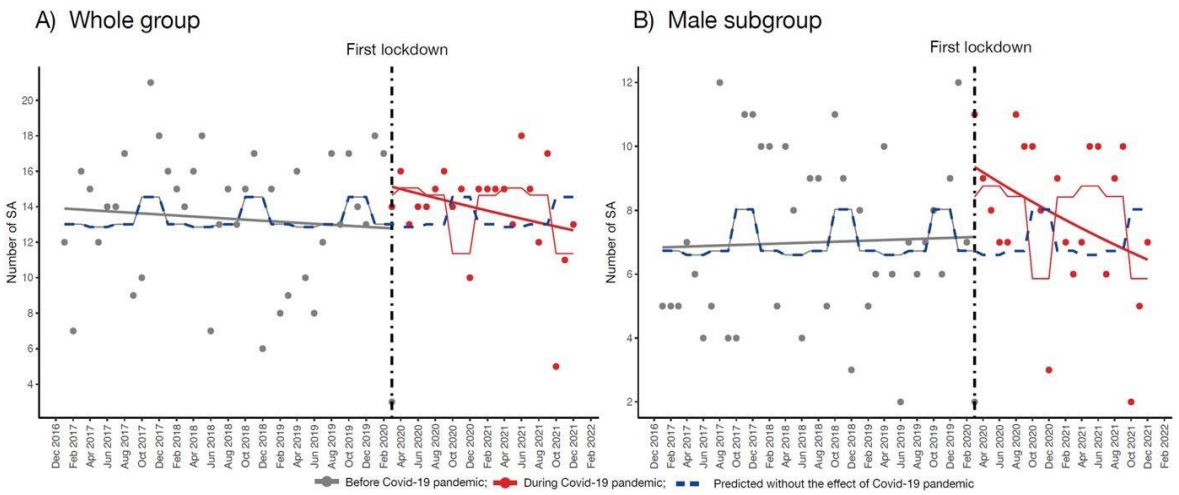
Effects of the COVID-19 pandemic on males and females

The investigation did not reveal any discernible impact of the COVID-19 pandemic on the occurrence of SA in males and females, trends in both groups, or seasonality patterns in females.

However, a notable impact of the COVID-19 pandemic on the seasonal patterns of SA was observed in male patients (z-value = -2.411, p-value = 0.016). This effect was comparable to that observed in the entire cohort and younger adults (see supplement Table S 33).

Figure 19

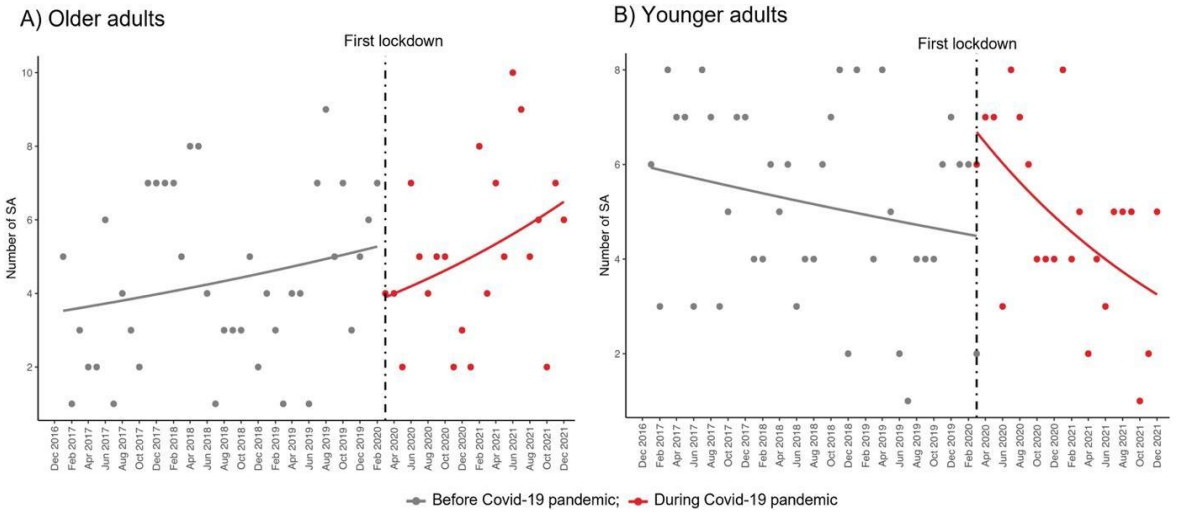
Interrupted time series for the whole group and male subgroup (RASAC, n = 825).



Note. In figure A, the grey points indicate the number of suicide attempts per month before the COVID-19 pandemic in the whole group of patients, and the red points show the number of suicide attempts during the pandemic. In figure B, the grey points indicate the number of suicide attempts per month before the COVID-19 pandemic in male patients only, and the red points show the number of suicide attempts during the pandemic. The solid grey line shows the Poisson trend line before and the solid red line after the first lockdown. The curvy grey solid line depicts the modeled seasonality pattern, and the curvy red solid line shows the seasonality pattern after the first lockdown. The dashed blue line shows the Poisson regression predicted based on data before the COVID-19 lockdown.

Figure 20

Interrupted time series for the older and younger subgroup (RASAC, n = 825).



Note. In figure A, the grey points indicate the number of suicide attempts before the COVID-19 pandemic in patients aged > 55 years, and the red points show the number of suicide attempts during the pandemic. In

figure B, the grey points indicate the number of suicide attempts before the COVID-19 pandemic in patients between 18 and 35 years, and the red points show the number of suicide attempts during the pandemic. The solid grey line shows the Poisson trend line before the first lockdown, and the solid red line shows the Poisson trend line after the first lockdown. Comparing time trends, there was a significant interaction between both age groups and the time trends during the pandemic.

5 Discussion

In the dynamic field of psychiatric research on suicidality, our study is an important step towards decoding the complexity of intrapsychic processes from the suicidal idea to the suicidal act. We studied 938 individuals who were treated for a suicidal crisis in a central psychiatric hospital in a predominantly rural region in Germany in 2017 and 2018. The population studied is representative of an inpatient population in a rural area, as all 6546 psychiatric patients admitted during the study period were screened for suicidality. In contrast to conventional methods, our study combines careful descriptive analysis with the innovative use of LCA to provide a multidimensional understanding of the complex relationships underlying the phenomenon of suicidality. In addition, the study examines regional characteristics of individual risk factors and focuses on the impact of the COVID-19 pandemic on suicidal behavior in a rural population setting.

The regional reference is a novel approach because most studies of suicidality use large cross-sectional data, such as from death registries or broader health databases. Various studies have been conducted on general risk factors of suicidality (1,2), and useful models on the development of suicidality have been established (25,27,28). They provide a basis for preventive measures and a further understanding of suicidality. However, the cross-regional approach limits understanding of specific risk factors or characteristics in regional subgroups; most of these studies describe general risk factors for suicidality, targeted interventions for prevention may be ineffective. This need for intensive research is reflected in the regional suicide rates, which, despite short-term fluctuations, show stable differences in the long-term average, for which there are few explanations.

The relevance of the study for clinical practice is high because suicidal crises belong to the growing challenges of modern psychiatry. Suicidal behavior is increasingly understood as an entity and not just as a symptom of other mental disorders (254,299). Although specific therapeutic approaches are increasingly developing (198,300–303), their further development requires more subgroup-specific studies, in addition to research on regional characteristics or in relation to specific events. The main objectives of the study, LCAs of the suicidal population (chapter 5.1), epidemiological and clinical risk profiling (chapter 5.2), a focus on stressful life events (chapter 5.3), longitudinal observations of suicidal behavior (chapter 5.4), regional characteristics of the study population (chapter 5.5), and the influence of the COVID-19 pandemic (chapter 5.6) are discussed separately below.

5.1 Insights from Latent Class Analysis (LCA)

5.1.1 Profiling Distinct Latent Groups

The differentiation between individuals who die by suicide, who attempt suicide, and those who experience suicidal ideation without attempting suicide has been a subject of extensive discussion and research within the field of suicidology. This distinction is crucial in understanding individuals' varying risk profiles, underlying factors, and trajectories along the continuum of suicidal behavior. With this in mind, it is instructive to compare the results of the latent class analyses conducted in our study with previous findings on suicide or suicide attempts, particularly with our focus on a psychiatric hospital population in a rural population setting.

As early as 1976, Kiev described seven profile types as a result of a three-stage cluster analysis of data on patients with suicide attempts and recommended that these profiles have prognostic significance for treatment: suicidal gestures, acute depressive reaction, passive-aggressive personality disorder, anxious reaction with interpersonal conflict, social isolation, suicidal ideation, and chronic dysfunction (304). Another study by Szanto et al. identified three pathways to suicidal behavior in elderly patients: cognitive deficits, dysfunctional personality traits, and impulsive decisions (305).

Logan (2011) found nine distinct patterns of risk factors for suicide in a population of n = 28,703 individuals who died by suicide from 12 U.S. states (306). Only one class had factors related solely to mental health, and another had factors related exclusively to alcohol and substance abuse; all other seven classes had different patterns of factors that spanned multiple domains, such as substance abuse, financial problems, relationship problems, a recent crisis, or medical problems. In another study O'Connor et al. (1999), described three classes of suicides (307): A group of people with a psychiatric history who lived alone had no contact with a GP, had no NSSI, and were not obviously at risk. They were stressed but did not seek professional or medical help and did not appear to have adequate coping strategies. A second group, who did not live alone, had a history of suicide attempts or parasuicidal behavior and suffered from co-occurring alcoholism or physical illness but had no apparent mental illness. A third group resembled traditional suicidal individuals who were depressed, suffered from other mental illnesses, and had contact with the help system (307).

Contrary to the popular belief that suicidal tendencies are mainly associated with mental illness, many studies have already disproved this view; interpersonal conflicts, social isolation, personality, or financial problems are much more likely to trigger suicidal crises.

Our LCA concerning suicidal psychiatric inpatients has raised significant inquiries regarding the differentiation of various groups within this population. The analysis encompassed a dataset comprising 938 suicidal patients, of whom 296 attempted suicide, while 642 exhibited suicidal ideations without actual suicide attempts. We found evidence for the hypothesis that clusters of people who died by suicide are similar to, but not congruent with, these classes. We found evidence that suicidal ideation may act as a door opener for needed treatment.

Overall, we could identify three classes within the whole population: [A] young single men with interpersonal conflicts, [B] lonely and physically ill retirees, and [C] middle-aged depressed. Remarkably, these classes appeared detectable even within the subset of SA, suggesting that certain factors contributing to suicide attempts are shared across these classes.

However, these same classes could not be identified in the SI group. Within this subgroup there was a change in variation, but three groups could still be identified. Young single men also appeared to play a central role in this subgroup, as they are represented in both classifications. However, the "older" group was not differentiated by age or gender, but by marital status, with one group being married and the other divorced or separated.

Our findings suggest that a much more comprehensive approach to the classification of suicidal individuals is required than previously thought. Reducing suicide risk to mental illness alone is not sufficient, and although previous research has already identified initial patient profiles based on a limited number of factors, our study provides a more comprehensive understanding. Our latent classes are partially consistent with some previous findings but also show more recent distinctions. Age alone does not fully explain the differences in suicide risk categories; in addition to gender, specific epidemiological and clinical factors as well as stressful life events also play a crucial role in differentiation.

5.1.2 Class 1: High-Risk Individuals: Young Men with Interpersonal Conflicts

One class, which we named as “single younger men with interpersonal conflicts,” included individuals in their twenties who were unmarried or employed and faced major interpersonal

problems, financial issues, and trauma (see figures 21 A-C). This group contained more men and is characterized as unstable with interpersonal problems.

This group appeared to be similar to the primary risk group of suicidal individuals described by O'Connor et al. (1999) and is therefore at high risk of suicide (307). However, in our clinical population, they were more likely to have suicidal thoughts or intentions.

We suspect that this tendency is mainly due to the study design. The frequency of involuntary admissions and early discharges against medical advice in this patient group suggests, on the one hand, a lack of active help-seeking behavior and limited compliance with inpatient treatment, and on the other hand, it is well-known, that these populations are more difficult to recruit for voluntary study participation. The retrospective study approach allows a statement about the entire group of suicidal patients, in which younger men seem to play a greater role. It remains a major challenge to recruit them for further therapeutic interventions. In addition, gender norms can influence clinical engagement and treatment success, and clinicians need to consider how male socialization affects their clients and themselves (308). Psychological interventions must typically address the specific needs and characteristics of men, including cognitive distortions or biases associated with male ideas about emotional control, power, and success (309). Especially in the treatment of current suicide crises, this aspect plays a prominent role due to the high lethality with increasing age and requires much more scientific and therapeutic commitment in the future.

5.1.3 Class 2: Loneliness, Mental Health, and Burdensomeness

Another class, which we categorized as “lonely retirees with severe illness,” consisted of older people in their seventies who were either married or widowed (see figures 21 A-C). The majority of this group comprised retired women who suffer from physical ailments and relied on their pensions as their primary source of income. They often reported suffering from insomnia and felt like a burden to those around them. They had no financial problems or traumas and experienced fewer interpersonal conflicts.

We cannot determine the degree of bias in the sample selection because it is unknown to what extent people did not use the help system in the context of a suicidal crisis. On the one hand, the higher number of suicides among males indicates a reduced help-seeking behavior, as does the relative underrepresentation of the entire age group compared to the total population.

Nevertheless, our findings align with other studies that identified depressiveness, previous suicide attempts or physical limitations, and other aging challenges as risk factors for suicide attempts in old age. In 2014, Chan and colleagues identified a number of risk factors for cerebrovascular disease, including age, life events, marital status, physical illness burden, functional impairment, depressive disorders, cognitive impairment, and trait neuroticism. However, they found that these factors were not associated with attempted suicide in men (310), but were significantly associated with attempted suicide in older women aged over 65 years.

Various biological, psychological, and social reasons have been suggested to explain gender differences (298,311,312). Depression in later life persists with higher prevalence among women (311). We refer to the higher degree of feeling a burden to others. Knowledge of gender-specific risk profiles in old age has important clinical implications. Community-based interventions in Sweden and Italy (313,314) were specific to women, and also community-based interventions or care management programs in rural Japan and Hong Kong showed a gender difference in service uptake (312,315).

We suspect that the higher proportion of women in both the SA and SI groups is an indication that we are still not reaching men in older age groups with prevention resources, and the lower proportion may not indicate that suicidality is less important in older men. The higher suicide rates in this group clearly supports our hypothesis. We hypothesize that older men may be less likely to seek professional help, or that the limited social circle of older men may be a significant barrier to timely intervention. We therefore recommend a more explicit focus on preventive measures for the group of older men in the region.

5.1.4 Class 3: Marital Status as Risk Factor for Suicidal Behavior

The class “middle-aged depressed,” consists mainly of women who are either married or divorced and dependent on income or early retirement pensions (figures 21 A-C). experience higher rates of interpersonal conflict and financial problems. They suffer from insomnia, feel like a burden on others and show more symptoms of depression.

In numerous studies, marital status has been identified as a significant risk factor for suicidality. Research has demonstrated that individuals who have never been married, have been divorced, or have experienced the death of a spouse are at an elevated risk of suicide com-

pared to those who are married (81,95–97). Still, we have little knowledge of how socioeconomic factors modify this elevated risk, and little research has studied the risk among persons enduring a marital separation. Naess et al. (2021), found that suicide risk was highly associated with being never married, separated, divorced, or widowed, even after adjustment for income level, educational attainment, centrality of residence, and immigration status (316). Compared to the married, the most substantial effect was seen for a separated position. The risk of suicide is significantly correlated with a single status, with the highest risk occurring during a marital separation. Nevertheless, the elevated risk varies in intensity according to individual-level factors. The termination of a marriage is a significant risk factor for suicide, with the associated stress and loss of support being particularly detrimental. Those on low incomes are particularly vulnerable to this risk (316).

