

**Educational Suicide Prevention in Secondary
Schools: The Evaluation of the HEYLiFE
Prevention Program**

DISSERTATION

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Dedication

A suicide attempt is often the action of a person who has lost hope. As if a spark inside them has grown smaller and smaller until it eventually dies out. But outside depression, hope is still alive. If only a small breach in the cloak of darkness could let new oxygen in, the spark of hope may reignite. It could shed light on all the things, on all the people that bring love, joy and colour into life. It could inspire the strength and wisdom to ask for help, pursue those things and make life better (again).

I hope that my work as a therapist and as a researcher can help, in a small way, to protect and nurture some of those sparks. I dedicate this work to every young person that is fighting out there. You are not alone.

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Statement on the Included Publications

This dissertation is based on previously submitted or published articles. Following articles are included in this dissertation:

Chapter 3

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Chapter 6

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These publications are currently not used in other dissertations, and as of now, there are no plans to use it in the future.

Summary

In the past decade, adolescents' mental well-being has significantly deteriorated, and suicide is the second-leading cause of death in numerous nations. Strategies to improve mental health and to prevent suicide in this age group are called for. School-based, educational prevention programs are among the most promising strategies for suicide prevention with adolescents. However, the research on their effectiveness and safety has encountered several challenges. Up to date, there is no shared theoretical model to guide program development and evaluation. Furthermore, the nature of the phenomenon of suicidality (relative rarity, lethality) poses difficulties in designing methodologically sound evaluation studies. Data on the differential effects of programs on different groups of young people are lacking. The *Network for Suicide Prevention in Dresden* (NeSuD) project was initiated to improve suicide prevention in the city of Dresden (Saxony, Germany). After a literature review on educational suicide prevention, this thesis presents the results of the evaluation of HEYLiFE, an educative suicide prevention program for secondary schools developed during this project.

First, this thesis aimed to contribute to the theoretical foundation of educational suicide prevention. A three-staged Delphi survey was conducted to explore important contents, target outcomes, and methods of effective and safe educational programs. The Delphi survey is a method that allows to assess expert opinions reliably, reducing unfavourable group decision processes. Participating experts suggested that, above reducing suicidal ideation and attempts, educational programs should aim to increase help-seeking intentions and behaviour, enhance the quality of social support between peers, improve mental health literacy and life-skills such as coping with stress, emotional regulation and problem solving. The experts also proposed to embed suicide prevention in educational programs with a larger scope, to facilitate help-seeking among the program participants and to establish suicide prevention measures on multiple levels in schools to enhance the safety of educational programs. The Delphi survey served as a significant base for researchers to develop school-based, educational suicide prevention programs.

Enhancing mental health literacy regarding depression and suicide has been one of the central strategies for educational programs in the last decades. However, the construct of mental health literacy has been discussed critically due to an unsharp definition and unreliable assessments. These problems caused study results to be tautological and confounded. To solve this problem, it is crucial to define and explore what constructs play a role in enabling people to achieve and maintain a good mental health. Although mental health knowledge is considered the core component of mental health literacy, there is a lack of comprehensive reviews on how it interacts with other constructs relevant to prevention. Through a systematic review, we explored the correlation between mental health knowledge, mental health-related stigma and help-seeking. The review showed that mental health knowledge had a medium-sized, negative correlation with personal stigma (Mdn $r = -.28$) and a medium-sized positive correlation with attitudes towards help-seeking (Mdn $r = .29$). The correlations to self-stigma (Mdn $r = -.18$), help-seeking intention (Mdn $r = .15$) and help-seeking behaviour (Mdn $r = .15$) were low. Public stigma was not consistently related to mental health knowledge. These findings contributed to a more profound understanding of the construct of mental health knowledge.

HEYLiFE, an educational suicide prevention program for secondary schools, was a key component of the NeSuD project. HEYLiFE's efficacy, safety, and acceptability were evaluated with a RCT with waiting-control-group with 745 secondary-school-students aged 12 or older. Outcomes were measured immediately after the intervention (short term) and after 6 months (mid term). We used linear mixed models (LMM) for analysing ordinal outcomes and generalized linear mixed models (GLMM) for binary outcomes, controlling for the nested nature of the data. The program led to an improvement of mental health knowledge and favourable attitudes towards suicidality in the short term. In the mid term, the intervention group showed a more favourable development for help-seeking intentions and risk-factors for suicidality (hopelessness, isolation, burdensomeness, sense of entrapment) from baseline to follow-up than the control group. The program had mixed effects on stigma, with a paradoxical increase in stigma (lower prosocial emotional reaction, higher wish for social distance) in the short term but a more favourable development in the intervention group regarding social distance at follow-up. The evaluation study suggested that the program was acceptable and safe. HEYLiFE is a promising intervention for suicide prevention among adolescents and young adults.

Moreover, this dissertation examines differential effects of HEYLiFE for gender, age, and risk status for suicide attempts. In the main evaluation study ($N = 745$), HEYLiFE had less favourable effects for males than for females on stigmatizing emotional responses to a suicidal peer in the short term and on wish for social distance and help-seeking behaviours in the mid term. Participants in the youngest age group (12-13 years) gained more knowledge than the older ones (14-16; 17+ years) in the mid term. However, they seemed to have stigmatizing emotional reactions to suicidal peers in the short term and did not profit as much in the mid term in terms of a reduction of risk factors. In a second study ($N = 218$, 14-18 years old), three suicide risk clusters were built using cluster analysis based on suicidality, depression, impulsivity/carelessness and emotional avoidance. We assessed the short time effects on suicide knowledge, agency, and help seeking intentions in case of suicidal thoughts. While knowledge improved in all groups, agency, and help seeking intentions only improved in the low and middle risk group. This study confirmed that HEYLiFE is an effective intervention for suicide prevention. Adolescents already suffering from suicidal ideation and behaviour, however, should receive more targeted interventions.

In summary, this thesis contributes to our understanding of school-based, educational suicide prevention and supports the use of interventions such as HEYLiFE to prevent suicidality among adolescents. Future research should explore how these interventions can be tailored for the needs of males, younger adolescents and adolescents at risk.