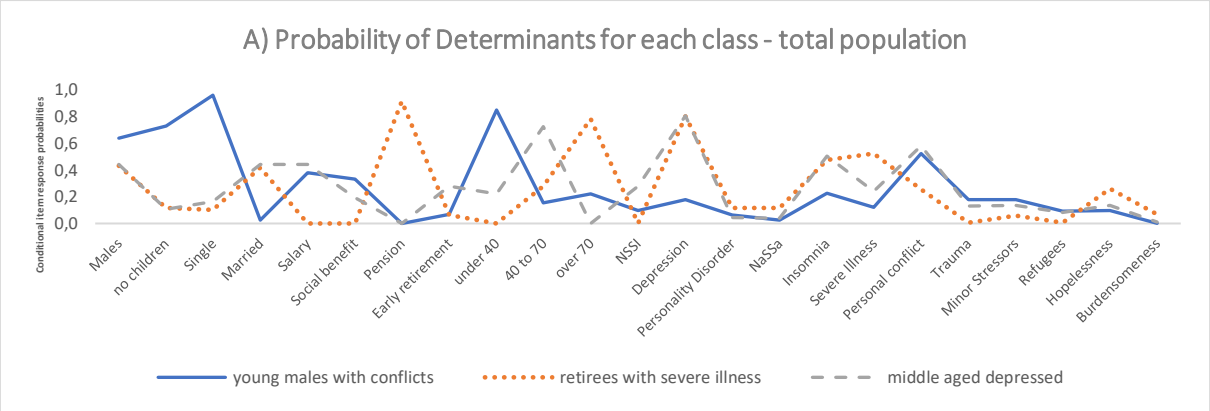
A synthesis of findings from previous studies on suicide rates revealed that individuals who were never married experienced the most unfavorable outcomes in their 30s and 40s. This was particularly evident in comparisons between younger and older age groups. A preliminary Norwegian study indicated that the advantage of marriage increased until approximately 40 years of age, after which it declined (317). The status integration theory and other single theories of marriage effects and marital selection were unable to account for these findings in a satisfactory manner (317).

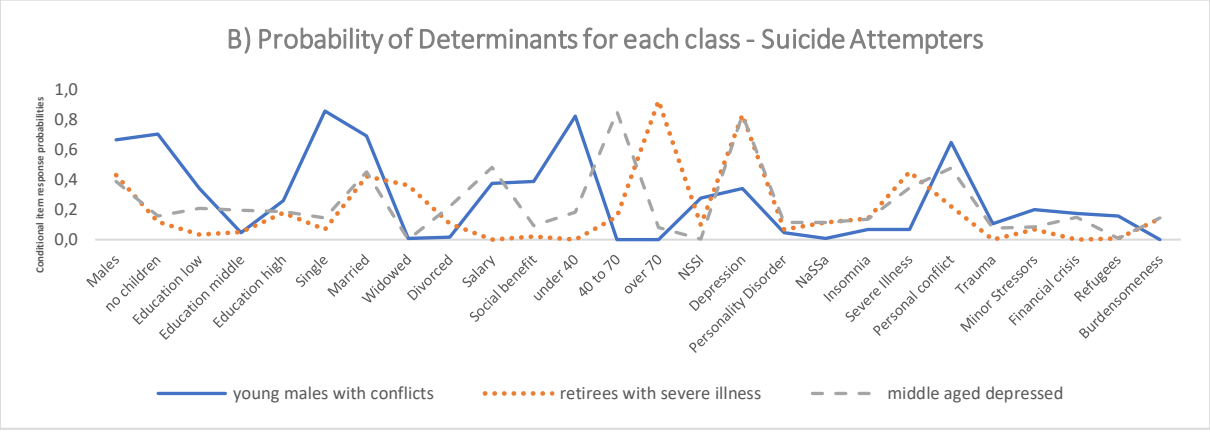
In our study, we found that both married and divorced people were equally prevalent in this class, so we hypothesize that the effects of financial difficulties or interpersonal conflicts, depressive illness, and the experience of being a burden to others are more important segregating factors for this class formation. Supplementary, this suggests that future research should focus not only on the married or divorced aspect, but also on the duration and quality of the relationship or interpersonal conflict.

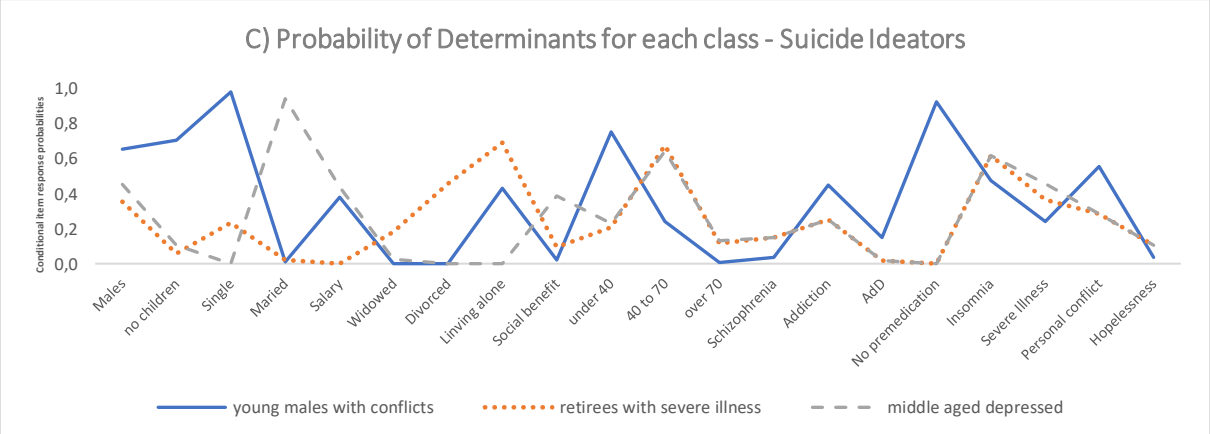
Having identified these three latent classes has profound implications for suicide prevention and intervention strategies. By recognizing the diversity within the at-risk population, health professionals can more effectively target their approaches. This understanding allows for targeted interventions, early identification of individuals at risk, and the potential to reduce suicide rates. In conclusion, the revelation of three distinct latent classes within our study population underscores the complexity of suicidality and the need for a nuanced approach to understanding patient profiles. This finding underscores the importance of comprehensive

assessment of psychiatric inpatients at risk for suicide and provides a cornerstone for subsequent analysis and intervention.

Figures 21 A-C
Combined latent class profiles of epidemiological, clinical factors, stressful life events.







Note. The figures illustrate the characteristics of the three classes based on responses to the indicators. Age, class, or income are multifactorial variables. Presentation of main differences for the total population (Figure 19A), SA (Figure 19B), and SI (Figure 19C). NSSI = non-suicidal self-injury, NaSSa = Noradrenergic and Specific Serotonergic Antidepressant, AdD = Adjustment Disorders

5.2 Suicidal Profiles – Suicide Attempters and Suicide Ideators

Suicidal ideation is the contemplation or preoccupation with the idea of ending one's life. It covers a range of concepts, from fleeting and passive to persistent and active thoughts of self-harm. Suicide attempts, on the other hand, refer to specific actions taken with the intention of ending one's life. These acts can vary in lethality, ranging from nonlethal self-injurious behaviors to highly lethal attempts. Our study found similar results that could be observed in larger collectives, for example, men are more likely to resort to violent means (males 40.9% vs. females 17.2%) when attempting suicide, while women tend to prefer nonviolent means (males: 59.0% vs. females 81.0%).

Previous studies consistently showed a strong relationship between suicidal ideation and suicide attempts (318–320). It is common sense that suicidal ideation and suicide attempts represent two important dimensions of suicidal behavior. However, we have proven that it cannot be assumed that every person with suicidal ideation will necessarily attempt suicide.

Current theories emphasize that clinical risk factors for suicidal ideation and suicidal behavior have some overlap, but also some specificity (51,205,321,322). Accordingly individual risk factors that distinguish suicidal ideation from suicide attempts include violence (85), psychiatric illness(323), demographic characteristics such as gender (324), age, residence, and ethnicity (99), physical illness (115,116,118), or negative interactions with friends (325,326). Unemployment is another characteristic of SA (15,16).

For suicide research, this raises the central questions of whether certain groups of individuals could be identified who are exclusively suicidal, what factors could protect against suicide, and what factors trigger the transition between the two.

The results of this study shed further light on the complex dynamics associated with suicide ideation and suicide attempts. They provide valuable insights into the different characteristics and risk factors associated with each group. These findings not only contribute to the general understanding of suicidal behavior. They also will have implications for the development of targeted prevention and intervention strategies.

5.2.1 Frequency of Suicidal Ideation and Suicide Attempts

There are no general data available for Germany on the number of patients who are admitted to emergency departments of somatic hospitals or psychiatric clinics after a suicide attempt. To date, no structured data on psychiatric emergencies or suicide attempts in emergency departments (ED) can be found in the literature, nor can data be found on how many patients are subsequently treated in a specialized psychiatric department or clinic.

The first recent studies of psychiatric emergencies in EDs provide an indication of the proportion of psychiatric patients in the total number of patients treated in general hospital EDs. Schlump et al. reported in 2022 for a total of 12 EDs in Germany that the proportion of psychiatric emergencies in all EDs was 2.1% (35); other studies estimate it at 5-9% (327–329). Suicide attempts accounted for 0.3% of all emergency admissions. In a survey of 74 German emergency departments, the proportion of suicide attempts was 2% (330).

Difficulties in recording psychiatric emergencies are well known (331): There is a risk of overestimating the number of suicide attempts in emergency departments because of inadequate differentiation between serious self-harm and suicide attempts. There is also often a lack of information in studies about the underlying motivation for self-harm. In addition, data from EDs are often evaluated on a case-by-case basis rather than an individual basis, which may lead to misinterpretation because people with mental and behavioral disorders often have repeated visits to EDs, especially for self-harm or alcohol abuse (35).

As we examined all patients (n = 6459) admitted to Helios FKH in 2017 and 2018 in our study, we can make statements about the absolute number and proportion of patients referred from other clinics or primarily admitted to psychiatry.

We found a total of n = 1,080 cases (16.73%) in which suicidal ideation or a suicide attempt was detected on admission. 55.2% of SA were transferred from an external somatic hospital after primary inpatient treatment, and 35.1% were transferred directly to the psychiatric hospital as an acute emergency. SIs were admitted as emergencies in 66.8% of cases, and less from other hospitals (11.6%). In addition, 8.8% of SAs and 21.1% of SIs are regularly admitted without an emergency admission.

This means that suicide attempts are among the most frequent psychiatric emergencies in psychiatric departments or hospitals, along with acute intoxications or cases of other danger to others or self-harm.

However, the state of research on general population suicide attempts in Germany is inconsistent and difficult to compare because of different definitions, cohorts, and observation periods. Due to the lack of systematic data, the lifetime prevalence of suicide attempts in the general population can currently only be estimated. Voss et al. reported a lifetime prevalence of 3.3% for Germany based on a representative survey conducted between 2009 and 2012 (332). However, representative survey studies are subject to considerable bias in the results, as individuals may fear stigmatization or negative consequences. Alternatively, severely affected individuals may be unwilling to participate in such studies (333).

There is also uncertainty about what happens during periods of acute suicidality. We do not yet know what proportion of people come into contact with the health care system after a suicide attempt. Especially after aborted or interrupted suicide attempts or in the case of a non-fatal choice of method, it can be assumed that there is often no voluntary presentation to a general practitioner or a specialist outpatient clinic.

Taken together, this is likely to lead to a significant underestimation of the true number of suicide attempts in the general population.

For future research, we recommend combining data from emergency departments and psychiatric or specialty clinics for a structural survey of patients after a suicide attempt and selecting defined regions of care for this purpose. In addition, uniform criteria for distinguishing suicidal behavior from nonsuicidal self-injurious behavior need to be used; we recommend the DSM-5 criteria for SBD and NSSI.

Further epidemiological studies should also be devoted to answering the question of suicidality over the life course. Longitudinal studies of patients from the first admission for a suicidal crisis would be conceivable. In our collective, we found a number of patients who had attempted suicide with a latency period of significantly more than 10 years, which means that study approaches must cover significantly longer periods of time.

5.2.2 Sociodemographic Profiles of SI and SA

The SI subgroup was more likely to be unemployed, to suffer from the consequences or lack of prospects of a serious illness, to report personal losses, or to have experienced abuse and trauma. At the same time, the frequency with which specialized therapists were involved in the pretreatment of SI underscores the importance of early intervention and support for those struggling with such challenges, this may have contributed to the avoidance of a suicide attempt despite a high stress level.

On the other hand, the more common characteristics of SA demonstrated a different profile. A higher prevalence of people suffering from severe depression, advanced age (>70 years), interpersonal conflicts, non-German origin, divorce, sickness-related worries, and a sense of hopelessness gave evidence of the experienced lack of perspective. Combined with a lower psychopathological symptom burden, this underscored the deceptive nature of their mental state and emphasized the critical need for attentive assessment and intervention, even in cases where initial symptoms may have appeared less severe.

The motivational SLE survey further illuminated the disparities between SI and SA groups (see pages 158 ff.). SI exhibited a higher burden of severe illness, personal loss, and interpersonal trauma, highlighting the role of cumulative life stressors in developing suicidal ideation. Moreover, the disproportionate representation of non-Germans and of refugees in the SA group underscores certain populations' unique challenges, emphasizing the importance of culturally sensitive mental health support and prevention efforts (see pages 164 ff.). In the SA group, the dominance of interpersonal conflict and the impact of acute stressors, such as fleeing crisis areas, underscored the important influence of external factors on suicide attempts. This suggests that it is critical for suicide prevention to address individual vulnerabilities as well as broader societal and environmental stressors.

5.2.3 The Complexity of Suicidality Across the Lifespan

The age distribution of suicides has been the subject of numerous national and international studies. Suicide rates and age distributions vary between countries, population groups, and over time (334,335). Several studies have examined the occurrence of suicide attempts or suicidal ideation within specific age groups, but few describe differences between age groups (334,336–338). One study found the highest prevalence of suicidal ideation and suicide attempts among adults ages 18 to 25, based on the 2018 National Survey on Drug Use and

Health (339). The study also found that adults under 50, college graduates, those never married or divorced/separated, and white males were at increased risk for suicidal ideation (338). Finally, a study of prisoners found that suicide attempts were more commonly reported by younger prisoners, whereas suicidal ideation was more widely reported by older prisoners (340).

It should be noted that the group of suicidal patients (SI and SA) in our study group is underrepresented in the older age groups compared to the total population of the region. The general figures on the increased suicide rate among older people contradict the assumption that older patients are less at risk of suicide than younger people and suggest that older people are less likely to seek help. Furthermore, it remains to be discussed whether suicide attempts in old age are recognized as such. We suspect that there is a large unrecognized population of elderly patients with an unclear overdose or incorrect dosage of medication. Or where life-threatening illnesses are triggered by the self-motivated omission of necessary medication or measures.

The impact of the Corona pandemic reinforced our view that different age groups are differently susceptible to periodic factors and effects. Indeed, during the Corona pandemic, we noted a decrease in the number of cases in younger patients, with a concomitant increase in the older group (see chapter 5.6 *The Impact of the COVID-19 Pandemic on Suicide Attempts*). In addition to the higher rate of suicide attempts in older adults, we are concerned that low help-seeking behavior in younger adults may be a risk factor for future suicidality or suicide. Such studies should be conducted in the post-pandemic period.

The subgroup comparison of age groups in the descriptive analysis showed that younger patients were more likely to cite interpersonal conflicts as a motivation, while older patients were more likely to cite the feeling of being a burden on others or suffering from a serious physical illness. In the younger group there were more patients with drug addiction, experience of abuse, experience of flight or the current situation of an unresolved asylum procedure.

5.2.4 Psychopathological Insights

There is evidence that the severity of psychopathological symptoms is related to suicidal behavior or attempts. Studies have shown that patients with schizophrenia and suicidal ideation have more severe symptoms, functional impairment, and neurocognitive deficits than

those without suicidal ideation (341). Furthermore, users of opioids and psychedelics are more likely to have suicidal thoughts than users of psychostimulants and psycholeptics (342). In bipolar-II-depressions, suicidal ideation was associated with lower self-esteem, racing thoughts, and psychomotor agitation (343). In addition, bipolar patients with psychotic symptoms during a depressive episode were more likely to have active suicidal ideation (344). The presence and severity of psychopathological symptoms such as depression, substance use disorders, and psychosis are significant predictors of suicidal behavior or ideation (345). However, there are also studies in which the severity of psychopathology shows a strong association with future suicide, but there are no associations between symptoms and suicidal symptoms (346).

First and foremost, our investigation revealed that individuals classified as SI exhibited a notably higher prevalence of addictive disorders than their counterparts in the SA group. This crucial observation underlines the intricate interplay between substance use and suicidal ideation, implicating the significance of addressing addiction in suicide prevention and intervention strategies.

Furthermore, our study unearthed a noteworthy disparity in the severity of psychopathological symptoms between these two groups. Specifically, individuals categorized as SI exhibited more pronounced psychopathological symptoms, encompassing delusions, hallucinations, depression, sleep disorders, and self-harm. This revelation points out the multifaceted nature of the psychological distress experienced by individuals grappling with suicidal ideation, necessitating a nuanced and tailored approach to their clinical care.