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List of Abbreviations

- ACT: Acknowledge, Care and Tell
- ADHD: Attentional Deficit and Hyperactivity Disorder
- AHSQ: Actual Help Seeking Questionnaire
- ASSIP: Attempted Suicide Short Intervention Program
- CAMS: Collaborative Assessment and Management of Suicidality
- CG: Control Group
- DBT: Dialectic-Behavioural Therapy
- ERMIS: Emotional Reactions to the Mental Ill Scale
- GHSQ: General Help Seeking Questionnaire
- GLMM: Generalized Linear Mixed Models
- IG: Intervention Group
- IMV: Integrated Motivational-Volitional Model of Suicide
- ISDELTBSB: International Study of Definitions of English-Language Terms for Suicidal Behaviors
- ITS: Interpersonal Theory of Suicide
- IQR: Inter-Quartile Range
- LGBTQ+: Lesbian, Gay, Bisexual, Transgender, Queer and more
- LMM: Linear Mixed Models
- MHFA: Mental Health First Aid
- MHL: Mental Health Literacy
- NeSuD: Network for Suicide Prevention in Dresden
- NHLBI: National Heart, Lung, and Blood Institute
- NSSI: Non-Suicidal Self-Injury
- PHQ: Patient Health Questionnaire
- PICOS: Population, Intervention, Comparison and Outcomes
- PRISMA: Preferred Reporting Items for Systematic reviews and Meta-Analyses
- PSS: Paykel's Suicide Scale
- ROAMER: Roadmap for Mental Health Research in Europe
- RCT: Randomized-Controlled Trial
- RFS: Risk Factors Scale
- SF: Short Form

SAE: Severe Adverse Events

SAVE: Suizidprävention an Schulen – Evaluation individuenzentrierter und gruppenbezogener Präventionsansätze

SDQ: Strengths and Difficulties Questionnaire

SDS: Social Distance Scale

SEYLE: Saving and Empowering Young Lives in Europe

SPSI-R: Social Problem-Solving Inventory-Revised

SOS: Signs of Suicide

SOSa: Signs of Suicide questionnaire, attitudes scale

SOSk: Signs of Suicide questionnaire, knowledge scale

T0: baseline assessment

T1: post assessment (immediately after the intervention)

T2: 6-9 months follow-up assessment

USE: Unwanted Side Effects.

WFI: Werner Felber Institute for Suicide Prevention and Interdisciplinary Research e. V.

WHO: World Health Organization

YAM: Youth Aware of Mental Health

Chapter 1 Introduction

“Sometimes even to live is an act of courage.”

Lucius Annaeus Seneca

1.1 Suicide Among Adolescents: A Global Health Issue

Every year, more than 703000 people worldwide die by suicide (World Health Organization, WHO, 2021c), with suicide causing one in every ten deaths worldwide (WHO, 2021a). For every person who dies by suicide, it is estimated that 10-40 attempt to take their life (Bertolote et al., 2006). The 12-month prevalence of reported suicide attempts in developed countries is 0.3%, and the lifetime cumulative incidence rate is 3.6%. The rates are similar for developed and developing countries (Borges et al., 2010; Pirkis et al., 2000). Suicide deeply affects families and communities. It has been repeatedly affirmed that an average of six people are emotionally affected when someone dies by suicide. Recent data showed that the emotional impact of suicide may be considerably even larger, with up to 135 people exposed to grieving that may need emotional support or mental health services after the loss (Cerel et al., 2019). The grief following a loss through suicide is particularly tragic. In addition to the normal grieving process, people left behind may experience strong feelings of guilt, rejection, anger, experience stigmatization through others or suffer from post-traumatic stress symptoms (Armstrong & Young, 2015; Tal Young et al., 2012). Suicidal behaviour and suicide deaths also cause high economical direct (medical care) and indirect costs (loss of productivity through disability or mortality) (Palmer et al., 1995). The average lifetime cost of each death by suicide in EU countries is around 2 million euros (McDaid et al., 2010). Suicide is clearly a major public health concern that must be addressed at a global, national, and regional level.

Adolescents and young adults are one of the primary target populations for suicide prevention globally (Pelkonen & Marttunen, 2003). Suicide is a leading cause of death for people in this age group in most examined countries (Glenn et al., 2020). In the European Union, suicide is the second or third most frequent cause of death for adolescents and young adults (World Health Organization, 2021b). The incidence of suicide thoughts and suicidal behaviour exponentially rises during adolescence (Cha et al., 2018). For instance, a representative survey in Canada described an average onset age for suicidal thoughts as low as 16.9 years (Thompson et al., 2012). Previous suicide attempts are one of the most recognized risk-factors of suicidal behaviour (Beghi & Rosenbaum, 2010; Chan et al., 2016); half of those who died by suicide had made at least one further suicide attempt in the past, often in their young years (Masango et al., 2008). Therefore, it seems crucial for prevention strategies to reach people at a young age to reduce overall suicide mortality.

According to the WHO Global Observatory, suicide rates have changed from 14.03 to 8.96 cases per 100 000 persons globally in the first two decades of the 21st century (2000-2019; Nosova et al., 2021; Ilic & Ilic, 2022). Most regions (Africa, South-East-Asia, Europe, Eastern Mediterranean, Western Pacific) saw this improvement, except for the North and South America (Nosova et al., 2021; Ilic & Ilic, 2022). In adolescents and young adults, suicide rates decreased in most European countries in this period, while they rose in North and South America and Australasia (Roh et al., 2018; Bertuccio et al., 2024). The reasons for these trends are the result of a complex interplay of societal and psychological factors, along with regional peculiarities. The raise of suicidality rates in some countries has been associated with economic (instability, poverty, unemployment, income inequality), societal (limited educational achievement, high divorce and birth rates, low female labour force participation, homelessness, gun laws, social media use) and public health factors (high alcohol and drugs consumption, rising rates of psychiatric disorders, medical prescription laws, limited access to medical care) (Ilic & Ilic, 2022; Bertuccio et al., 2024; Yip et al., 2021). Although the mechanisms are not completely clear, yet, research on protective factors suggested that the positive trends could result from economic growth coupled with improvements in the treatment of mental health problems (use of selective serotonin reuptake inhibitors and lithium) and suicide prevention measures (mean restriction, pesticide control, national prevention programs) (Kölves & Leo, 2016; Matsubayashi & Ueda, 2011; Ilic & Ilic, 2022; McLoughlin et al., 2015, Yip et al., 2021; Fountoulakis et al., 2014).

Since Covid-19 pandemic, however, children and adolescent's mental health has increasingly come into the focus of press and politics. Newest data show that the mental health of our youngest has deteriorated in the last few years so that researchers are talking of a "mental health crisis" in children and adolescents (McGorry et al., 2024). In the USA, for example, the trend of increased prevalence of serious mental health disorders in children and adolescents intensified since 2020 (Sorter et al., 2024; McGorry et al., 2024). A negative development of youth mental health since the Covid-19 pandemic has been observed in several European countries (Grzejszczak et al., 2024; Lass-Hennemann et al., 2023; Mucci et al.; 2023; Soriano et al., 2024). Experts assume that the co-occurrence of multiple crises (the Covid-19 pandemic, war in Ukraine, the climate crisis) may have contributed to create a climate of fear and pessimism and led to the deterioration of mental health in the young generations (Benton et al., 2024; McGorry et al., 2024). This "mental health crisis" has also been related to an increase in suicidal ideation and self-harm (Grzejszczak et al., 2024; Lu & Keyes, 2023). At this moment of time, prevention in the young generations seems to be more important than ever.

1.2 Suicide Prevention: From General Methods to School-Based Practice

Public awareness of the importance of suicide prevention has grown over the past few decades. Almost ten years ago, the WHO designated suicide prevention as one of the top goals on the global public health agenda (WHO, 2014). Since then, numerous countries have agreed to develop national suicide prevention strategies (Platt et al., 2019), which have proved effective in lowering suicide deaths overall and especially in individuals aged 25-64 years (Lewitzka et al., 2019). A growing body of studies has made it possible to pinpoint some of the most effective strategies for suicide prevention. The strongest support exists for laws and regulation restricting the access to suicide means like the accessibility to high buildings and bridges, toxic pesticides, and pharmacological agents (Platt & Niederkrotenthaler, 2020). This strategy effectively lowers the number of suicide deaths by discouraging people from suicide attempts. However, it does not aid those struggling with

existential crises; thus, it seems insufficient to reduce the emotional strain of suicidal thoughts and the associated impact on health-outcomes and the economy.

Encouraging individuals in need to seek appropriate forms of assistance is another promising strategy for reducing suicidal thoughts and suicide attempts. Adequate mental health support can substantially reduce suicidal thoughts and suicide attempts. Psychological autopsy studies (i.e. interviews with family and friends after a suicide death) have revealed that between 70 and 90% of individuals who died by suicide suffered from a mental health disorder (Cavanagh et al., 2003; Evans et al., 2005; Favril et al., 2022; Hawton & van Heeringen, 2000), particularly affective disorders, borderline-personality disorder, schizophrenia, and substance-related disorders (Favril et al., 2022; Yoshimasu et al., 2008). Among others, dialectic-behavioural-therapy (DBT, DeCou et al., 2019) as well as therapy programs specifically developed to reduce suicidality (e.g. Collaborative Assessment and Management of Suicidality, CAMS, Arkov et al., 2008; Attempted Suicide Short Intervention Program, ASSIP, Keller et al., 2021) have demonstrated effectivity in treating suicidal patients. Pharmacological therapy (e.g. with lithium) has also shown promise in the treatment of suicidality in clinical samples (Wilkinson et al., 2022). Although research on non-traditional sources of care is still in its early stages, crises telephone lines, chat support, support groups have been found to provide valid support to individuals at risk (Hom & Stanley, 2021). However, research indicates that only a small percentage of people with past suicidal ideation or suicide attempts (29.4%, Hom et al., 2015) or with mental disorders (38-44%; Kohn et al., 2004, Wang et al., 2023) had contact with mental health services. This is due, in part, to substantial individual and structural barriers that impede the access to adequate treatment (Hom et al., 2015).

Given that that most young individuals spend a considerable amount of their daytime at school, school-based prevention programs serve as a central tool for universal suicide prevention in this age group (Miller et al., 2009; Ayer & Colpe, 2023). Various approaches have found to be promising, including screening programs (i.e. offering help to individuals with suicidal thoughts after general screening), gate-keeper training (i.e. training significant contact persons to recognize suicidality and offer help), educational or awareness programs (i.e. workshops about mental health), life-skill-enhancement trainings (e.g. training of problem-solving, stress-coping or social skills) and postvention interventions (i.e. interventions after a death by suicide) (Cusimano & Sameem, 2011; Katz et al., 2013;

Robinson et al., 2013; Surgenor et al., 2016; Walsh et al., 2022). First evidence shows that school-based suicide prevention programs can be effective in addressing multiple suicide-related variables, such as mental health literacy and help-seeking (Katz et al., 2013; Robinson et al., 2013). Several large intervention studies successfully reduced risk factors for suicide, suicidal ideation and suicide attempts through school-based interventions (Gijzen et al., 2022; Walsh et al., 2022).

1.3 Ongoing Challenges for Educational Suicide Prevention

Several challenges impair the quality and quantity of research studies. Some of these are the absence of a shared theoretical model to guide suicide prevention, practical and ethical challenges and methodological shortcomings in study design and assessment (Platt & Niederkrotenthaler, 2020; Singer et al., 2018). As a result, the current evidence is insufficient to establish solid evidence-based recommendations. In particular, it remains yet to be established which psychological changes induced through prevention programs help to reduce suicidal thoughts and suicide attempts and which kinds of programs are the most effective (Platt & Niederkrotenthaler, 2020; Wasserman et al., 2021). In the following paragraphs, I will illustrate some of the major ongoing challenges for educational suicide prevention more in detail.