Notably, while no significant differences were found in the prevalence of depressive or other diagnostic groups between the SA and SI groups, there was an interesting finding within the substance abuse subgroup. Within this diagnostic category, the proportion of individuals classified as SI significantly exceeded that of SA. This intriguing observation prompts further inquiry into the intricate relationship between substance abuse, suicidal ideation, and suicide attempts, highlighting the need for specialized interventions and preventive measures tailored to this subgroup.

In the descriptive and latent class analyses, several features of group differences stood out: Compared to patients with suicidal ideation, patients with suicide attempts tended to have a lower symptom burden on admission. This is in contrast to the idea that severe symptoms

are automatically associated with suicidal tendencies. Instead, we suggest that severe symptoms open the door to treatment. It would be important to investigate whether a lack of symptom reduction or persistent symptom distress over time could lead to increased suicidality.

Another important point is certainly that some SA may consciously tend to name the social conflict or stressful situation as the trigger of the suicidal crisis, thus denying more serious psychiatric symptoms, not mentioning them for fear of stigma or shame, or deliberately concealing them to avoid negative consequences such as prolonged inpatient psychiatric treatment.

We are unable to report on anxiety disorders as they are not included in the primary diagnosis and are relatively rare in the secondary diagnosis. We suspect that there may be undercoding, i.e. that the investigators may have subsumed anxiety symptoms under depressive symptoms.

In summary, this provides a nuanced understanding of the factors that differentiate SI and SA individuals and emphasizes the need for tailored interventions that address each group's specific needs and vulnerabilities. Only by recognizing the complex interplay between personal, psychological, and socio-cultural factors we can develop more effective suicide prevention strategies and provide timely support to those at risk.

5.2.5 The Paradox of Symptom Burden: A Closer Look at Suicide Attempters

Our study uncovers a paradoxical dynamic between symptom burden and clinical treatment for suicidality: Patients who attempted suicide tended to have lower symptom burden at hospital admission in our study, possibly challenging previous findings on suicidality. A direct link between symptom burden and increased risk of suicide has been found in many studies (107–109,115,116,242,293).

The fact that SA in this study had a lower symptom burden than those with SI may therefore be surprising, but in our opinion, it is also consistent with hypotheses on the development of suicidal acts.

First, when people experience pronounced psychiatric symptoms and severe distal factors, this may trigger a heightened awareness of their mental health problems. This increased

awareness, combined with the severity of their symptoms, may lead them to seek help sooner and to more willingly seek clinical treatment options. In addition, mental health professionals may be more inclined to provide intensive care and support to individuals with severe acute symptoms because they recognize the urgency of their condition.

Another explanation is that individuals with a persistent high symptom burden receive sustained attention from health care providers, leading to closer monitoring over months or years and earlier clinical interventions, before a suicidal act occurs. This ongoing care could serve as a protective buffer against suicidal behavior and allow treating physicians or therapists to intervene early in a crisis before a suicide attempt occurs.

From this perspective, high symptom distress and severe distal factors can be considered potential protective factors against suicidal acts if they bring people to clinical treatment in a timely manner.

Conversely, patients with perceived less severe psychiatric illnesses and interpersonal conflicts, as well as elderly patients, often did not enter clinical treatment until after a suicide attempt, underscoring the need for greater awareness and support.

Our analysis revealed evidence of lower symptom burden associated with certain motivational factors across age groups. Younger patients were most likely to cite interpersonal conflict, whereas older patients were more likely to cite feelings of being a burden on others and severe physical illness as motives for suicidality. This is obviously not equivalent to reporting a high symptom burden in the psychopathological sense. And it remains unanswered whether this group of subjects attributed their crises exclusively to the explanatory model of an interpersonal conflict or stressful situation, while at the same time dissimulating, concealing, or hiding severe psychiatric symptoms. Concealment could result from fear of stigmatization, shame, or possible negative consequences such as prolonged inpatient psychiatric treatment.

Also forgotten is the presuicidal syndrome described by Ringel as early as 1973, which he derived from a 1949 study of 745 suicide attempts (348): people enter a constriction regardless of disorder, experience inhibited aggression, and then develop suicidal fantasies. The suicide attempt resolves the massive self-esteem crisis, pre-suicidal symptoms are then no longer detectable. Other survivors are relieved at the failure of the suicide attempt, they are exhausted from the attempt (349), or exhibit shame reactions (350), and a few remain in an

acute suicidal mode with persistent suicidal fantasies or impulses to act. Interestingly, despite their own attempts, the majority of attempters were found to believe that others should not commit suicide (351).

One final explanation points to possible bias in the study. The results were based on interviews with investigators in clinical practice. It is quite possible that in the context of the drama of the suicide attempt on admission, the focus tended to be on emergency medical concerns, and exploration of suicidality, motivational factors, or symptom burden took a back seat. We had tried to sensitize the investigators to this through prior training, but we cannot rule out a possible shift in focus.

It is important to recognize that the relationship between symptom distress and clinical treatment is multifaceted and may vary depending on individual circumstances. Our findings also highlight a possible suicide-preventive role of early intervention for those with prominent symptoms, but this should only be considered in the context of available support systems. In underserved areas, the effect may be the opposite.

Thus, further research is needed to investigate the specific mechanisms and clarify our understanding of this presumed paradoxical relationship.

In summary, we believe the study results underscore the importance of early identification and intervention for suicidality. They emphasize that individuals with high symptom burden and severe distal factors may benefit from targeted support and treatment, ultimately reducing their risk for suicide attempts. These findings offer valuable insights into suicide prevention strategies and challenge us to prioritize timely and comprehensive mental health care for those in need.

5.2.6 Divergent Pathways related to Substance Abuse

Interestingly, our group comparison revealed significant differences in the context of substance abuse. While there were no significant differences between SIs and SAs in the depressive and other diagnostic groups, the proportion of SIs was significantly higher than that of SAs in the group of substance abusers. This unexpected finding calls for a re-evaluation of the factors influencing suicidal behavior in this subgroup.

In our view, there are two main reasons for this result. The addictive behavior was also found to be particularly prevalent in the group of younger men, who made up a considerable proportion of the SI group that was already discussed above. The state of intoxication then allows emotional expressions that can be cognitively controlled much better in the normal state. The "withdrawal" of suicidal thoughts at the latest the day after detoxification would correspond to this assumption. However, the reduced adherence of these patients usually prevents a deeper exploration and motivational research, so that this assumption is rather hypothetical. However, we see the need to engage this group in further therapy. In other words, the door only opens in the acute admission situation and is closed again after a short time.

There is another factor that should not go unmentioned. Clinically, we observe that access to inpatient treatment is sought through reports of a suicidal crisis, especially when regular access to therapy is difficult and admission is obtained through a crisis-like description of the state of health. In our view, however, the frequent premature discontinuation of treatment contradicts this assumption, and it is not possible to verify the truth of a statement in an emergency. Due to the increased mortality risk of young, often male addicts, it should always be assumed that they are currently suicidal.

5.3 Focus on Stressful Life Events (SLE)

5.3.1 Overview on Stressful Life Events (SLE)

Individuals who attempt suicide are often exposed to multiple stressors, with stressful interpersonal relationships considered a major risk factor (99).

Previous research has focused primarily on the role of single forms of life stress, such as child maltreatment (101). However, people generally experience multiple types of stressors that are unlikely to occur in isolation, and dose-response effects are evident (102). Early life stressors, such as childhood bullying, also increase the likelihood of suicide attempts in later life (103–107). Other forms, such as financial difficulties (108), job loss or job insecurity (109,110), relationship problems (102,111), and conflict (112–114), are associated with suicidality.

We observed that interpersonal conflicts and stress due to serious illness were significantly more frequently reported as triggering stressors of suicidal crisis, in line with previous studies. Significantly fewer patients were affected by financial crises or personal losses. This contradicts some studies on suicide that link personal loss to a higher risk of suicide (352–354).

McFeeters et al. (2015) identified a high burden of SLE in intensive interviews with suicidal individuals. They postulated that the total number of events could be considered a risk for suicidal acts (355).

In a 2016 Australian cross-sectional study, Currier et al. identified 2016 life events that appear to be related to suicidal ideation in adult males, independent of depression, anxiety, and harmful alcohol use. In the event that life events occur in conjunction with depression (356), the risk is significantly (OR 10.3) elevated.

Before discussing stressful life events in detail, we want to highlight a vital study limitation. The exploration of stressful life events was asked directly upon admission of the patients, and there was no structured reevaluation of the information in the course of further treatment. In addition, the investigators did not use standardized questionnaires to record the respective items. Nevertheless, this provides a good overview of acute stress factors. Patients and investigators gravitated toward current stressors during the acute phase of admission, shedding

light on the dynamic nature of suicidality. This focus on immediate stressors revealed contrasting patterns between SI and SA, with potential implications for clinical assessment.

Interestingly, in the group comparison between SI and SA, we observed that SI also had a higher burden of severe illness or personal loss and more interpersonal trauma in the survey of motivational SLE, comparable to the higher symptom burden discussed above. SA was dominated by interpersonal conflict and the effects of fleeing crisis areas, both acute stressors.

We suspect earlier admission to a specialized suicide prevention clinic was avoided due to a lack of care structures, knowledge about treatment options, or fear of stigmatization. Better information or establishing specialized crisis intervention centers could help reduce the frequency of suicide attempts.

We would like to point out that we are describing the probability of SA and cannot make any statements about suicides. A decrease in SA could therefore mean a parallel increase in suicides in the same group, which we could not observe. We also emphasize, as we have elsewhere, that this is a clinical population of inpatients. It is therefore quite possible that patients in a grieving process related to a suicidal crisis may have sought therapeutic help elsewhere (e.g., outpatient therapists, crisis hotlines).

However, we found that patients were less likely to report interpersonal trauma during the initial interview or to directly link past events to the current crisis. Relationship conflicts are more understandable from a motivational perspective for patients in suicidal crisis.

The clarification of internal connections or effects of life-historical traumatization is goal of appropriate psychiatric-psychotherapeutic treatment and less the focus of crisis intervention treatment. Our results also show that interpersonal traumatization should be considered a significant risk factor for recurrent suicidal crises and that knowledge of it would be essential for good preparation of discharge management and further support planning.

In this context, we consider it extremely important in the clinical context to ask patients about possible triggers of the initial suicidal crisis within the framework of a two-stage suicide assessment: (A) in the exceptional situation and (B) after the acute phase has subsided. We, therefore, propose a two-stage suicide assessment for patients: at the beginning, clarification of acute suicidality with pressure to act and clarification of the suicide mode, as well

as acute stress-triggering events. At the end of treatment, assessment of baseline suicidality, including extended motive clarification and the presence of distal stressors, combined with treatment planning and emergency prevention.

Although this approach seems obvious, it does not necessarily fit into routine clinical practice. There are both treatment and patient-related reasons for this. Patients avoid talking about the suicide attempt, which is often perceived as traumatic or embarrassing, and therapists limit themselves to assessing acute suicidality.

Our results differ from structured interview studies in that patients reported significantly fewer SLE overall in the intake interviews. This was despite the fact that the investigators were sensitized to SLE due to their previous training. As our study is based on routine clinical data without structured interviews, we explain this result by the fact that both patients and investigators focused more on current stressors in the acute phase of admission, which could explain the relatively high proportion of interpersonal conflicts and the rather low proportion of primarily distal factors such as previous trauma.

Future studies should take this into account and differentiate more between current stressors and past life events.

5.3.2 Demographic Patterns and Stressor: Non-Germans and Refugees

It was already clear from the study of SLE above that special attention should be paid to people with refugee backgrounds, who are less well served by professionals and rarely receive appropriate early treatment. Several studies (59,90,91) have already shown that the risk of suicide in this group is exceptionally high. It is essential to consider whether refugees have just arrived or have been in the country for longer, e.g., awaiting decisions on their right to stay. For example, Nesterko et al. (2022) found that 30.3% of refugees surveyed who had just arrived in Germany had suicidal ideation within the two weeks before the study (91). Notably, the SA group exhibited a higher proportion of non-Germans and refugees, emphasizing the importance of cultural considerations in suicide risk assessment and intervention.

Another German research also described a high prevalence of suicidal ideation, indicating severe psychological distress in this population. In this context, most suicide attempts appear similar to those in the non-refugee population (59).

At first glance, this contrasts with our study, as we found a higher proportion of non-Germans and refugees in the SA group. However, we cannot use the overall refugee group as a control group, as non-Germans were significantly underrepresented in the SI group. Therefore, we suspect this is due to poorer specialist care in outpatient and inpatient settings or lower help-seeking behavior among those affected due to fears of stigmatization or culturally determined lack of knowledge about treatment options. Language barriers and the lack of native-speaking therapists are probably further limitations.

It is generally agreed that there is a significant lack of epidemiological research on suicidal ideation and attempted suicide among refugees. The disproportionately high prevalence of suicidal ideation suggests substantial psychological distress in this population (59,90,91,357). Very different aspects of migration issues need to be considered in their impact on suicidality: PTSD, separation from family for unaccompanied younger refugees, pre-existing mental illness, living in refugee shelters, lack of perspective, poor schooling, unemployment, and fear of deportation to the home country certainly contribute in very different ways to the acute stress of these populations and require very different strategies. Culturally sensitive therapeutic services and training of native speakers, including from the extended social welfare system, could help to protect these groups better.

5.4 The Dynamic of Suicidality Across the Lifespan

5.4.1 Unveiling Hidden Histories: Previous Suicide Attempts

Focusing on the dynamics of suicidal crises also highlights the limitations of retrospective studies of risk factors. Knowledge of a risk factor alone can tell us little about an individual's risk and is difficult to predict, especially since people with a history of suicidality tend to have only vague autobiographical memories (162). In addition, people with depression (8), among others, tend to exaggerate the severity of their depressive symptoms in retrospect (358) or withhold important information, such as previous suicide attempts, out of concern for stigma or fear of negative consequences.

After the first interim analysis of the results, we found that 20.4% of suicidal patients reported having attempted suicide in their lifetime. This is consistent with the main risk factor for further suicidal behavior, a previous suicide attempt, which has been studied repeatedly, especially for the special population of a psychiatric hospital with a comparatively large group of SRAs and MSAs. Boisseau et al. studied 668 patients over a ten-year period. 21% of the participants attempted suicide, with 39 (9.0%) reporting a single suicide attempt and 54 (12.5%) reporting multiple suicide attempts (274).

However, it must also be considered that younger people in particular, who have only attempted suicide once so far, cannot be reliably assigned to the SSA group due to the lack of long-term observation, as it is possible that they could attempt suicide again in later years.

After analysis of individual medical records (1998 to 2016), an additional 241 suicide attempts were identified, and the proportion of patients with a history of suicide attempts doubled to 43.1% after correction. This is indeed surprising and must of course be seen against the background of the specific patient clientele. The percentage relates exclusively to the group of suicidal patients treated as inpatients. The rural structure should also not be disregarded. The changes within the population structure are certainly much less dynamic than in urban structures. While patients in urban areas are treated in different hospitals or settings over the course of their lives, the care situation in rural areas remains stable. The evaluation of the clinic's medical records provides a good overview of the patients' individual medical histories and thus also allows representative statements to be made for other suicidal patients.

Why is it that we found correct information about previous suicide attempts in less than half of the records we reviewed? We recommend a patient- and investigator-centered discussion to further explore this question. Withholding information about previous suicide attempts because of shame or fear of negative consequences is a phenomenon described in the literature (272). Several studies have investigated why patients withhold or do not disclose information about previous suicide attempts. A study comparing structured clinical assessments with research measures of suicide risk found that false-negative rates in clinical screening were associated with older age, concealment, and lower frequency of suicidal ideation (359). Richards et al. (2019) also postulate that patients may not express suicidal ideation due to fear of stigma and overreaction (360).

This is consistent with our finding that a significantly higher proportion of individuals in the 70+ age group concealed previous suicide attempts. We suspect that older patients do not disclose their previous suicide attempts because this generation is more characterized by shame and fear of stigma. Clinical experience shows that the suicide attempt is then often quickly dismissed as "a mistake," "an impulsive act," and "a promise that it will never happen again." Since we were only able to look at medical records from the last 20 years, the proportion in this group is probably even higher if we assume possible suicide attempts in adolescence or young adulthood.

However, it is possible that the motives for concealing suicidal thoughts in the past were not so much dishonesty or even deliberate concealment, but rather difficulties in articulating relevant inner emotional states. The understanding of suicidal acts as appealing or help-seeking behavior has been discussed repeatedly (361–364).