(i) Theoretical framework. An obstacle in the creation of suicide prevention programs is the absence of a shared theoretical model. Until now, little guidance has been provided about what elements, contents, or mechanisms are effective for school-based suicide prevention (Hill et al., 2022; Singer et al., 2018). In their systematic review, Hill et al. (2022) found that 25 publications about prevention programs mentioned 21 different theories as their theoretical basis. Under these circumstances, it is difficult to compare and generalize study results, as well as to understand what elements or mechanisms of prevention programs are the most important to reduce suicidal ideation and attempts. This lack of clarity also limits the ability of stakeholders to recognize, select and implement effective programs in schools. This is also due to ethical and practical problems. Clearly, it is not ethical to randomly assign young people to conditions that may not reduce or even increase suicidality, limiting the possibilities of empirical studies for the evaluation of specific interventions (Singer et al.,

2018). Suicidal ideation, suicide attempts, and suicide deaths are the main target outcome of suicide prevention programs. Due to the difficulty of recruiting populations large enough to detect effects on such rare phenomena, researchers have been encouraged to evaluate their impact on proximal factors associated with suicidality (Klimes-Dougan et al., 2013). In this context, it is central to identify and prioritize outcomes that truly contribute to the reduction of suicidal ideation or behaviour. Merely reporting effects on certain variables without establishing their relevance to suicide prevention can lead to misleading conclusions. This seems particularly applicable for the rather novel research field of mental health literacy (MHL). This concept arose in the late 1990ies to indicate the “knowledge and beliefs about mental disorders which aid their recognition, management or prevention” (Jorm et al., 1997). Numerous studies that evaluate suicide prevention programs uncritically report effects on MHL. Nevertheless, the definition and measurement of this construct are still rather imprecise (Spiker & Hammer, 2018; Wei et al., 2015, 2016), and it remains unclear whether and how improved MHL leads to better health outcomes (Espelage et al., 2022). Overall, it is imperative to establish a robust theoretical framework with viable scientific methods to elucidate the underlying mechanisms that make prevention programs effective, identifying pivotal outcomes and examining how they can be obtained.

(ii) Program development and evaluation. Despite promising results for the effectiveness of school-based suicide prevention programs, many evaluation studies have methodological shortcomings. The majority of studies are based on single measurements or on a pre-post-test design without control groups. Further randomized-controlled trials are required to provide additional evidence regarding the efficacy of these programs (Breet et al., 2021; Calear et al., 2016; Robinson et al., 2018). Also, the feasibility, acceptability and safety of the programs have not been sufficiently explored (Espelage et al., 2022; Kuiper et al., 2019; Walsh et al., 2022). For prevention programs in schools to truly benefit the population, it is crucial to ensure successful implementation on a larger scale. Many prevention programs remain inaccessible to communities due to practical or financial constraints. Many of the evaluated programs, for example, are only available in English and most evaluation studies have been conducted in English-speaking countries (Robinson et al., 2018). A translation or cultural adaptation is necessary to allow their implementation in other countries. Also, every program requires a different amount of financial and personal resources to reach effective results (Ahern et al., 2018). If these requirements are too high, stakeholders may decide against a

program implementation (Scherff et al., 2005). Yet, there is a need of accessible prevention programs that are adapted to local needs and resources and proven to be effective with specific populations. We are in need for research projects that develop accessible programs for different regions and realities and evaluate them with sound empirical studies.

(iii) Differential effects. Even when we know that prevention programs are effective, we currently lack clarity about which individuals profit most from the programs or, on the contrary, if some programs are even detrimental for specific groups (Musci et al., 2018). When gender effects are measured, females seem to profit more than males (Hamilton & Klimes-Doughan, 2015). Most school-based programs are conducted with older adolescents; however, first studies show that they could also be beneficial for younger adolescents (Shilling et al., 2014). The role of age has not been sufficiently examined yet. Another important research question that needs to be addressed is if universal prevention programs are apt to prevent suicide attempts among young adolescents with a higher risk for suicide. Universal prevention programs are normally delivered to whole school classes, without assessing individual risk or symptoms beforehand. However, few studies reported negative emotional reactions from adolescents with suicidal ideation to these interventions (Kuiper et al., 2019). High-risk students were not always an object of evaluations and are sometimes even excluded from evaluation trials (Wasserman et al.; 2015). Thus, it is pivotal to further examine differential effects to determine the most adequate targets for school-based suicide prevention or to adapt existing programs to different target groups.

After providing an overview of the phenomenon of suicidality among young people and its prevention (Chapter 2), this work wants to contribute to our understanding of effective, school-based, educational suicide prevention. In particular, this work presents and discusses the results of the research work accomplished by the author and her colleagues during the study “*Network for Suicide Prevention in Dresden*” (*NeSuD*). The *NeSuD* study was financed by the German Federal Ministry of Health (grant number ZMVI1-2517FSB148; 01.12.2017 – 15.03.2021) and aimed at raising awareness of suicidality, particularly among young people, and boosting access to sources of help. In an effort to enhance suicide prevention in the city of Dresden, the study team organised meetings and seminars for local mental health practitioners and developed an informative internet site for people with suicidal ideation, for people bereaved by suicide and for professional helpers who work with suicidal people. The

NeSuD-team also created the universal suicide prevention educational programme HEYLiFE for secondary schools. This thesis presents the results originated during the development and evaluation of HEYLiFE.

The specific aim of the thesis were to (i) enhance the theoretical model at the base of educational suicide prevention in secondary schools (theoretical model), (ii) evaluate an educational suicide prevention program for secondary schools (HEYLiFE program) using a strong study design (program evaluation) and (iii) explore differential effects on adolescents depending on demographics and mental health characteristics (differential effects).

Following research questions has been derived from the aforementioned research aims:

(i) Theoretical framework:

What contents, methods and outcomes characterize safe and effective school-based, educational school prevention programs? In particular:

Research Question (1.1): What do experts recommend regarding outcomes and methods of school-based, educational prevention programs?

Research Question (1.2): How is mental health literacy related to more direct predecessors of mental health, like mental-health related stigma and help seeking?

(ii) Program development and evaluation:

Research Question (2): Does the HEYLiFE suicide prevention program prove to be an effective, safe, and acceptable intervention for school-based suicide prevention in a randomized-controlled trial?

(iii) Differential effects:

Is the HEYLiFE program effective for all students in secondary school? In particular:

Research Question (3.1): Does the HEYLiFE prevention program have differential effects on students with different demographic characteristics (gender, age)?

Research question (3.2): Does the HEYLiFE prevention program have differential effects on students with varying risk for suicidality?

The results of this research project will be presented in Chapters 3 to 6 and discussed in Chapter 7.