Another phenomenon of patient misreporting is the false-positive reporting of current suicidality to obtain hospitalization, conflict resolution, or deliberate concealment of suicidal ideation for similar motives. Some studies show that patients with addiction problems may use suicidal ideation to force their admission. On the other hand, some addiction treatment programs may not admit patients with a recent history of suicidal ideation, so concealing past or current suicidality may be "helpful" from the individual's perspective (365).

5.4.2 Who will be honest – Surprising Facts?

In the group with dependence disorders, we observed more patients with suicidal ideation without suicide attempts. This may support the hypothesis that this group is trying to gain

admission by expressing suicidal ideation. However, these patients were also significantly more honest about previous suicide attempts than other diagnostic groups. This was in contrast to patients admitted for acute stress disorder. In this group, there was a weakly significant increase in patients who concealed previous suicide attempts, indicating deliberate minimization.

Individuals who covered a prior suicide attempt had a significantly increased risk of a repeat attempt during the prospective course of our study (OR=2,307). This underscores the importance of comprehensive information collection; missing information may lead to inaccurate acute or prognostic assessments of suicidal behavior. The fact that individuals are more likely to provide more information in interview studies suggests that more intensive training of professionals could improve the identification of relevant risk factors (359).

Despite pretrial training, we cannot rule out investigator-related factors. During the preparation of the study, we repeatedly noticed that the more information the patient provided about previous suicidal crises, the more the therapists tended to favor special safety measures such as admission to a protected ward for safety reasons. We also found little differentiation between acute suicidality, baseline suicidality, and risk factor assessment prior to training. The silent commitment of therapists and patients to extended inpatient treatment for suicidal crises, as set out in non-harm contracts, must not be forgotten. Jobes (2016) described this in his book "Managing suicidal risk" (366): "The worst thing about traditional no-harm contracting is that it can often become a game where both parties know how ineffective this intervention actually is. In many cases, our patients know what they need to say or not say in order to be hospitalized or discharged. Worse, we know that they know that we know. "

This suggest that nonjudgmental listening and expressions of care without overreaction by providers may help patients overcome the fear of providing information about their true suicidality (360). A stable therapeutic alliance will improve access to relevant risk assessment factors. Patients should be able to communicate information about their suicidality without shame or fear of stigma in subsequent therapies.

Although we cannot conclude the motivations of individual patients, the highly heterogeneous factors suggest that patients may have different reasons for concealing or not disclosing information about previous suicide attempts. Despite considerable methodological challenges, this describes an important future area of research to identify this at-risk group and

better elucidate the motivations for concealing suicidality in self-history. Understanding these motivations may help improve prevention and intervention strategies.

5.4.3 Characteristics of Suicide Re-Attempters (SRA)

Several studies have revealed a different clinical profile of SSA and SRA. SRA show a more severe manifestation of psychopathological symptoms, especially with regard to depressive symptoms, suicidal ideation, and hopelessness (43,324,367). Comparative analysis of multiple variables, including depressive and anxiety symptoms, suicidal ideation, hopelessness, ability to solve problems, and a range of personality traits, showed that those who attempted multiple times had a more severe clinical picture and a higher risk of suicide than those who did not attempt suicide (273).

MSAs demonstrated a higher likelihood of exhibiting a family history of suicidal ideation, physical illness, and mental disorders, as well as elevated scores on the Beck Hopelessness Scale (BHS) and Suicide Intent Scale (SIS), and reduced scores on the Duke Social Support Scale (DSSI) (368). Significant predictors of multiple suicide attempts included a family history of suicide, mental disorders, hopelessness, and social support (368). MSAs have a higher lethality of their last suicide attempt than SSAs; they were more likely to be single, less likely to be married, and younger (271). They also show higher levels of aggression, anger outbursts, self-aggression, and specific personality traits such as “urgency” in response to negative emotions (369).

Suicide Re-Attempters are likelier to have a history of childhood trauma, emotional abuse, and first-degree relatives with suicidal behavior (370). MSAs were significantly more likely to meet the criteria for borderline personality disorder and to have higher impulsivity scores than were SRAs (274). In addition to the aforementioned demographic factors, clinical variables associated with RA included a family history of suicidal behavior, the presence of childhood trauma and emotional abuse, higher scores on hopelessness and motor impulsivity, a lifetime history of aggressive behavior, poorer interpersonal functioning (e.g., deficits in conflict resolution skills), and a more significant number of stressful life events (270,276).

Consistent with previous research, we identified significant sociodemographic differences between SRA and SSA. Compared to SSA, SRA were younger, more likely to be female, unmarried, had fewer children, and had more first-degree relatives with suicidal behavior

(347). Additionally, the subjects reported a greater history of psychiatric and psychotherapeutic treatment, which is consistent with their more severe psychopathological profile (369).

We detected no significant differences in NSSI, PTSD, or personality disorders between SSA, SRA and MSA. An interesting difference was found if there was specialist care before admission. The proportion of repeat attempts was significantly lower in this group of patients with an OR of 0.5424, suggesting a protective effect.

These results suggest that Suicide Re-Attempter (SRA) are more vulnerable and high-risk than individuals who have made only one attempt.

This observation is in line with many other previous studies (347,371,372). For this prospective observation period, we also noted the previously described effect of high symptom burden on suicidality or further suicide attempts. We cannot answer whether treatment success or further chronicity might influence the risk of suicide attempts; this needs to be investigated by other studies with more specific questions.

We performed an interim analysis for a subset of patients for whom a BDI was available at admission and discharge (n = 476). However, there was no evidence whether a significant change in BDI was associated with a higher risk of suicide recurrence compared to patients with unchanged or worsened depressive disorder at discharge. Whether adequate symptom relief can reduce future suicidal crises remains to be seen.

The apparent differences in risk profiles between single and repeat suicide attempts suggest that different intervention approaches could be developed specifically for each type of attempt. Such approaches could target the more severe psychopathology, deficits in emotion regulation and problem-solving skills, higher self-aggression, and more significant suicidality observed in repeat suicide attempts. These observations are in line with those presented in our recent systematic review of psychotherapeutic interventions to prevent repeat suicide attempts (302). Previous studies of PT interventions have included varying proportions of individuals with repeat suicide attempts (302,373,374). However, they have not systematically examined differences in PT outcomes between single and repeated suicide attempts.

We have already discussed that depending on the number of attempts and the time between attempts, SRA is likely to be a heterogeneous group. In many studies, the epidemiological

and clinical characteristics described suggest that special groups were classified here, for example, traumatized persons or patients with impulsive personality disorders.

Due to the small number of cases in our study, it is impossible to conclude whether this is related to recurrent illnesses, major depression, structural deficits, lack of resilience, or due to distal factors, such as early trauma. We therefore recommend that patient groups should be further classified according to the occurrence of suicidal crises and that further research be conducted. Conceivable categories would be (A) recurrent suicidal crisis, (B) single suicidal crisis without previous suicidality, (C) persistent suicidal crisis > 1 year, each with and without suicide attempt, and (D) multiple suicide attempt (MSA).

5.4.4 The Timing of Re-Attempts: A Critical Window of Risk

We find it particularly noteworthy that, regardless of the country or region studied, 60% of cases were followed by a suicide attempt within the first year of suicidal ideation. (5). Skogman et al. (2004) found gender influences on repeat suicide attempts in a 6-year follow-up period; of 1050 individuals, 50 made another suicide attempt, with men showing higher suicide frequency and use of a more violent method. Women showed higher age and suicide intention in the BSS (375).

Our study also emphasizes the importance of the early post-discharge period. After the first admission in the primary study period, n = 87 (8.06%) participants made at least another suicide attempt or attempted suicide in the observation period up to 2021 after having been previously admitted with suicidal thoughts. Notably, individuals who reported a previous suicide attempt had a significantly increased risk of a repeat attempt during the prospective course of our study (OR=2,307). Nearly 70% of patients who attempted suicide again did so within the first two years, and 26% did so within the first six months.

Thus, information about previous suicide attempts is central to successful prevention; it is part of the mandatory information collection for at-risk patients. As important as this information is, information collection is prone to error. Hom et al. (2007) pointed out that asking a patient about a previous suicide attempt risks misclassification because in a follow-up survey, only 60% of the information provided according to CDC criteria indicated an actual suicide attempt (376). However, there is little research on the significance of specific time periods for suicide reattempts. In our view, there is a significant difference between people who attempt suicide within a few weeks or months and those who attempt suicide within ten

years. The question arises as to how long suicidal crises last, or how long a suicidal mode as described by Rudd (2000) can persist (185). We must also consider that people are in chronic states of suicidality, especially patients with borderline personality disorders (72,377,378). Finding more homogeneous groups for future studies is therefore an important challenge in order to avoid generalizations from individual case descriptions. Many studies examine quite different follow-up periods, depending on their methodology, and combine them when surveying repeat attempts. However, our study population found that some patients attempted suicide again within a few months, whereas others made multiple suicide attempts within a few years. Still, others reported one suicide attempt, some decades earlier. It is suggested that these groups differ substantially in terms of underlying motivational or clinical factors and cannot be grouped into a single risk factor of "previous suicide attempt" or as Re-Attempters.

5.5 Regional Differences and Socioeconomic Factors

An important question of this study was to find causes of regional differences in suicide rates by examining regional characteristics of suicide attempts or suicidality. The consistency of different suicide rates over the 10-year period in the subregions suggest the presence of subgroup differences, based on those affected by their regional affiliation.

There is strong evidence in international research that regional characteristics may have an impact on suicide rates (213–215). Durkheim's (1897) awareness of the remarkable stability of regional suicide rates from year to year, a phenomenon he sought to elucidate, led him to search for characteristics of regions correlated with such regional suicide rates (44). Durkheim concentrated on social characteristics such as social integration and social regulation (social norms and customs). This has resulted in a substantial body of research examining the potential association between various variables, including divorce rate, unemployment, proportion of African American residents, and income, and regional suicide rates (379). Lester (1995) found for U.S. states in 1980 that suicide rates were higher in western states with high birth rates and a relatively high proportion of males than in other regions (379). In the United States, factors such as access to firearms, drug and alcohol use, and limited health care resources contribute to higher suicide rates in rural areas (89). And the gap in suicide rates between rural and urban areas has widened over the years. Similar trends are seen in Finland, where suicides in urban areas are often related to separation, while suicides in rural areas are associated with health stress experiences (211). In Australia, middle-aged men in remote areas have a higher risk of suicide. Lack of access to mental health professionals certainly contributes to this problem (212,216). In Denmark, a case-control study found that suicide risk varies by city, with rural areas at higher risk when certain factors are considered (219). It is important to note that defining rurality and urbanity can be difficult and that additional focus should be placed on individually experienced inequalities, crisis management, and future prospects.

Helbich et al. (2017) examined suicide risk at the county level in Germany and found that rural areas have a higher risk of suicide. Important factors in this analysis include accessibility indicators such as population potential and population density (36). During the study period, 133 people died in the service area, and their average age was 60.25 years (245). In the region studied, the suicide rate fluctuates between 14.2 and 19.2/per 100,000 inhabitants over a 10-year period, with probably no socioeconomic differences between the regions.

It has been observed for years that the average age of people dying by suicide has been steadily increasing in parallel with the age trend in each sub-region. It would therefore be conclusive to link the increased suicide rates to the age structure alone, especially since the city of Suhl, with the highest suicide rate of all subregions, also has the highest average age. However, the age average is increasing in all subregions, but certain regions such as Hildburghausen continue to show a stable low suicide rate. In our view, this indicates that factors other than age must also be considered.

International studies drew attention to the diversity of rurality and urbanity. In our view, however, the geographical concept of remoteness can only be applied to the rural German situation to a limited extent. Certain regions are less well connected to medical services, but they still differ significantly from the remoteness of other international regions. Nevertheless, different results can be found when comparing rural and urban regions in Germany. It, therefore, seemed much more important to us to focus not only on problems such as accessibility to medical care but rather on individually experienced inequalities (222), different abilities to deal with crises, or experienced future perspectives.

We found discrete, non-significant differences between subregions, such as lower levels of specialized outpatient care, more frequent concealment of suicide attempts in medical records, admissions against will, or clustering of persons with a refugee background in the critical regions of Suhl and Ilm district. In our view, this suggests that targeted preventive special care services could reduce the suicide rate. However, longer-term regional observations are needed to answer this question; under-sampling provides an inadequate picture of regional characteristics.

In summary, we would like to point out that we do not believe it is possible to draw qualified conclusions about regional differences in suicide from suicide attempt rates alone. We would also like to reiterate that older adults were underrepresented in the study population, which limits our ability to draw conclusions about this high-risk group in different regions. Given these findings, we suggest that research should be more regionally focused. Specifically, we recommend focusing on specific age groups within each subregion, examining subgroups such as refugees longitudinally, and focusing more on the different health system services available in relation to population potential.

Our study highlights the complexity of suicide in a regional context and underlines the need for context-sensitive prevention approaches.

5.6 The Impact of the COVID-19 Pandemic on Suicide Attempts

The COVID-19 pandemic, an unprecedented global crisis, prompted a significant shift in societal dynamics and health outcomes. Researchers worldwide began investigating its potential impact on various aspects of mental health, including suicidality. Understanding how the pandemic influenced suicide attempts became a critical research question.

As the occurrence of the coronavirus pandemic was not yet included in the primary study protocol, we additionally examined the regional impact of the pandemic and related interventions on the number of suicide attempts in a second approach by analyzing the time course of suicide attempts from January 2017 to December 2021 in the same regional care hospital. The results have been published previously (380) but are discussed again regarding general risk factors because of their importance.

The COVID-19 pandemic and related restrictive measures have significantly impacted suicidal behavior. The pandemic has resulted in mental health problems, anxiety, depression, and sleep disturbances in the general population (313). Risk factors for suicidal behavior, such as social isolation, unemployment, alcohol use, domestic violence, and limited access to health services, have been exacerbated during the pandemic (384). Vulnerable populations are particularly at risk. These include people with pre-existing psychiatric disorders, COVID-19 survivors, and older adults (385). Feelings of exclusion and social pain have increased due to social distancing and quarantine policies, further promoting suicidal ideation (386–388). Other population surveys also support this, showing that psychological distress during the pandemic strongly correlates with suicidal ideation (129,389).

Following the onset of the COVID-19 pandemic in mid-March 2020 and the implementation of extensive contact reduction programs in Germany and Thuringia, we expected to see a significant impact on the number of suicide attempts. We selected patients who were hospitalized after a suicide attempt over a five-year period (2017-2021) to test our hypothesis. However, contrary to our expectations, Poisson regression analysis revealed no significant differences in the total number of suicide attempts or their trends during the pandemic compared to previous years. There was a regression to the mean in the first months of the pandemic, although the monthly number of suicide attempts in the entire group initially increased after the initial closure.

Instead, we found differences in seasonal patterns, trends, and seasonal patterns of SA in individual subgroups. Mental health has been significantly impacted by previous epidemics such as Severe Acute Respiratory Syndrome (SARS), economic crises, and the current COVID-19 pandemic (14,230,390–393). Suicide rates have been shown to increase during rising unemployment or in the wake of significant economic uncertainty in Europe (14) and during SARS epidemics, particularly among older women (230,231).

We found no significant increase in suicide rates during the pandemic compared with the pre-pandemic period, in contrast to these experiences. These observations are consistent with evidence from high- and middle-income countries, which did not observe an increase in suicide attempts or deaths during the pandemic (61,238,290,394).

Widespread increases in psychological distress and mental health problems may have increased suicidal ideation, but not necessarily suicide attempts (51,395). Recent studies have described a link between acute stress or anxiety and increased suicidality in the general population (396,397), but this is unlikely to apply in the same way to suicide attempts.

It is widely recognized that suicidal behavior is complex and may have multiple causes, and the current pandemic is certainly one of the risk factors (396). However, it does not appear to be the sole catalyst for suicidal behavior, at least not during the two years of the pandemic. The significant increase in symptoms of depression and anxiety among adolescents and young adults during the coronavirus pandemic in German (398) could be of particular significance. It remains to be seen to what extent these symptoms will recede once the restrictions are lifted in 2023 or whether there will be lasting consequences for both general mental health and the occurrence of future suicidal crises, particularly for the group of young adults.

Our analysis revealed clear and significantly different trends in the frequency of suicidal ideation (SA) in older and younger adults. The latter group experienced a decrease in suicidality during the pandemic, whereas we observed the opposite effect in older adults. In addition, we suggest an observable, although not statistically significant, increase in suicidality as the pandemic progressed, which urgently requires further follow-up in the post-pandemic period.

Studies of previous pandemics, such as SARS (83,85),have also shown that older people are more vulnerable to the effects of a pandemic, which may explain the observed increase in suicide attempts (77).

The protective measures associated with the ongoing COVID-19 pandemic and the healthcare system are focused on treating many infections that have affected access to the medical assistance system. A reduction in the number of patients seeking care was observed, particularly in the early stages of the pandemic (390). Nevertheless, we posit that younger individuals may have utilized disparate support systems or exhibited superior coping abilities. Conversely, older individuals were more prone to social isolation and less inclined to utilise alternative psychosocial support systems. Furthermore, it has been postulated that the fear of contagion and the concurrent perception of being a burden to the younger generation due to severe social limitations may have exerted a pessimistic influence on their views of the future and may have increased thoughts of death. Some studies have indicated that older individuals were more prone to anxiety, depression, and loneliness during the pandemic than they had been prior to the onset of the crisis (233).

Our data suggest that during the first phase of the pandemic, older people were less likely to experience suicidal crises. Other studies also showed that older people were more resilient to mental disorders in the early phase of the COVID-19 pandemic (399). However, we suspect this reversed as the pandemic progressed and that older adults may have been more distressed.

Consequently, it is postulated that the initially observed enhanced resilience of the supplement may have been attributable not only to superior individual protection against mental illness but also to elevated levels of prosocial behavior, greater empathy, or more effective emotion regulation. These abilities may have been of critical importance during the initial stages of the pandemic. Concurrently, concerns about the future, a sense of being a burden on others, fear of the disease, loneliness, and isolation became increasingly salient as the pandemic progressed.

In contrast to older adults, the initial phase of the pandemic appears to have played a significant role in suicidality among younger adults. On the one hand, the observed decline during

the pandemic may be attributed to enhanced adaptation in this group, which may have facilitated the development of new coping skills and abilities (400). Conversely, the decline may have been an artifact of reduced help-seeking after a suicide attempt.

A study by Jollant et al. (2021) conducted on a French population found that 39.3% of respondents indicated that they had not been hospitalized following their most recent suicide attempt, even before the advent of the pandemic (237). This phenomenon may be further exacerbated by the necessity for home isolation and apprehensions about infection in emergency departments and clinics, which may serve as another contributing factor in the decline in the younger demographic. The results from France and England on patients with self-harm and other mental illnesses support this suggestion (237,390). It is necessary to investigate whether there is a change in the use of other services. Most importantly, this effect must be subject to monitoring over time.

Another noteworthy finding of the present study was the significant impact of the pandemic on seasonal fluctuations and periodic variability in suicide attempts (SA). This impact was particularly evident among men and younger adults. The study of seasonality in suicide has been a long-standing focus of suicide research (401,402).

A limited number of studies have examined the seasonality of suicide attempts (291). The majority of data pertains to the incidence of suicide from death registries in specific regions. Although the precise cause of seasonal peaks remains uncertain, previous epidemiological studies have indicated that meteorological factors may play a role in suicide, accounting for a greater degree of variance in suicide incidence than socioeconomic factors (402).

The results of the present study indicate that the effects of the COVID-19 pandemic and related interventions on suicide attempts were superior to possible meteorological variables, such as seasonal sunshine duration. This resulted in a reduction in the seasonal variability of suicide attempts before the pandemic.

It is noteworthy that seasonal variability had a more pronounced impact on men and younger adults than on women. This suggests the existence of gender- and age-specific stressors, differential resilience, or adaptive capacity. Other studies have indicated that women experienced greater psychosocial distress during the COVID-19 pandemic (400). However, it is unclear whether this has longer-term effects on suicidality. Women were more stressed when

caring for children, relatives or the elderly; feeling needed may be a suicide-preventing factor. It is therefore important to monitor how increased psychosocial stress affects women's mental health after the pandemic has subsided.

5.7 Strengths of the Study

The strengths of this study lie in the comprehensive factor analysis of patients hospitalized for acute suicidality over a two-year period in a psychiatric hospital in a specific rural region in Germany. Real-time data were collected from patients after suicide attempt and acute suicidality over a five-year period and a systematic review of all retrospective and prospective suicide attempts in this population over a 25-year period was conducted.

Due to the naturalistic study design, we can make statements about the clinical applicability of currently accepted hypotheses on suicidality and derive corresponding recommendations for the clinical assessment of suicidal crises and supplementary prevention measures.

At least two investigators excluded NSSI or other self-injury according to DSM-5 criteria, and data were stratified by age and gender.

Patients who have attempted suicide and live in the care region are admitted exclusively to the Helios FKH due to legal requirements, so that we can make representative statements for the care region: We can make specific statements about the impact of the COVID-19 pandemic on the frequency of suicide attempts in this defined rural region (hypothesis #4) and we can make representative statements about epidemiologic and clinical factors (hypotheses #1 through #3).

In contrast with studies that depend on the willingness of volunteers to participate, a retrospective study design permits the formulation of statements about patients with exclusion criteria (e.g., acute psychosis, acute intoxication or withdrawal symptoms, diagnosed mental disability, language barriers, lack of insight or cognitive disorders).

5.8 Limitations

This study must also be considered with limitations. Although our sample was large, it was drawn from a single psychiatric hospital in Germany, which may limit the generalizability of our findings to other regions.

Although the number of inpatient admissions of patients after a suicide attempt allows significant conclusions to be drawn about suicidality, it cannot represent the entire spectrum in a region; there are limitations, particularly in the case of those who have died by suicide. The lower inpatient treatment rate of older suicidal patients is also important for the description of the population. Important findings on the use of inpatient treatment can be derived from this, although there are methodological limitations for representative statements on very old subgroups.

LCA is a powerful statistical method. However, it has its limitations. LCA assigns individuals to classes based on the probability of them belonging to a class, considering the pattern of their values for the indicator variables (283). There is no guarantee of correct class assignment. In addition, because the assignment of classes is based on probabilities, it is not possible to determine the exact number or percentage of sample members in each class (30). In addition, LCA relies on extensive factor selection; variable selection may influence class formation. By their nature, retrospective studies cannot capture all the necessary parameters, especially not in the complexity postulated by the IMV of suicidality emergence.

With regard to the time series analysis of the effects of the coronavirus pandemic, it is unclear whether the patients in question were solely treated in the emergency room of a non-psychiatric hospital following a suicide attempt without being referred to psychiatry for further treatment. This would be at odds with pre-pandemic experience, where it was standard practice for almost all patients to be referred to a psychiatric hospital for further assessment of suicide risk. The long-term consequences of the pandemic and the associated interventions may have an impact on future suicidal behavior, which should be investigated and interpreted in further studies.

In addition, we were only able to include people who had sought help for a severe suicidal crisis or who had been referred by others. A further limitation to this research is that, particularly during the pandemic, there is a dearth of data concerning the extent to which individ-

uals experiencing suicidal crises were instead supported by outpatient services or counselling centres. Similarly, the initial treatment of patients following suicide attempts is unclear, with no clear evidence as to whether these individuals were referred to psychiatrists for further treatment or not. These assumptions are in marked contrast to pre-pandemic practice, where it was standard practice for almost all patients to be referred to a psychiatric hospital for further assessment of suicide risk.

It is known that suicidal ideation and behavior vary greatly even over short periods of time (403,404). Given the dynamic nature of suicidal crises, the limitations of retrospective studies on risk factors in suicidal crises also become clear. We have tried to focus on acute suicidal crises by limiting the definition of suicide attempt. Nevertheless, ambiguities remain regarding the patient's stated motives for the suicide attempt or suicidal crisis. The declaration of a suicidal crisis may also include motives other than seeking therapeutic help. It is also possible that people exaggerate the severity of their depressive symptoms (358), are overly aggressive or withhold important information, such as previous suicide attempts, for reasons of stigmatization or fear of negative consequences. Information about the inner mental state remains subjective and can only be objectified to a limited extent.

6 Conclusion

In this comprehensive study of suicidality and its complex determinants, we thoroughly investigated a pressing social problem. We took an in-depth look at the experiences of 938 people who were admitted to a psychiatric hospital in a rural region of Germany between 2017 and 2018. Through careful research and analysis, we have uncovered profiles of these patient groups at various levels and discovered characteristics that at least challenge conventional categorizations. The complete study of a well-defined population allows us to derive generalizations for psychiatric inpatients and predominantly rural areas.

Central to our findings is the identification of three discrete latent classes within our study population that transcend conventional demographic distinctions. In addition to cohorts affected by mental illness, we identified cohorts composed of isolated older people and young people struggling primarily with interpersonal conflict. This finding has profound implications for the design of suicide prevention and intervention strategies and underscores the urgent need to recognize and address the diversity of populations at risk.

Our study also examined the impact of the unprecedented COVID-19 pandemic on suicidality, revealing remarkable seasonal and age-specific patterns. These observations highlight the dynamic interplay between external crises and mental health outcomes and underscore the need for adaptive support mechanisms in exceptional circumstances.

We also explored the paradoxical relationship between symptom burden and clinical treatment and emphasized the importance of early intervention for individuals with prominent psychiatric symptoms. However, we challenged conventional assumptions by demonstrating that individuals with lower symptom burden may still be suicidal, highlighting the need for comprehensive assessment and support.

Examination of regional disparities and socioeconomic factors deepened our understanding of mental health inequalities. Nuanced regional differences were identified, the underlying factors underscore the need for equitable access to suicide prevention services.

Particular attention was paid to the apparent underreporting of the important risk factor of a previous suicide attempt by patients on admission. We discuss possible motives and make suggestions for better assessment.

In summary, this dissertation improves our understanding of the complex web of suicidality. It highlights the need for personalized assessment, adaptive interventions, and targeted support mechanisms that consider the remarkable diversity within the at-risk population.

By uncovering latent classes, describing pandemic effects, and examining the interplay between symptoms and treatment, this research contributes to the ongoing discourse on suicide prevention. It paves the way for more effective strategies.

These findings serve as a foundation for future research and underscore the urgency of addressing the multifaceted nature of suicidality. We recommend testing our findings with additional populations in the future. We conclude this dissertation with a strong call for further research in the area of suicidality. We hope that the knowledge gained here will help to provide better individualized support to people in suicidal crisis at an early stage.

7 Abstract in Croatian Language

Klasifikacija pacijenata sa suicidalnim ideacijama i suicidalnim pokušajima u ruralnoj regiji u Njemačkoj primjenom latentne klasterske analize: Što čini razliku?

Uvod: Regionalne karakteristike važna su obilježja istraživanja suicidalnosti, ali čimbenici koji su u pozadini regionalnih razlika često nisu dovoljno razumljivi. Stoga je na uzorku psihijatrijskih pacijenata provedena latentna klasterska analiza s ciljem utvrđivanja grupa klastera koji karakteriziraju pacijente sa suicidalnim ideacijama i pacijente sa suicidalnim pokušajima.

Metode: Analizirana je medicinska dokumentacija 1080 pacijenata koji su, prema DSM-5 kriterijima, zadovoljavali kriterije za suicidalne pokušaje (n = 339), a prema C-SSRS kriterijima za suicidalne ideje (n = 741) u razdoblju od 1. siječnja 2017. do 31. prosinca 2018. godine. Pacijenti su bili stanovnici ruralne regije u Njemačkoj. Primjenom LCA na ukupnom uzorku pacijenti su stratificirani prema pokušajima samoubojstva, suicidalnim idejama, dobi, spolu i regionalnoj pripadnosti.

Rezultati: Unutar cjelokupne populacije identificirane su tri primarne klase: mladi neoženjeni muškarci s međuljudskim sukobima, umirovljenici s tjelesnim bolestima i osobe u srednjoj životnoj dobi sa simptomima depresije. Niti jedna klasa nije identificirana kao dominantna s obzirom na pripadnost podregijama. Dostupnost pružatelja zdravstvenih usluga identificirana je kao pokazatelj regionalnih karakteristika. Nisu pronađene razlike u ukupnom broju pokušaja samoubojstva tijekom pandemije COVID-19 u usporedbi s godinama prije pandemije.

Zaključci: Rezultati ukazuju da su dob, spol, akutni ili životni stresni događaji jače povezani s rizikom prijelaza u suicidalno ponašanje nego regionalno porijeklo. Utvrđena klasifikacija suicidalnih psihijatrijskih bolesnika ukazuje na potrebu za specifičnom procjenom rizika kod ranjivih skupina. Utjecaju nepredvidljivih vanjskih događaja treba posvetiti više pozornosti u prevenciji suicidalnosti.

8 Abstract and Title

Classification of patients with suicidal ideation and suicide attempts in a rural region in Germany by latent cluster analysis: What makes the difference?

Background: Regional characteristics are an important determinant of suicidality, but the underlying factors are often poorly understood for specific regions. Therefore, we performed a latent class analysis (LCA) on a psychiatric inpatient collective to examine different classes of suicide attempters (SA) and suicide ideators (SI).

Methods: We included 1080 patient records according to DSM-5 criteria for suicidal behavior (n = 339) and C-SSRS criteria for suicidal ideation (n = 741) between January 1, 2017, and December 31, 2018. The patients were admitted in a predominantly rural region in Germany. We applied LCAs in the whole group and stratified by SA, SI, age, gender, and region.

Results: Three primary classes were identifiable within the whole population: young single men with interpersonal conflicts, physically ill retirees, and middle-aged individuals experiencing depressive symptoms. We were unable to identify any particular class as dominant in the subregions. We found indications of regional characteristics, such as the availability of healthcare providers. Differences in the total number of suicide attempts or their trends during the COVID-19 pandemic compared to the years before have not been found.

Conclusions: The results suggest that age, gender, and acute stressful or lifetime events are more strongly associated with the risk of transition to suicidal behavior than regional origin. The present classification of suicidal psychiatric inpatients underlines the need for specific risk assessment of vulnerable risk groups. More attention needs to be paid to the influence of temporal events in the prevention of suicidality.

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10.3.1 Descriptive Analysis

Table S 1
Descriptive statistics of clinical variables, difference by gender, all cases (SIC, n = 1,080)

		Gender				Total		Statistics		
		Male n = 576		Female n = 504		n = 1,080				
		N	%		%	N	%	χ^2	df	p
NSSI	yes	35_a	6,1%	**86_b**	**17,1%**	121	11,2%	32,617	1	<,001
Schizo*	yes	57_a	9,9%	34_a	6,7%	91	8,4%	3,456	1	,063
Depr*	yes	260_a	45,1%	**337_b**	**66,9%**	597	55,3%	51,324	1	<,001
Addic*	yes	**201_a**	**34,9%**	106_b	21,0%	307	28,4%	25,395	1	<,001
PD*	yes	41_a	7,1%	42_a	8,3%	83	7,7%	,560	1	,454
AdD*	yes	**74_a**	**12,8%**	20_b	4,0%	94	8,7%	26,668	1	<,001
Personality	Yes	34_a	5,9%	**64_b**	**12,7%**	98	9,1%	22,695	3	<,001
disorder	Suspect	30_a	5,2%	**45_b**	**8,9%**	75	6,9%			
	Unclear	5_a	0,9%	3_a	0,6%	8	0,7%			
PTSD	Yes	13_a	2,3%	**38_b**	**7,5%**	51	4,7%	20,274	3	<,001
	Suspect	4_a	0,7%	9_a	1,8%	13	1,2%			
	Unclear	1_a	0,2%	2_a	0,4%	3	0,3%			
Pretreat-	Specialist	74_a	12,8%	54_a	10,7%	128	11,9%	5,239	3	,155
ment	PIA	73_a	12,7%	82_a	16,3%	155	14,4%			
	GP and Psychotherapist	10_a	1,7%	5_a	1,0%	15	1,4%			
	Only GP	419_a	72,7%	363_a	72,0%	782	72,4%			
Admission	Emergency	**377_a**	**65,9%**	279_b	56,0%	656	61,3%	15,008	3	,002
Type	Regular	97_a	17,0%	88_a	17,7%	185	17,3%			
	Transfer from ext. Hospital	96_a	16,8%	**127_b**	**25,5%**	223	20,8%			
	Return from ext. Hospital	2_a	0,3%	4_a	0,8%	6	0,6%			
Legal status	Voluntary	419_a	72,7%	**408_b**	**81,0%**	827	76,6%	13,694	4	0,008
	Thür PsychKG	**138_a**	**24,0%**	87_b	17,3%	225	20,8%			
	BGB	3_a	0,5%	0_a	0,0%	3	0,3%			
	Prisoner	3_a	0,5%	0_a	0,0%	3	0,3%			

*Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of gender categories whose column proportions do not differ significantly from each other at the ,05 level. * Main diagnosis*

Table S 2
Admission type grouped by sub-region (SIC, n = 1,080)

	Admission type								Statistics		
	Emergency n = 656		Regular n = 185		Ext. hospital n = 223		Total* n = 1064				
	N	%	N	%	N	%	N	%	χ^2	df	p
North. Bavaria	25_a	3,8%	12_a	6,5%	13_a	5,8%	50	4,7%	15,451	18	.631
Hildburghausen	124_a	18,9%	32_a	17,3%	41_a	18,4%	197	18,5%	No differences		
Ilm District	91_a	13,9%	26_a	14,1%	32_a	14,3%	149	14,0%			
Meiningen	150_a	22,9%	54_a	29,2%	50_a	22,4%	254	23,9%			
Sonneberg	131_a	20,0%	35_a	18,9%	50_a	22,4%	216	20,3%			
City of Suhl	99_a	15,1%	16_a	8,6%	27_a	12,1%	142	13,3%			
Other regions	36_a	5,5%	10_a	5,4%	10_a	4,5%	56	5,3%			

*Note. Each subscript letter denotes a subset of admission type categories whose column proportions do not differ significantly from each other at the ,05 level. *Missings: no documented information in 16 cases.*

Table S 3
Gender grouped by URT (IEA, n = 938)

	Gender								
	Male		Female		Total		Statistics		
Inhabitants	N	%	N	%	N	%	χ^2	df	p
Under 1.500	17_a	3,4%	18_a	4,1%	35	3,7%	$2,593^a$	4	,628
1.500 to 3.000	70_a	14,2%	77_a	17,3%	147	15,7%			
3.000 to 10.000	102_a	20,6%	94_a	21,2%	196	20,9%			
10.000 to 30.000	179_a	36,2%	153_a	34,5%	332	35,4%			
Over 30.000	126_a	25,5%	102_a	23,0%	228	24,3%			
Total	494	100,0%	444	100,0%	938	100,0%			

Note. Each subscript letter denotes a subset of gender categories whose column proportions do not differ significantly from each other at the ,05 level.