Chapter 2 Literature Review

2.1 Suicidality: Definition and Terms

Suicide indicates a death caused by intentional self-injury (Valach & Reissfelder, 2022). Central to distinguishing suicide from other causes of death are two characteristics: suicide is self-initiated (locus of origin) and results from actions with an intent to die (intention; De Leo et al., 2006; Moriyama et al., 2011). However, this definition has been criticized as imprecise since the intent to die is not always clearly discernible in self-initiated deaths. As a result of the International Study of Definitions of English-Language Terms for Suicidal Behaviors (ISDELTSB), experts on the field defined suicide as:

An act resulting in death which is initiated and carried out by an individual to the end of the action, with the knowledge of a potentially fatal result, and in which intent may be ambiguous or unclear, may involve the risk of dying, or may not involve explicit intent to die. (De Leo et al., 2021, p. 8)

As opposed to suicide, a *suicide attempt*, thus, is the goal-oriented action of hurting oneself with the intent of dying that does not result in actual death (Leo et al., 2021; Valach & Reissfelder, 2022). The terms *suicidal behaviour*, *suicidal actions* or *suicidal acts* are used interchangeably to describe all actions or action chains that are part of a suicide or a suicide attempt. Suicidal actions can be part of more complex *suicidal projects* encompassing several *preparatory suicidal behaviours* (like buying a rope or collecting pills), a series of actions made to prepare a suicide or suicide attempt over a longer period (Leo et al., 2021; Valach & Reissfelder, 2022). Of note, not all suicide attempts are preceded by careful planning; thus, we can distinguish between *planned* or *spontaneous (impulsive)* suicidal acts (Valach & Reissfelder, 2022).

A distinction must be made between suicidal behaviour and *non-suicidal self-injury* (NSSI), a “direct, deliberate destruction of one's own body tissue in the absence of suicidal intent” (Nock & Favazza, 2009, p. 9). The term *para-suicide* is used when self-initiated, serious self-harm occurs without the intent to die (Welch, 2001). Following De Leo et al.

(2021), people engage in suicidal behaviour (and not in NSSI) when they at least consider the possibility of dying as a result of their actions. Since the intention behind self-harming behaviours is not always clear, it may be difficult in some situation to differentiate between NSSI, para-suicide and suicidal behaviour. This distinction, however, is central for research and clinical practice since different mechanisms and causes may underlie these phenomena (Muehlenkamp & Gutierrez, 2007). NSSI will not be a subject of this dissertation.

Cognitive precursors of suicidal behaviours are *suicidal thoughts*, *suicidal ideas* or *suicidal ideation*. De Leo et al. (2021, p.8) defined suicidal ideation: “To think of suicide with or without suicidal intent, or hope for death by killing oneself, or state suicidal intention without engaging in behaviour”. The severity of suicidal ideation can range from wishing to die without self-harming (also *passive ideation* or *death wishes*), contemplating a suicide attempt (*active ideation*), to concrete *suicide plans* (thoughts about when, where, and how to make a suicide attempts) (De Leo et al., 2021; Wastler et al., 2022).

An individual may express suicidal ideation or suicide plans verbally through what is commonly referred to as *suicidal threats*. Since this term has a negative connotation implying a manipulative intention, Frey et al. (2020) suggested to use *suicide-related communication* as a more neutral alternative.

Suicidality is an overarching term encompassing all already named cognitive, emotional and behavioural processes connected to suicide. People who are experiencing suicidality are people with suicidal thoughts or displaying suicidal behaviours. Since suicidality is a very general term, researchers urge using more precise terms when possible (Meyer et al., 2010).

Silverman and Felner (1995, p. 3) describe *suicide prevention programs* as the intentional, evidence-based interventions that aim at “(...) the modification of those processes that lead to or maintain suicidal actions, thoughts, and tendencies”.

Language is constantly adapting to cultural changes. It is worth noting that, in addition to suicide threat, further termini that were once widely used are now criticized for being stigmatizing or negatively connotated. For example, the phrase “to commit suicide” was coined in a time when suicide was considered a crime. The phrase “successful” or “completed suicide” (as opposed to an “unsuccessful suicide attempt”) suggests that suicide is a positive outcome and that surviving a suicide attempt may be seen as a failure (van Zyl,

2020). The use of these terms is not recommended to avoid fostering stigma and will be avoided in this work.

The focus of this work is suicide prevention among adolescents and young adults. For the sake of this work, the term *pre-adolescent children* will be used for children aged <12 years, *adolescents* for young people between 12 and 18 years of age (*younger adolescents* 12-14 years of age, *older adolescents* 15-18 years of age), and *young adults* for the period between 18 and 25 years of age (Sheftall et al., 2016) when not declared otherwise. The term *young people* will be used to refer to the group of adolescents from 12 years onwards and young adults together.

2.2 Suicide Among Adolescents and Young Adults

Suicide among young people is a serious public healthcare issue. Epidemiological research on suicidality in the youngsters is scarce (Ayer et al., 2020). The mortality statistics of the US Center for Disease Control and Prevention reported a suicide rate of 0.17 per 100 000 people in pre-adolescent children (5-11 years of age) in 2014 (Sheftall et al., 2016). However, suicidal ideation is a problem that affects pre-adolescents as well. A US-based multi-centred investigation with children aged 9-10 years (N=11 814) disclosed lifetime prevalence rates of 6.4% for passive ideation, 4.4% for active ideation, 2.4% for suicidal plans, 1.3% for suicide attempts (DeVille et al., 2020).

The incidence of suicidal ideation and suicide attempts increases sharply after the 12th year of age (Cha et al., 2018; Voss et al., 2019). This can be explained by an increased neurodevelopmental vulnerability with the onset of puberty and by an increase in risk factors such as specific mental disorders (affective disorders, substance related disorders, psychotic disorders) and risk-taking behaviour (Hawton et al., 2012; Soole et al., 2015). The pooled suicide rate among adolescents (10-19 years of age) across 45 countries (data source: WHO mortality database, 2018) was 3.77 per 100 000 deaths (Glenn et al., 2020). The rate was lower for younger adolescents (10-14 years; 0.93) than for older adolescents (15-19 years; 6.04). A recent meta-analysis reported a pooled lifetime prevalence of 11.4% for suicidal ideation and 0.8% for suicide attempts in adolescents (Evans et al., 2017). If we consider young people who are currently receiving mental health treatment, the prevalence increases to 24.7% for ideation and 3.6% for attempts (Evans et al., 2017). Many studies reporting the

prevalence of suicidality among young adults were conducted among college students. The pooled lifetime prevalence in this group was of 22.3% for suicidal ideation, 6.1% for suicidal plans, and 3.2% for suicide attempts (Mortier et al., 2018).

Compared to other European countries, the prevalence of suicidal ideation and suicide attempts in Germany is near to the median value (Plener et al., 2017). The suicide rate of young adolescents (10-14 years) in Germany in 2021 was 0.7%, among older adolescents (15-19 years) 4.2% and 6.7% among young adults (20-25 years) (Statista Research Department, 2023). Passive or active suicidal ideation (i.e. wish of dying) had a life-time prevalence of 36.4% to 39.5% among German school-students (Plener et al., 2017). An epidemiological cohort study with young people between 14 and 21 years in Germany found a lifetime prevalence of 10.7% for active ideation (i.e. serious thought of ending one's life), 5% for plans and 3.4% for suicide attempts (Voss et al., 2019).

2.2.1 Trajectories of Suicidality

Many individuals undergo distinct stages of suicidality prior to engaging in a suicide attempt (passive suicidality, active suicidality, suicide plans). Suicidal ideation is considered a predecessor (i.e. proxy) and main risk factor for suicide attempts (Sveticic & Leo, 2012). For this reason, suicidality has often been conceptualized as a continuum or an ideation-to-action-process (Haregu et al., 2023). Suicidal ideation typically has an earlier onset than suicidal behaviour (and even than NSSI) with the transition from ideation to attempt often occurring within a year (Glenn et al., 2017). Voss et al. (2019) observed that 35.1% of young people with suicidal ideation developed suicide plans and 17.0% made a suicide attempt within the same year (48.2% and 25.8% after 5 years). However, it is important to acknowledge that adolescents attempt suicide without a previous history of suicidal ideation more often than adults (90% of previous suicidal ideation compared to 99.2%) (Sveticic & Leo, 2012).

The development of suicide risk can take different paths over the years from childhood through young adulthood. Regarding the trajectory from childhood to adolescence, Zhu et al. (2019) identified a group demonstrating a moderate increase in suicidal ideation over time (7.1%) and a group exhibiting early high levels of suicidality that stayed stable through the years (6.5%) among Chinese pre-adolescents and young adolescents. Thompson et al. (2012)

examined the later development of suicidal ideation and behaviour across adolescence and young adulthood (10-30 years of age) in Canada. While most young people had a constantly low suicide risk, 5.1% of young people showed an elevated likelihood of attempting suicide in early adolescence, which decreased over time. A further 1.3% carried a constantly high risk for suicide attempts throughout adolescence and young adulthood.

2.2.2 Risk and Protective Factors

Suicidal ideation and suicide attempts are complex phenomena. The stress-diathesis-model describes the interaction of genetic, psychological, and social factors that contribute to suicidality; individuals with a higher genetic and psychological vulnerability (internal risk factors) are presumed to be more strongly affected by external stressors and adverse life events (external risk factors) (Wasserman et al., 2021). Understanding risk and protective factors for suicidal ideation and suicide attempts is very important to identify young people at risk and provide targeted interventions. Furthermore, this data can assist in the development of universal prevention strategies aimed to reducing risk factors and increasing protective factors both systemically and at the individual level. The results of recent reviews on risk and protective factors for suicidality in adolescents and young adults (Ati et al., 2021; Carballo et al., 2020; Wasserman et al., 2021) will be described in the following sections.

2.2.2.1 Internal Risk Factors

Since suicidal behaviours and suicides in the family are a risk factors for suicidality, genetic factors may play a role in increasing the risk of suicide through genetic and environmental transmission or gene-environment interactions (Wasserman et al., 2021). Although only a limited number of neurobiological and genetic studies exists, a connection to dysfunctions in the serotonergic system, reduced neuroplasticity, low serum cholesterol levels, hyperactivity of the hypothalamic–pituitary–adrenal axis, inflammation parameters and suicidal behaviour has been reported (Wasserman et al., 2021).

As with other age groups, prior suicide attempts are regarded as a major risk factor for future suicidal behaviour among young individuals (Carballo et al., 2020), thereby increasing the likelihood of suicide attempts by a factor of three or more (Hulten et al., 2001). It is estimated that about 90% of young people who died by suicide have suffered from mental

disorders beforehand (Marttunen et al., 1993). The highest level of evidence exists for depression and substance-related disorders (Carballo et al., 2020). Young people with a major depressive disorder have a fivefold risk for suicide attempts compared to young people without (Arria et al., 2009; Carballo et al., 2020). Alcohol abuse, as well as smoking and the abuse of other drugs, is a risk factor for suicidal behaviour even in the absence of depressive symptoms (Arria et al., 2009; Carballo et al., 2020). A particularly high risk exists for young people with a combined use of alcohol and other psychoactive substances (Goldston et al., 2009). Further disorders (eating disorders, anxiety disorders, psychotic disorders, externalizing disorders, affective dysregulation) have been found to be related to suicidality, although the amount of evidence is weaker (Carballo et al., 2020). Young people with comorbid mental disorders and repeated hospitalization are at particularly elevated risk (Carballo et al., 2020).

Worries about sexual orientation and gender dysphoria have been found to be risk factors for suicidality as well (Carballo et al., 2020). LGBTQ+ youth exhibit a five to eight-fold higher risk for suicidal ideation than their non-LGBTQ+ peers (Russon et al., 2022). In a study with $N = 120\,617$ adolescents aged 11–19 years, Toomey et al. (2018) reported that approximately 14% of adolescents reported having attempted suicide previously, with notable variations by gender identity. The highest rate of suicide attempts was reported by female to male transgender adolescents (50.8%), followed by those identifying as neither exclusively male nor female (41.8%), male to female transgender adolescents (29.9%), questioning adolescents (27.9%), female adolescents (17.6%), and male adolescents (9.8%).