Table S 4
Suicidality grouped by URT (IEA, n = 938)

	Suicidality								
	SA (n = 296)		SI (n = 642)		Total		Statistics		
Inhabitants	N	%	N	%	N	%	χ^2	df	p
Under 1.500	15_a	5,1%	20_a	3,1%	35	3,7%	$4,237^a$	4	,375
1.500 to 3.000	46_a	15,5%	101_a	15,7%	147	15,7%			
3.000 to 10.000	60_a	20,3%	136_a	21,2%	196	20,9%			
10.000 to 30.000	96_a	32,4%	236_a	36,8%	332	35,4%			
Over 30.000	79_a	26,7%	149_a	23,2%	228	24,3%			
Total	296	100,0%	642	100,0%	938	100,0%			

Note. Each subscript letter denotes a subset of suicidality categories whose column proportions do not differ significantly from each other at the ,05 level.

Table S 5
Schizophrenia grouped by URT (IEA, n = 938)

	Schizophrenia								
	yes		no		Total		Statistics		
Inhabitants	N	%	N	%	N	%	χ^2	df	p
Under 1.500	5_a	6,8%	30_a	3,5%	35	3,7%	3,601[a]	4	,463
1.500 to 3.000	10_a	13,5%	137_a	15,9%	147	15,7%			
3.000 to 10.000	12_a	16,2%	184_a	21,3%	196	20,9%			
10.000 to 30.000	26_a	35,1%	306_a	35,4%	332	35,4%			
Over 30.000	21_a	28,4%	207_a	24,0%	228	24,3%			
Total	74	100,0%	864	100,0%	938	100,0%			

Note. Each subscript letter denotes a subset of URT categories whose proportions do not differ significantly from each other at the ,05 level.

Table S 6:
Adjustment Disorders (AdD) grouped by URT (IEA, n = 938)

	AdD								
	yes		no		Total		Statistics		
Inhabitants	N	%	N	%	N	%	χ^2	df	p
Under 1.500	3_a	3,3%	32_a	3,8%	35	3,7%	9,338[a]	4	,053
1.500 to 3.000	9_a	10,0%	138_a	16,3%	147	15,7%			
3.000 to 10.000	11_a	12,2%	185_b	21,8%	196	20,9%			
10.000 to 30.000	39_a	43,3%	293_a	34,6%	332	35,4%			
Over 30.000	28_a	31,1%	200_a	23,6%	228	24,3%			
Total	90	100,0%	848	100,0%	938	100,0%			

Note. Each subscript letter denotes a subset of URT categories whose proportions do not differ significantly from each other at the ,05 level.

Table S 7
Gender and number of readmissions

	Gender								
	Male (n = 494)		Female (n = 444)		Total		Statistics		
	N	%	N	%	N	%	χ^2	df	p
First admission	221	44,7%	198	44,6%	419	44,7%	0,817	6	0,992
1 readmission	88	17,8%	87	19,6%	175	18,7%			
3-5 readmissions	96	19,4%	82	18,5%	178	19,0%			
6-10 readmissions	49	9,9%	43	9,7%	92	9,8%			
11-15 readmissions	17	3,4%	14	3,2%	31	3,3%			
16-20 readmissions	12	2,4%	9	2,0%	21	2,2%			
Over 20 readmissions	11	2,2%	11	2,5%	22	2,3%			

Note. Admissions by suicidal crisis at Helios FKH as inpatient.

Table S 8
Descriptive statistics of demographic variables by suicide-types

		SA-Types						Total (n = 443)		Statistics		
		SSA (n = 324)		SRA (n = 103)		MSA (n = 16)						
		N	%		%			N	%	χ^2	df	p
Gender	male	167_a	51,5%	52_a	50,5%	9_a	56,3%	228	51,5%	,187	2	,911
	female	157_a	48,5%	51_a	49,5%	7_a	43,8%	215	48,5%	no significant diff.		
Age class	10 to 19 years	22_a	6,8%	8_a	7,8%	1_a	6,3%	31	7,0%	22,038	16	,142
	20 to 29 years	79_a	24,4%	19_a	18,4%	0_a	0,0%	98	22,1%	no significant diff.		
	30 to 39 years	52_a	16,0%	16_a	15,5%	6_a	37,5%	74	16,7%			
	40 to 49 years	47_a	14,5%	20_a	19,4%	5_a	31,3%	72	16,3%			
	50 to 59 years	54_a	16,7%	22_a	21,4%	1_a	6,3%	77	17,4%			
	60 to 69 years	28_a	8,6%	7_a	6,8%	2_a	12,5%	37	8,4%			
	70 to 79 years	23_a	7,1%	10_a	9,7%	0_a	0,0%	33	7,4%			
	80 to 89 years	15_a	4,6%	1_a	1,0%	1_a	6,3%	17	3,8%			
	> 90 years	4_a	1,2%	0_a	0,0%	0_a	0,0%	4	0,9%			
Region	North. Bavaria	24_a	7,4%	4_a	3,9%	1_a	6,3%	29	6,5%	16,145	12	,185
	Hildburghausen	69_a	21,3%	12_a	11,7%	3_a	18,8%	84	19,0%	no significant diff.		
	Ilm-District	46_a	14,2%	16_a	15,5%	1_a	6,3%	63	14,2%			
	Meiningen	72_a	22,2%	33_a	32,0%	2_a	12,5%	107	24,2%			
	Sonneberg	56_a	17,3%	24_a	23,3%	4_a	25,0%	84	19,0%			
	City of Suhl	49_a	15,1%	10_a	9,7%	4_a	25,0%	63	14,2%			
	Other region	8_a	2,5%	4_a	3,9%	1_a	6,3%	13	2,9%			
	Yes	292	90,1%	**98**	**95,1%**	16	100,0%	406	91,6%	13,052	4	,011

German nation-ality	No	**32**	**9,9%**	3	2,9%	0	0,0%	35	7,9%			
Marital status	Never married	157_a	48,5%	54_a	52,4%	8_a	50,0%	219	49,4%	3,991	12	,984
	Married	87_a	26,9%	25_a	24,3%	4_a	25,0%	116	26,2%	no significant diff.		
	Widowed	22_a	6,8%	5_a	4,9%	1_a	6,3%	28	6,3%			
	Divorced	31_a	9,6%	12_a	11,7%	1_a	6,3%	44	9,9%			
	Divorced and remarried	8_a	2,5%	3_a	2,9%	1_a	6,3%	12	2,7%			
	Married and live apart	15_a	4,6%	4_a	3,9%	1_a	6,3%	20	4,5%			
	Unknown	4_a	1,2%	0_a	0,0%	0_a	0,0%	4	0,9%			
Employ-ment	Employed	93_a	28,7%	25_a	24,3%	3_a	18,8%	121	27,3%	11,151	10	,346
	Housewife or houseman	5_a	1,5%	2_a	1,9%	0_a	0,0%	7	1,6%	no significant diff.		
	Pension	105_a	32,4%	40_a	38,8%	5_a	31,3%	150	33,9%			
	Unemployed	73_a	22,5%	19_a	18,4%	5_a	31,3%	97	21,9%			
	In training	29_a	9,0%	6_a	5,8%	0_a	0,0%	35	7,9%			
	Unknown	19_a	5,9%	11_a	10,7%	3_a	18,8%	33	7,4%			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of suicide-type categories whose column proportions do not differ significantly from each other at the ,05 level.

Table S 9

Descriptive statistics of SLE categories by suicide-types, population P938

	SA-Types						Total (n = 443)		Statistics		
	SSA (n = 324)		SRA (n = 103)		MSA (n = 16)						
	N	%		%			N	%	χ^2	df	p
Severe illness	76_a	23,5%	33_a	32,0%	5_a	31,3%	114	25,7%	$3,276^a$	2	,194
Personal Loss	36_a	11,1%	8_a	7,8%	1_a	6,3%	45	10,2%	$1,235^a$	2	,539
Interpersonal conflict	164_a	50,6%	45_a	43,7%	6_a	37,5%	215	48,5%	$2,311^a$	2	,315
Financial crisis	33_a	10,2%	$18_{a,b}$	17,5%	4_b	25,0%	55	12,4%	$6,238_a$	2	,044
Interpersonal abuse	38_a	11,7%	11_a	10,7%	5_b	31,3%	54	12,2%	$5,714_a$	2	,057
Minor stressors	37_a	11,4%	13_a	12,6%	1_a	6,3%	51	11,5%	$,562^a$	2	,755
Refugees	32_a	9,9%	4_b	3,9%	$0_{a,b}$	0,0%	36	8,1%	$5,228_a$	2	,073

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of suicide-type categories whose column proportions do not differ significantly from each other at the ,05 level.

Table S 10

Differences between SSA, SRA, and MSA, Frequency and Percentage of psychopathological symptoms.

	SA-Types						Statistics		
	SSA (n = 367)		SRA (n = 140)		MSA (n = 35)				
	N	%		%	N	%	χ^2	df	p
Fear of physical illness	20_a	5,4%	9_a	6,4%	0_a	0,0%	2,307[a]	2	,316
Isolation /Loneliness	31_a	8,4%	10_a	7,1%	1_a	2,9%	1,494[a]	2	,474
Shame/Embarrassment	6_a	1,6%	3_a	2,1%	1_a	2,9%	,356[a]	2	,873
Realization of a severe mental illness	6	1,6%	3	2,1%	3	8,6%	47,106[a]	2	,029
Perspectivelessness/ hopelessness	71_a	19,3%	38_a	27,1%	6_a	17,1%	4,057[a]	2	,132
Burdensomeness	18_a	4,9%	8_a	5,7%	0_a	0,0%	2,031[a]	2	,362
Hallucination	68_a	18,5%	13_b	9,3%	$4_{a,b}$	11,4%	7,059[a]	2	,029
Depression	188_a	51,2%	70_a	50,0%	21_a	60,0%	1,149[a]	2	,563
Insomnia	95_a	25,9%	39_a	27,9%	5_a	14,3%	2,739[a]	2	,254
NSSI	44_a	12,0%	17_a	12,1%	7_a	20,0%	1,897[a]	2	,387
Long term drugs	29_a	7,9%	9_a	6,4%	3_a	8,6%	,369[a]	2	,832
Long term alcohol	26_a	7,1%	13_a	9,3%	7_a	20,0%	7,018[a]	2	,030

Note. Each subscript letter denotes a subset of suicide-type categories whose column proportions do not differ significantly from each other at the ,05 level.

10.3.2 Covariates Analysis

Table S 11

Covariate gender of subgroup SA n = 339 (SIC, n = 1,080)

	SA (n = 339)								
	Older n = 178		Younger n = 161		Total		Statistics		
	N	%	N	%			χ^2	df	p
Male	75_a	42,1%	**101_b**	**62,7%**	176	51,9%	14,368	2	<.001
Female	**103_a**	**57,9%**	60_b	37,3%	163	48,1%			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of class categories whose column proportions do not differ significantly from each other at the ,05 level.

Table S 12
Covariate age class of subgroup SA, n = 339 (SIC, n = 1,080)

	SA (n = 339)								
	Older n = 178		Younger n = 161		Total		Statistics		
	N	%	N	%			χ^2	df	p
under 20	0_a	0,0%	**26_b**	**16,1%**	26	7,7%	210,826	8	<.001
20-29	4_a	2,2%	**71_b**	**44,1%**	75	22,1%			
30-39	18_a	10,1%	**39_b**	**24,2%**	57	16,8%			
40-49	32_a	18,0%	22_a	13,7%	54	15,9%			
50-59	**48_a**	**27,0%**	3_b	1,9%	51	15,0%			
60-69	**27_a**	**15,2%**	0_b	0,0%	27	8,0%			
70-79	**30_a**	**16,9%**	0_b	0,0%	30	8,8%			
80-89	**16_a**	**9,0%**	0_b	0,0%	16	4,7%			
over 90	3_a	1,7%	0_a	0,0%	3	0,9%			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of class categories whose column proportions do not differ significantly from each other at the ,05 level.

Table S 13
Covariate nationality of subgroup SA, n = 339 (SIC, n = 1,080)

	SA (n = 339)								
	Older (n = 178)		Younger (n = 161)		Total		Statistics		
	N	%	N	%			χ^2	df	p
German	**177_a**	**99,4%**	130_b	80,7%	307	90,6%	34,555[a]	2	<.001
Non-German	1_a	0,6%	**31_b**	**19,3%**	32	9,4%			
Unknown	178	100,0%	161	100,0%	339	100,0%			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of class categories whose column proportions do not differ significantly from each other at the ,05 level.

Table S 14
Covariate gender of subgroup SI (n = 741)

	SI (n = 741)								
	Younger (n = 371)		Older (n = 370)		Total		Statistics		
	N	%	N	%			χ^2	df	p
Male	**229_a**	**61,7%**	171_b	46,2%	400	54,0%	17,937	2	<.001
Female	142_a	38,3%	**199_b**	**53,8%**	341	46,0%			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of class categories whose column proportions do not differ significantly from each other at the ,05 level.

Table S 15

Covariate age class, classes of subgroup SI (n = 741)

	SI (n = 741)								
	Younger (n = 371)		Older (n = 370)		Total		Statistics		
	N	%	N	%			χ^2	df	p
Under 20	**43_a**	**11,6%**	16_b	4,3%	59	8,0%	42,199[a]	8	<.001
20-29	**89_a**	**24,0%**	57_b	15,4%	146	19,7%			
30-39	78_a	21,0%	65_a	17,6%	143	19,3%			
40-49	56_a	15,1%	65_a	17,6%	121	16,3%			
50-59	62_a	16,7%	**85_b**	**23,0%**	147	19,8%			
60-69	33_a	8,9%	45_a	12,2%	78	10,5%			
70-79	5_a	1,3%	**19_b**	**5,1%**	24	3,2%			
80-89	4_a	1,1%	**15_b**	**4,1%**	19	2,6%			
Over 90	1_a	0,3%	3_a	0,8%	4	0,5%			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of class categories whose column proportions do not differ significantly from each other at the ,05 level.

Table S 16

Covariate nationality, subgroup SI, n = 741

	SI n = 741								
	Younger (n = 371)		Older (n = 370)		Total		Statistics		
	N	%	N	%			χ^2	df	p
German	345_a	93,0%	359_b	97,0%	704	95,0%	7,535[a]	2	,023
Non-German	23_a	6,2%	8_b	2,2%	31	4,2%			
Unknown	3_a	0,8%	3_a	0,8%	6	0,8%			

Note. Each subscript letter denotes a subset of class categories whose column proportions do not differ significantly from each other at the ,05 level.

Table S 17

Covariate region of subgroup SA, n = 339

	Suicide Attempters n = 339								
	Older (n = 178)		Younger (n = 161)		Total (n = 339)		Statistics		
	N	%	N	%			χ^2	df	p
North. Bavaria	11_a	55,0%	9_a	45,0%	20	100,0%	8,848	6	,182
Hildburghausen	40_a	62,5%	24_a	37,5%	64	100,0%			
Ilm District	29_a	56,9%	22_a	43,1%	51	100,0%			
Meiningen	32_a	47,1%	36_a	52,9%	68	100,0%			
Sonneberg	39_a	56,5%	30_a	43,5%	69	100,0%			
City of Suhl	23_a	42,6%	31_a	57,4%	54	100,0%			
other	4_a	30,8%	9_a	69,2%	13	100,0%			

Note. Each subscript letter denotes a subset of class categories whose column proportions do not differ significantly from each other at the ,05 level.

Table S 18

Covariate gender, entire population (SIC, n = 1,080)

	Entire population n = 1,080										
	Older n = 371		Young women n = 270		Young males n = 439		Total		Statistics		
	N	%	N	%	N	%			χ^2	df	p
Male	182_a	49,1%	100_b	37,0%	**294_c**	**67,0%**	576	53,3%	$64,338^a$	2	<.001
Females	189_a	50,9%	**170_b**	**63,0 %**	145_c	33,0%	504	46,7%			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of class categories whose column proportions do not differ significantly from each other at the ,05 level.

Table S 19

Covariate age class and region, entire population (SIC, n = 1,080)

	Entire population n = 1,080										
	Older n = 371		Young women n = 270		Young males n = 439		Total		Statistics		
	N	%	N	%	N	%			χ^2	df	p
Under 20	0_a	0,0%	**51_b**	**18,9%**	34_c	7,7%	85	7,9%	673,876	16	<,001
20-29	0_a	0,0%	**82_b**	**30,4%**	139_b	31,7%	221	20,5%			
30-39	8_a	2,2%	**83_b**	**30,7%**	109_b	24,8%	200	18,5%			
40-49	52_a	14,0%	30_a	11,1%	**93_b**	**21,2%**	175	16,2%			
50-59	**121_a**	**32,6%**	20_b	7,4%	57_c	13,0%	198	18,3%			
60-69	**95_a**	**25,6%**	3_b	1,1%	7_b	1,6%	105	9,7%			
70-79	**54_a**	**14,6%**	0_b	0,0%	0_b	0,0%	54	5,0%			
80-89	**34_a**	**9,2%**	1_b	0,4%	0_b	0,0%	35	3,2%			
Over 90	**7_a**	**1,9%**	0_b	0,0%	0_b	0,0%	7	0,6%			
North. Bavaria	20_a	29,4%	21_a	30,9%	27_a	39,7%	68	100,0%	$31,953^a$	12	,001
Hildburghausen	83_a	41,3%	46_a	22,9%	72_a	35,8%	201	100,0%			
Ilm-District	55_a	36,4%	26_a	17,2%	70_a	46,4%	151	100,0%			
Meiningen	**$91_{a,b}$**	**35,5%**	81_b	31,6%	84_a	32,8%	256	100,0%			
Sonneberg	67_a	30,6%	52_a	23,7%	100_a	45,7%	219	100,0%			
City of Suhl	50_a	34,5%	30_a	20,7%	65_a	44,8%	145	100,0%			
Other	5_a	12,5%	**14_b**	**35,0%**	**21_b**	**52,5%**	40	100,0%			
German	**368_a**	**99,2%**	248_b	91,9%	395_b	90,0%	1011	93,6%	$36,463^a$	2	<.001
Non-German	1_a	0,3%	19_b	7,0%	**43_b**	**9,8%**	63	5,8%			
unknown	2_a	0,5%	3_a	1,1%	1_a	0,2%	6	0,6%			
Total	371	100,0%	270	100,0%	439	100,0%	1080	100,0%			

Note. Bold font indicates statistical significance. Each subscript letter denotes a subset of class categories whose column proportions do not differ significantly from each other at the ,05 level.

Table S 20

Covariate region grouped by marital status for SI, n = 642

	SI n = 642										
	Married n = 150		Divorced n = 156		Younger n = 337		Total		Statistics		
	N	%	N	%	N	%			χ^2	df	p
North. Bavaria	10_a	22,2%	8_a	17,8%	27_a	60,0%	45	100,0%	6,662	12	.879
Hildburghausen	28_a	23,5%	33_a	27,7%	58_a	48,7%	119	100,0%			
Ilm District	20_a	24,1%	20_a	24,1%	43_a	51,8%	83	100,0%			
Meiningen	41_a	24,6%	40_a	24,0%	86_a	51,5%	167	100,0%			
Sonneberg	34_a	27,0%	28_a	22,2%	64_a	50,8%	126	100,0%			
City of Suhl	15_a	19,0%	22_a	27,8%	42_a	53,2%	79	100,0%			
Other	3_a	12,5%	5_a	20,8%	16_a	66,7%	24	100,0%			

Note. Each subscript letter denotes a subset of class categories whose column proportions do not differ significantly from each other at the ,05 level.

Table S 21

Covariate nationality, subgroup SI, n = 642 (IEA, n = 938)

	SI n = 642										
	Married n = 150		Divorced n = 156		Younger n = 337		Total		Statistics		
	N	%	N	%	N	%			χ^2	df	p
German	147_a	98,0%	153_a	98,1%	313_a	92,9%	613	95,3%	10,608	4	.031
Non-German	$3_{a, b}$	2,0%	2_b	1,3%	22_a	6,5%	27	4,2%			
Unknown	0_a	0,0%	1_a	0,6%	2_a	0,6%	3	0,5%			

Note. Each subscript letter denotes a subset of class categories whose column proportions do not differ significantly from each other at the ,05 level.

Table S 22

Covariate region, subgroup SI, n = 741 (SIC, n = 1,080)

	SI n = 741								
	Younger n = 371		Older n = 370		Total		Statistics		
	N	%	N	%			χ^2	df	p
North. Bavaria	24_a	50,0%	24_a	50,0%	48	100,0%	$4,186^a$	6	,651
Hildburghausen	65_a	47,4%	72_a	52,6%	137	100,0%			
Ilm District	50_a	50,0%	50_a	50,0%	100	100,0%			
Meiningen	91_a	48,4%	97_a	51,6%	192	100,0%			
Sonneberg	72_a	48,0%	78_a	52,0%	150	100,0%			
City of Suhl	53_a	58,2%	38_a	41,8%	91	100,0%			
Other	16_a	59,3%	11_a	40,7%	54	100,0%			

Note. Each subscript letter denotes a subset of class categories whose column proportions do not differ significantly from each other at the ,05 level.

10.3.3 Interrupted Time Series COVID-19

Table S 23
Results of the interrupted time-series Poisson regression for the whole group modeling COVID-19 pandemic, trend, as well as the interaction between COVID-19 pandemic and trend

	Estimate	StdErr	z	p	2·50%	97·50%
(Intercept)	3.043	0.45	6.758	0.000	2.161	3.926
COVID-19 pandemic	-0.406	0.459	-0.886	0.376	-1.306	0.493
Trend	-0.008	0.009	-0.924	0.356	-0.026	0.009
Interaction of COVID-19 pandemic and trend	0.006	0.010	0.606	0.544	-0.013	0.025

Table S 24
Results of the interrupted time-series Poisson regression for the whole group modeling COVID-19 pandemic, seasonality as well as the interaction between COVID-19 pandemic and seasonality

	Estimate	StdErr	z	p	2·50%	97·50%
(Intercept)	2.529	0·08	31·798	0.000	2.373	2.685
COVID-19 pandemic	0·106	0·098	1·075	0·283	-0.087	0.298
Seasonality	0·08	0·041	1·939	0·052	-0.001	0.161
Interaction of COVID-19 pandemic and seasonality	-0·115	0·051	-2·239	0·025	-0.216	-0.014

Table S 25
Results of the interrupted time-series Poisson regression for the older adults modeling COVID-19 pandemic, trend, as well as the interaction between COVID-19 pandemic and trend

Aged > 55 years	Estimate	StdErr	z	p	2·50%	97·50%
(Intercept)	0.413	0.763	0.541	0.588	-1.082	1.908
COVID-19 pandemic	0.837	0.781	1.071	0.284	-0.694	2.368
Trend	0.024	0.015	1.62	0.105	-0.005	0.054
Interaction of COVID-19 pandemic and trend	-0.013	0.017	-0.81	0.418	-0.046	0.019

Table S 26
Results of the interrupted time-series Poisson regression for the older adults modeling COVID-19 pandemic, seasonality as well as the interaction of COVID-19 pandemic and seasonality

Aged > 55 years	Estimate	StdErr	z	p	2·50%	97·50%
(Intercept)	1.522	0.132	11.555	0.000	1.264	1.78
COVID-19 pandemic	-0.030	0.167	-0.182	0.855	-0.358	0.297
Seasonality	0.083	0.068	1.222	0.222	-0.05	0.217
Interaction of COVID-19 pandemic and seasonality	-0.102	0.087	-1.168	0.243	-0.273	0.069

Table S 27

Results of the interrupted time-series Poisson regression for younger adults modeling COVID-19 pandemic, trend, as well as the interaction between COVID-19 pandemic and trend

Aged 18-35 years	Estimate	StdErr	z	p	2·50%	97·50%
(Intercept)	3.200	0.743	4.304	0.000	1.743	4.657
COVID-19 pandemic	-1.410	0.757	-1.863	0.062	-2.892	0.073
Trend	-0.034	0.015	-2.189	0.029	-0.064	-0.004
Interaction of COVID-19 pandemic and trend	0.026	0.017	1.561	0.119	-0.007	0.059

Table S 28

Results of the interrupted time-series Poisson regression for younger adults Modelling COVID-19 pandemic, seasonality as well as the interaction of COVID-19 pandemic and seasonality

Aged 18-35 years	Estimate	StdErr	z	p	2·50%	97·50%
(Intercept)	1.396	0.143	9.746	0.000	1.115	1.677
COVID-19 pandemic	0.311	0.17	1.832	0.067	-0.022	0.644
Seasonality	0.128	0.073	1.739	0.082	-0.016	0.272
Interaction of COVID-19 pandemic and seasonality	-0.178	0.088	-2.022	0.043	-0.351	-0.005

Table S 29

Results of the interrupted time-series Poisson regression for middle-aged adults modeling COVID-19 pandemic, trend, as well as the interaction between COVID-19 pandemic and trend

Aged 35-55 years	Estimate	StdErr	z	p	2·50%	97·50%
(Intercept)	2.319	0.816	2.841	0.004	0.719	3.919
COVID-19 pandemic	-0.822	0.832	-0.988	0.323	-2.451	0.808
Trend	-0.019	0.017	-1.144	0.253	-0.052	0.014
Interaction of COVID-19 pandemic and trend	0.015	0.018	0.841	0.400	-0.02	0.051

Table S 30

Results of the interrupted time-series Poisson regression for middle-aged adults modeling COVID-19 pandemic, seasonality, as well as the interaction of COVID-19 pandemic and seasonality

Aged 35-55 years	Estimate	StdErr	z	p	2·50%	97·50%
(Intercept)	1.358	0.139	9.749	0.000	1.085	1.631
COVID-19 pandemic	0.064	0.176	0.366	0.714	-0.28	0.409
Seasonality	0.024	0.073	0.324	0.746	-0.12	0.167
Interaction of COVID-19 pandemic and seasonality	-0.022	0.093	-0.232	0.816	-0.203	0.16

Table S 31

Results of the interrupted time-series Poisson regression modeling COVID-19 pandemic, trend,

age (younger and older adults) and the interaction between COVID-19 pandemic and trend as well as trend and age.

	Estimate	StdErr	z	p	2·50%	97·50%
(Intercept)	2.449	0.444	5.521	0.000	1.579	3.318
COVID-19 pandemic	-0.611	0.381	-1.605	0.109	-1.357	0.135
Trend	-0.018	0.009	-2.088	0.037	-0.035	-0.001
Age (younger and older adults)	-1.542	0.565	-2.731	0.006	-2.649	-0.436
Interaction of COVID-19 pandemic and trend	0.008	0.005	1.695	0.090	-0.001	0.017
Interaction of trend and age	0.025	0.008	2.934	0.003	0.008	0.041

Table S 32
Results of the interrupted time-series Poisson regression for males modeling COVID-19 pandemic trend, as well as the interaction between COVID-19 pandemic and trend.

Males	Estimate	StdErr	z	p	2·50%	97·50%
(Intercept)	2.94	0.596	4.933	0.000	1.772	4.109
COVID-19 pandemic	-1.016	0.609	-1.669	0.095	-2.209	0.177
Trend	-0.018	0.012	-1.484	0.138	-0.041	0.006
Interaction of COVID-19 pandemic and trend	0.019	0.013	1.435	0.151	-0.007	0.044

Table S 33
Results of the interrupted time-series Poisson regression for males modeling COVID-19 pandemic, seasonality, as well as the interaction of COVID-19 pandemic and seasonality

Males	Estimate	StdErr	z	p	2·50%	97·50%
(Intercept)	1.909	0.11	17.338	0.000	1.693	2.125
COVID-19 pandemic	0.105	0.135	0.78	0.435	-0.159	0.37
Seasonality	0.114	0.057	2.012	0.044	0.003	0.225
Interaction of COVID-19 pandemic and seasonality	-0.169	0.07	-2.411	0.016	-0.307	-0.032

Table S 34
Results of the interrupted time-series Poisson regression for females modeling COVID-19 pandemic trend, as well as the interaction between COVID-19 pandemic and trend

Females	Estimate	StdErr	z	p	2·50%	97·50%
(Intercept)	1.601	0.689	2.322	0.020	0.25	2.952
COVID-19 pandemic	0.365	0.701	0.521	0.602	-1.008	1.738
Trend	0.004	0.014	0.291	0.771	-0.023	0.03
Interaction of COVID-19 pandemic and trend	-0.01	0.015	-0.686	0.493	-0.039	0.019

Table S 35

Results of the interrupted time-series Poisson regression for females modeling COVID-19 pandemic, seasonality, as well as the interaction of COVID-19 pandemic and seasonality

Females	Estimate	StdErr	z	p	2·50%	97·50%
(Intercept)	1.752	0.115	15.222	0.000	1.527	1.978
COVID-19 pandemic	0.108	0.144	0.756	0.450	-0.173	0.39
Seasonality	0.039	0.060	0.643	0.520	-0.079	0.157
Interaction of COVID-19 pandemic and seasonality	-0.05	0.075	-0.668	0.504	-0.198	0.097

10.3.4 Material – C-SSRS, German Version 2009

COLUMBIA - BEURTEILUNGSSKALA

ZUR SUIZIDALITÄT

(C-SSRS)

Seit dem letzten Untersuchungstermin

Version 14.01.2009

Posner, K.; Brent, D.; Lucas, C.; Gould, M.; Stanley, B.; Brown, G.; Fisher, P.; Zelazny, J.; Burke, A.; Oquendo, M.; Mann, J.

Einschränkungsklausel:

Diese Beurteilungsskala ist für den Gebrauch durch in deren Anwendung ausgebildete Personen vorgesehen. Die in der Columbia - Beurteilungsskala zur Suizidalität (C-SSRS) enthaltenen Fragen sind Vorschläge. Über die Frage, ob tatsächlich Suizidgedanken oder suizidales Verhalten vorliegen, entscheidet letztlich das Urteil der Person, von der die Skala angewendet wird.

Die in dieser Skala verwendeten Definitionen suizidalen Verhaltens basieren auf jenen, die in ***The Columbia Suicide History Form*** *verwendet werden, entwickelt von John Mann, MD, und Maria Oquendo, MD, Conte Center for the Neuroscience of Mental Disorders (CCNMD), New York State Psychiatric Institute, 1051 Riverside Drive, New York, NY, 10032. (Oquendo M. A., Halberstam B. & Mann J. J., Risk factors for suicidal behavior: utility and limitations of research instruments. In M. B. First [Ed.]:* Standardized Evaluation in Clinical Practice, *pp. 103 -130, 2003.)*

Für Nachdrucke der C-SSRS wenden Sie sich bitte an Kelly Posner, Ph.D., New York State Psychiatric Institute, 1051 Riverside Drive, New York, New York, 10032; Kontakt für Anfragen und bei Schulungsbedarf: posnerk@nyspi.columbia.edu

C-SSRS-SinceLastVisit - Germany/German - Version of 23 Apr 14 - Mapi. - CSRA
ID7651 / C-SSRS-SinceLastVisit (Germany-German) 5.1.doc

SUIZIDGEDANKEN

Stellen Sie die Fragen 1 und 2. Wenn beide mit „Nein" beantwortet werden, machen Sie bitte mit dem Abschnitt „Suizidales Verhalten" weiter. Wenn Frage 1 mit „Ja" beantwortet wird, gehen Sie bitte weiter zum Abschnitt „Intensität der Suizidgedanken". Wenn Frage 2 mit „Ja" beantwortet wird, stellen Sie auch die Fragen 3, 4 und 5.