There is a clear connection between coping-styles and problem-solving skills and suicidality. Emotion-focused coping, avoidant coping (as opposed to task-focused coping) and poor problem-solving skills have been associated with a higher risk for suicide attempts (Ati et al., 2021; Carballo et al., 2020). Further personality characteristics that increase the risk for suicidal ideation and suicide attempts are neuroticism, impulsivity, aggressivity, perfectionism, low self-esteem, self-criticism (Carballo et al., 2020; McHugh et al., 2019; Wasserman et al., 2021). A high level of hopelessness was a major risk factor for suicidal ideation and suicide attempts in several studies (Wasserman et al., 2021).

Adolescents who see their own academic performance as a failure have a higher risk for suicide (Carballo et al., 2020). Further, maladaptive and risk-behaviours such as risky sexual

behaviours or physical fights in the last year were identified as risk factors (Carballo et al., 2020; Wasserman et al., 2021). Recent data highlight the emergence of smartphone abuse (prolonged use, use at late hours) and unfavourable health habits (unhealthy diet, overweight, sedentary lifestyle, abnormal sleep patterns) as risk factors for suicidality (Ati et al., 2021). For girls, an early menarche or irregular menstrual cycle as well as an early sexual initiation have been associated with suicidal ideation and behaviour (Ati et al., 2021; Wasserman et al., 2021).

Some characteristics have been identified as unique risk factors that distinguish between young people who exhibited suicidal behaviours and those who just had suicidal thoughts. According to Taliaferro and Muehlenkamp (2014), self-injury and running away from home were the most significant attempt-specific risk factor for both sexes. Gender-specific factors were same-sex sexual experience for females, being victim of relationship violence and cigarette smoking for males.

2.2.2.2 External Risk Factors

Among adolescents, the most frequent external risk factors for suicidal ideation are family issues and academic stressors (Carballo et al., 2020). Family conflicts, maladaptive parenting styles, a lack of parental support as well as mental, health or financial problems of the parents increase the risk of suicidal ideation and suicide attempts for young people (Ati et al., 2021; Carballo et al., 2020; Wasserman et al., 2021). Adolescents spend a large portion of time in school. The social environment at school has a strong impact on the well-being of young people. Students in low-income schools showed a higher risk for suicidal ideation and suicide attempts than students in middle income schools (Ati et al., 2021; Fang, 2018). Furthermore, social problems such as social isolation or victimization (bullying, cyber-bullying) contribute to an increase in suicidal behaviour and ideation (Carballo et al., 2020; Wasserman et al., 2021). Further noteworthy risk factors are adverse life events as traumatic experiences (sexual, physical, or emotional abuse, accidents, being victim of a crime) or losses (parental death, separation from a romantic partner) (Ati et al., 2021; Carballo et al., 2020; Wasserman et al., 2021).

2.2.2.3 Protective Factors

The presence of protective factors may reduce the risk of suicide by 75-80% (Wasserman et al., 2021). A major protective factor is social connectedness, which includes parental support, moderate parental control, positive communication in the family, connectedness to school and friends (Ati et al., 2021; Wasserman et al., 2021). Adequate coping strategies, such as task-oriented coping and good problem-solving skills can reduce suicidal ideation (Ati et al., 2021; Wasserman et al., 2021). Positive self-esteem also can reduce suicidal ideation when paired with a feeling of social connectedness (Wasserman et al., 2021). Reframing life as being meaningful seems to further reduce suicidal ideation and suicide attempts (Ati et al., 2021).

Researchers identified multiple protective factors related to a healthy lifestyle. Healthy nutritional habits as well as a moderate use of smartphones (in particular for social contacts) show protective effects for suicidal behaviours (Ati et al., 2021). Also, leisure activities such as reading and watching films had a protective effect (Ati et al., 2021).

2.2.3 Demographic Aspects

Factors like gender and age determine the specific risks for different groups of individuals and affect behaviours leading to suicidal ideation and attempts. By recognizing these distinctions, interventions can be better targeted to address the needs of each demographic group.

2.2.3.1 Age and Development

From a developmental perspective, preschoolers are not considered to be able to “(...) estimate degrees of lethality or outcomes of their self-destructive acts” (Pfeffer, 1997, p. 553). Coding systems often do not list suicide as a potential cause of death for children in this age group (Sheftall et al., 2016). Nonetheless, the ability to comprehend the concept of suicide emerges around the age of eight (Soole et al., 2015). Younger children tend to imagine death as a state of sleep from which one does not awake anymore but still can have thoughts and emotions. Gradually, the following attributes are added to the concept of death: finality (death is forever), universality/inescapability (every living being will die),

unpredictability (death can happen anytime) (Mishara, 2010). Children with more experiences of death (own severe illness, losses) have more mature concepts of death in earlier ages (Mishara, 2010). Mishara (2010) reported based on an interview study with 65 children, most of them understood the concept of “killing oneself” by Grade 3 (8-9 years of age), naming predominantly weapons (knives, guns), jumping from a high place, poison and jumping under a car as possible methods. Interestingly, all interviewed children heard about suicide in conversations with friends or from the media and not from adults, and five of them had knowledge of people who engaged in suicidal behaviour.

The specific risk-factors for suicidal ideation and attempt also depend on age and development. Stressors that are more common for pre-adolescents are often linked to adverse familiar situations and home environment, such as poor family cohesion, divorce, witnessing or experiencing violence, experiencing multiple transitions in the living situation, and a history of maltreatment (Tishler et al., 2007). Furthermore, children in this age experience many changes in the psychosocial and personal sphere (Slavutskaya & Slavutskii, 2019; Bhana, 2010). Peers become increasingly important and the academical requirements increase; in this age, children develop a sense of mastery, self-esteem, more mature emotion regulation strategies (Bhana, 2010). Children who are coping with negative peer pressure, bullying, peer problems, poor performance, and loneliness at this age are at risk for suicide ideation and attempts (Tishler et al, 2007).