Seit dem letzten Untersuchungstermin

1. Wunsch, tot zu sein
Person hegt den Wunsch, tot oder nicht mehr am Leben zu sein, oder den Wunsch, einzuschlafen und nicht wieder aufzuwachen.
Haben Sie sich gewünscht, tot zu sein, oder den Wunsch gehabt, Sie könnten einschlafen und müssten nicht mehr aufwachen?
Ja ☐ Nein ☐

Wenn Ja, bitte beschreiben:

2. Unspezifische, aktive Suizidgedanken
Im Einschätzungszeitraum allgemeine, unspezifische Gedanken daran, seinem Leben ein Ende machen/Suizid begehen zu wollen (z. B. *„Ich habe daran gedacht, mich umzubringen"*), ohne Gedanken über die Art der Selbsttötung/damit zusammenhängende Methoden, Vorsatz oder Plan.
Haben Sie tatsächlich daran gedacht, sich umzubringen?
Ja ☐ Nein ☐

Wenn Ja, bitte beschreiben:

3. Aktive Suizidgedanken mit Überlegungen zur Methode (nicht zu einem Plan), aber ohne Vorsatz zu handeln
Person hegt Suizidgedanken und hat im Einschätzungszeitraum über mindestens eine Methode der Selbsttötung nachgedacht. Das (z. B. Gedanken über eine Methode der Selbsttötung, aber kein spezifischer Plan) ist etwas anderes als ein spezifischer Plan, in dem Zeit, Ort und Methode ausgearbeitet wurden. Dazu gehört z. B. jemand, der sagt: *„Ich dachte daran, eine Überdosis zu nehmen, habe aber noch nie einen genauen Plan gemacht, wann, wo oder wie ich das tatsächlich tun würde ... außerdem würde ich das nie durchziehen."*
Haben Sie darüber nachgedacht, wie Sie das tun könnten?
Ja ☐ Nein ☐

Wenn Ja, bitte beschreiben:

4. Aktive Suizidgedanken mit einem gewissen Vorsatz zu handeln, aber ohne spezifischen Plan
Aktive Suizidgedanken, und Person berichtet, dass sie einen gewissen Vorsatz habe, solche Gedanken in die Tat umzusetzen, im Gegensatz zu: *„Ich denke zwar daran, aber ich werde diese Gedanken ganz sicher nicht in die Tat umsetzen."*
Haben Sie solche Gedanken gehabt und eine gewisse Absicht, diese in die Tat umzusetzen?
Ja ☐ Nein ☐

Wenn Ja, bitte beschreiben:

5. Aktive Suizidgedanken mit spezifischem Plan und Vorsatz
Gedanken an Selbsttötung und detaillierter Plan, der ganz oder teilweise ausgearbeitet ist, und die Person hat einen gewissen Vorsatz, den Plan auszuführen.
Haben Sie die Einzelheiten, wie Sie sich töten wollen, angefangen auszuarbeiten oder bereits ausgearbeitet? Haben Sie vor, diesen Plan auszuführen?
Ja ☐ Nein ☐

Wenn Ja, bitte beschreiben:

INTENSITÄT DER SUIZIDGEDANKEN

Die folgenden Merkmale sollen für die stärkste Art von Suizidgedanken bewertet werden (d.h. 1 - 5 aus dem Abschnitt oben, wobei 1 am wenigsten stark und 5 am stärksten ist).

Am stärksten

Stärkster Suizidgedanke: _____ *Art Nr. (1-5)* _____ *Beschreibung des Suizidgedankens*

Häufigkeit
Wie oft hatten Sie diese Gedanken?
(1) Weniger als einmal pro Woche (2) Einmal pro Woche (3) 2-5-mal pro Woche (4) Täglich oder fast täglich (5) Jeden Tag viele Male
—

Dauer
Wenn Sie diese Gedanken haben, wie lange dauern sie an?
(1) Flüchtig - wenige Sekunden oder Minuten
(2) Weniger als 1 Stunde/eine Weile
(3) 1-4 Stunden/lange Zeit
(4) 4-8 Stunden/fast den ganzen Tag
(5) Mehr als 8 Stunden/durchgehend oder andauernd
—

Kontrollierbarkeit
Konnten/Können Sie aufhören, daran zu denken sich umzubringen oder sterben zu wollen, wenn Sie es wollten?
(1) Kann die Gedanken leicht kontrollieren
(2) Kann die Gedanken ohne große Schwierigkeiten kontrollieren
(3) Kann die Gedanken mit einigen Schwierigkeiten kontrollieren
(4) Kann die Gedanken mit großen Schwierigkeiten kontrollieren
(5) Kann die Gedanken nicht kontrollieren
(0) Versucht nicht, die Gedanken zu kontrollieren
—

Hinderungsgründe
Gibt es Personen oder Dinge (z. B. Familie, Religion, Schmerzen beim Sterben), die Sie davon abhielten, sterben zu wollen oder Selbstmordgedanken in die Tat umzusetzen?
(1) Das hat Sie ganz sicher davon abgehalten, sich das Leben zu nehmen
(2) Das hat Sie wahrscheinlich davon abgehalten
(3) Nicht sicher, ob Sie das abgehalten hat
(4) Das hat Sie höchstwahrscheinlich nicht davon abgehalten
(5) Das hat Sie ganz sicher nicht davon abgehalten
(0) Trifft nicht zu
—

Gründe für Suizidgedanken
Welche Art von Gründen hatten Sie, dass Sie daran dachten, sterben oder sich umbringen zu wollen? Wollten Sie Ihren Schmerzen oder der Art, wie Sie sich fühlten, ein Ende bereiten (mit anderen Worten: Sie konnten mit den Schmerzen oder so, wie Sie sich fühlten, nicht weiterleben), oder wollten Sie auf sich aufmerksam machen, sich rächen oder eine Reaktion von anderen Menschen bekommen? Oder beides?
(1) Ausschließlich, um auf sich aufmerksam zu machen, sich zu rächen oder eine Reaktion von anderen Menschen zu bekommen.
(2) Überwiegend, um auf sich aufmerksam zu machen, sich zu rächen oder eine Reaktion von anderen Menschen zu bekommen.
(3) Um auf sich aufmerksam zu machen, sich zu rächen oder eine Reaktion von anderen Menschen zu bekommen und in gleichem Maße, um die Schmerzen zu beenden.
(4) Überwiegend, um die Schmerzen zu beenden (Sie konnten mit den Schmerzen oder so, wie Sie sich fühlten, nicht weiterleben).
(5) Ausschließlich, um die Schmerzen zu beenden (Sie konnten mit den Schmerzen oder so, wie Sie sich fühlten, nicht weiterleben).
(0) Trifft nicht zu
—

SUIZIDALES VERHALTEN

(Kreuzen Sie alle zutreffenden Punkte an, solange es sich um separate Ereignisse handelt; gefragt werden muss nach allen Arten suizidalen Verhaltens)

Seit dem letzten Untersuchungstermin

Tatsächlicher Suizidversuch:
Eine potenziell selbstschädigende Handlung, die zumindest mit einem gewissen Wunsch durchgeführt wurde, *durch diese Handlung* zu sterben. Verhalten war zum Teil als Methode der Selbsttötung gedacht. Vorsatz muss nicht 100 % sein. Wenn mit der Handlung ***irgendein*** Vorsatz/Wunsch zu sterben verbunden war, kann sie als tatsächlicher Suizidversuch betrachtet werden. ***Es muss keine Verletzung oder körperlicher Schaden aufgetreten sein***, lediglich die Möglichkeit einer Verletzung oder eines körperlichen Schadens. Wenn die Person auf den Abzug drückt, während sie sich die Schusswaffe in den Mund hält, diese aber defekt ist und deshalb keine Verletzung verursacht, wird diese Handlung als Suizidversuch betrachtet.
Schluss auf einen Vorsatz: Selbst wenn das Individuum den Vorsatz/Wunsch zu sterben bestreitet, kann klinisch aus dem Verhalten oder den Umständen darauf geschlossen werden. Beispielsweise kann bei einer mit großer Wahrscheinlichkeit tödlich ausgehenden Handlung, die eindeutig kein Unfall ist, auf Suizid geschlossen werden (z. B. Schuss in den Kopf, Sprung aus einem in großer Höhe befindlichen Fenster). Auch wenn jemand den Vorsatz der Selbsttötung bestreitet, aber glaubt, dass seine Handlung hätte tödlich sein können, kann auf Vorsatz geschlossen werden.

Haben Sie einen Selbstmordversuch unternommen?
Haben Sie etwas unternommen, um sich zu verletzen?
Haben Sie irgendetwas Gefährliches getan, bei dem Sie hätten sterben können?
- ***Was haben Sie getan?***
- ***Haben Sie _____ als einen Weg gesehen, Ihr Leben zu beenden?***
- ***Hatten Sie (auch nur den leisen) Wunsch zu sterben, als Sie _____?***
- ***Versuchten Sie, Ihrem Leben ein Ende zu machen, als Sie _____?***
- ***Oder hielten Sie es für möglich, dass Sie hätten sterben können, als Sie____?***

Oder handelten Sie aus ganz anderen Gründen/ohne JEGLICHE Absicht, sich umzubringen (etwa um sich von Stress zu befreien, sich wohler zu fühlen, Mitleid zu erregen oder damit etwas anderes geschieht)? (Selbstschädigendes Verhalten ohne Vorsatz der Selbsttötung)
Wenn Ja, bitte beschreiben:

Ja Nein
☐ ☐

Anzahl Suizidversuche insgesamt
_____

Ja Nein
☐ ☐

Hat die Person nichtsuizidales selbstschädigendes Verhalten gezeigt?

Unterbrochener Suizidversuch:
Wenn die Person (durch einen äußeren Umstand) von der potenziell selbstschädigenden Handlung abgehalten wird *(wenn dies nicht geschehen wäre, hätte ein tatsächlicher Suizidversuch stattgefunden).* Überdosis: Person hat Tabletten in der Hand, wird aber davon abgehalten, sie einzunehmen. Sind die Tabletten bereits eingenommen, gilt dies als Suizidversuch und nicht als unterbrochener Suizidversuch. Schießen: Person hat die Schusswaffe auf sich gerichtet, die dann aber von jemandem weggenommen wird, oder Person wird irgendwie daran gehindert, den Abzug zu drücken. Hat die Person auf den Abzug gedrückt, auch wenn die Schusswaffe nicht losgeht, gilt dies als Suizidversuch. Springen: Person ist im Begriff zu springen, wird aber gepackt und vom Rand weggezogen. Erhängen: Person hat die Schlinge um den Hals, hat aber mit der Strangulierung noch nicht angefangen - wird daran gehindert.

Ja Nein
☐ ☐

Haben Sie schon einmal etwas unternommen, um Ihrem Leben ein Ende zu machen, aber jemand oder etwas hat Sie davon abgehalten, bevor Sie zur Tat geschritten sind?
Wenn Ja, bitte beschreiben:

Anzahl unterbrochener Suizidversuche insgesamt
_____

Abgebrochener Suizidversuch:
Wenn die Person Schritte zu einem Suizidversuch unternimmt, ihre Handlung aber einstellt, bevor sie selbstzerstörerisches Verhalten tatsächlich ins Werk setzt. Ähnliche Beispiele wie bei unterbrochenen Suizidversuchen, außer dass das Individuum den Versuch selbst abbricht und nicht durch etwas anderes davon abgehalten wird.

Ja Nein
☐ ☐

Haben Sie schon einmal etwas unternommen, um Ihrem Leben ein Ende zu machen, aber Sie haben den Versuch abgebrochen, bevor Sie zur Tat geschritten sind?
Wenn Ja, bitte beschreiben:

Anzahl abgebrochener Suizidversuche insgesamt
_____

Vorbereitende Handlungen oder vorbereitendes Verhalten:
Handlungen oder Vorbereitungen, die auf einen bevorstehenden Suizidversuch gerichtet sind. Dazu kann alles zählen, was über suizidale Äußerungen oder Gedanken hinausgeht, z. B. sich auf eine bestimmte Methode der Selbsttötung vorbereiten (z. B. Tabletten kaufen, sich eine Schusswaffe besorgen) oder Maßnahmen zur Vorbereitung seines Freitods treffen (z. B. Dinge weggeben, einen Abschiedsbrief schreiben).

Ja Nein
☐ ☐

Haben Sie Schritte unternommen, um einen Selbstmordversuch zu machen oder Vorbereitungen getroffen, sich umzubringen (z. B. Tabletten gesammelt, sich eine Schusswaffe besorgt, Wertsachen weggegeben oder einen Abschiedsbrief geschrieben)?
Wenn Ja, bitte beschreiben:

Suizid:

Ja Nein
☐ ☐

Beantwortung nur für tatsächliche Suizidversuche

Letalster Versuch Datum:

Tatsächliche Letalität/körperlicher Schaden:

Code eintragen

0. Kein körperlicher Schaden oder sehr geringer körperlicher Schaden (z. B. oberflächliche Schrammen).
1. Geringer körperlicher Schaden (z. B. lethargisches Sprechen, Verbrennungen ersten Grades, leichte Blutung, Verstauchungen).
2. Mäßiger körperlicher Schaden; medizinische Behandlung erforderlich (z. B. bei Bewusstsein, aber schläfrig, einigermaßen ansprechbar, Verbrennungen zweiten Grades, Blutung aus einem Hauptblutgefäß).
3. Mäßig schwerer körperlicher Schaden; Krankenhausaufenthalt und wahrscheinlich Intensivversorgung erforderlich (z. B. komatös bei erhaltenen Reflexen, Verbrennungen dritten Grades an weniger als 20 % des Körpers, beträchtlicher Blutverlust, der aber kompensiert werden kann, schwere Frakturen).
4. Schwerer körperlicher Schaden; Krankenhausaufenthalt mit Intensivversorgung erforderlich (z. B. komatös bei nicht erhaltenen Reflexen, Verbrennungen dritten Grades an über 20 % des Körpers, beträchtlicher Blutverlust und instabile Vitalfunktionen, schwere Verletzung an einem lebenswichtigen Organ).
5. Tod

_____

Potenzielle Letalität: Nur beantworten, wenn tatsächliche Letalität = 0

Code eintragen

Wahrscheinliche Letalität des tatsächlichen Suizidversuchs, wenn kein körperlicher Schaden entstanden ist (die folgenden Situationen bleiben zwar ohne medizinische Beeinträchtigung, haben aber das Potenzial, mit sehr großer Wahrscheinlichkeit zum Tode zu führen: Person steckt sich die Schusswaffe in den Mund und drückt auf den Abzug, aber die Waffe geht nicht los, sodass kein körperlicher Schaden entsteht; legt sich vor einem herannahenden Zug auf die Schienen, rollt sich aber weg, bevor sie überfahren wird).
0 = Verhalten führt wahrscheinlich nicht zu Verletzungen
1 = Verhalten führt wahrscheinlich zu Verletzungen, aber wahrscheinlich nicht zum Tod
2 = Verhalten führt wahrscheinlich trotz vorhandener medizinischer Versorgung zum Tod

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11 Biographical Note

Dr. med. Ulrich W. Kastner received his medical degree from the Friedrich-Alexander-University in Erlangen, Germany and completed his training as a specialist in psychiatry and psychotherapy at the Rheinische Kliniken in Bonn, Germany and as a specialist in psychosomatic medicine at the Clinic for Psychosomatic Medicine of the Steigerwaldklinik Burgebrach, Germany and the Helios Fachkliniken Hildburghausen, Germany.

He is a member of the Working Group on Suicidality at the University of Jena, the Network for Suicide Prevention in Thuringia, the National Suicide Prevention Program of Germany (NaSPro), the German Society for Psychiatry, Psychotherapy and Neurology (DGPPN), the German Society for Gerontopsychiatry and Gerontopsychotherapy (DGGPP), and the German Association for Suicide Prevention (DGS). He is interested in suicidality, personality disorders, NSSI, and psychotherapy of suicidal patients.

He is now the head physician of the Department of Psychiatry and Psychotherapy in Erlangen and Fuerth, Germany.