During adolescence and emerging adulthood, key developmental tasks include achieving educational milestones, entering the workforce, becoming independent of parents, and forming significant relationships. Suicidality in this age can be related to a failure in achieving these tasks (Conner & Goldstone, 2006). As described earlier, the incidence of suicidal ideation and suicide attempts increases exponentially from pre-adolescence to young adulthood. Different approaches have been used to explain this phenomenon. One of them is the observed co-occurrence of temporal changes. For example, an increased incidence of specific mental disorders is connected to the increase in suicidality (Conner & Goldstone, 2006). Among males, the incidence of both suicidality and substance abuse shows the same development from early adolescence to young adulthood. The incidence of depression shows a similar increase during early adolescence; however, the incidence of depression stabilizes during late adolescence and young adulthood, while the incidence of suicidality continues to grow. The incidence of other mental disorders (e.g. disruptive-disorders, anxiety disorders)

seems widely unrelated to the incidence of suicidality (Conner & Goldstone, 2006). Another important factor among males that may contribute to an increase in suicide attempts is the increase in violent behaviours and severe aggressions against others (Conner & Goldstone, 2006). Psychological autopsy studies confirm the relevance of substance abuse and depression as predecessors of suicidality throughout adolescence (Conner & Goldstone, 2006).

2.2.3.2 The Gender Paradox

A gender paradox was observed in suicide research (Miranda-Mendizabal et al., 2019; Shelef, 2021). Suicide is more common among young males than among young females in almost all countries worldwide, with the male:female ratio varying between 1.14 (Sweden) and 2.73 (Italy) (Glenn et al., 2020). There are some exceptions to this rule, with girls in China and some regions of India dying more often by suicide than young males (Glenn et al., 2020; McLoughlin et al., 2016). The rate of suicide attempts, on the contrary, is higher among young females than among young males in most countries (Shelef, 2021; Miranda-Mendizabal et al., 2019). A systematic review revealed that females are more likely to attempt suicide compared to males in young people, with an odds ratio of 1.96 (CI95% 1.54–2.50) (Miranda-Mendizabal et al., 2019). Young females also perform suicide attempts at a younger age than males (Wanderlich et al., 2001). The rate differences are especially large in countries with higher gender equality, since improvements in women rights seem to reduce suicidality in women and leave the risk for men unchanged (Shelef, 2021; Chang et al., 2019).

It remains unclear if the differences in gender ratios result from genetic determinants of sex or from differences in gender identity or socialization (Shelef, 2021). It is possible that gender specific risk factors for suicide attempts, such as a higher exposure to psychological, physical, and sexual violence and a higher rate of internalizing mental disorders (also originating from this exposure), may explain the higher risk for suicide attempts among young females (Miranda-Mendizabal et al., 2019; Shelef, 2021). Furthermore, young females may be more strongly affected by social models (media, social media, friends), adopting NSSI and witnessing suicidal behaviour (Abrutyn et al., 2014). The higher mortality rate observed among males might be partly attributed to the utilization of more lethal means for

suicide attempts (Miranda-Mendizabal et al., 2019; Shelef, 2021). Men report more often a strong intent to die (as opposed to hoping to receive help) when performing a suicide attempt (Hawton, 2001; Freeman et al., 2017; Jaworski, 2009; Canetto, 1997; Shelef, 2021). Cultural and social norms may push man more towards more lethal methods for suicide attempts (Shelef, 2021). Males exhibit higher levels of impulsivity and aggressivity and show lower ability to regulate strong emotions (Shelef, 2021; Miranda-Mendizabal et al., 2019) compared to females. Finally, lower levels of social connectedness and help-seeking (professional and with family and friends) could also contribute to this outcome (Miranda-Mendizabal et al., 2019; Shelef, 2021).

Gender is a complex construct. Although it became famous as gender paradox, what we described in the last two paragraphs should be more correctly named “sex paradox”, since it reflects differences among the two biological sexes (Shelef, 2021). As described before, non-conforming sexual orientation and gender dysphoria are major risk factors for suicidality. This higher risk is only partially mediated by higher depression, substance use and victimization rates (Garthe et al., 2022). Perceiving oneself as a burden, being neglected by family, internalized stigma may be further mechanisms that explain this risk (Garthe et al., 2022; Grossman et al., 2016; Austin et al., 2020).

2.3 Psychological Theories of Suicide

Several psychological theories have been established over time to explain how suicidal ideation develops and what contributes to the transition between suicidal ideation and suicide attempts (Gunn & Lester, 2015). In the following paragraph, some of the most influential theories of suicide will be presented. These models have been developed for adults. While they have also been tested with adolescent populations, the evidence for young people is scarcer. Also, no theoretical model up to date adapted the theories specifically to adolescent populations, e.g. adding developmental factors (Kirshenbaum et al., 2024).

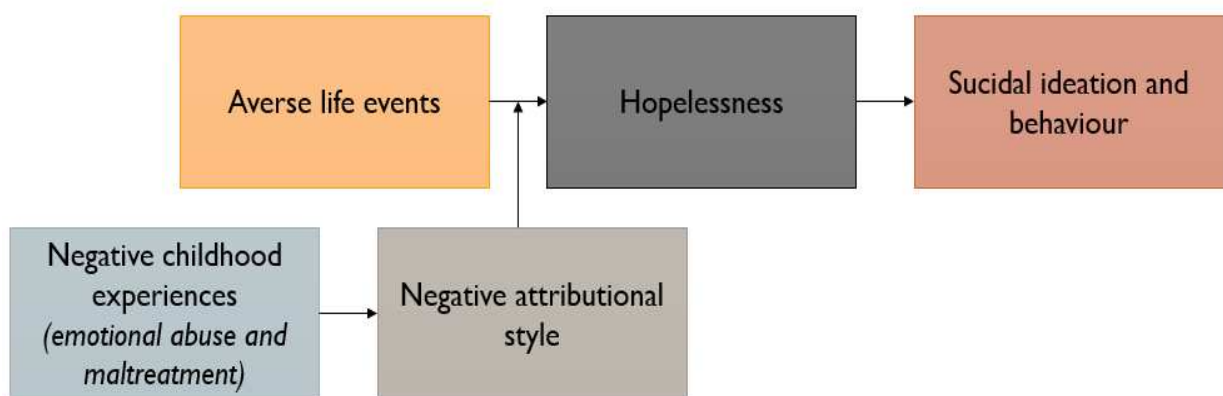
2.3.1 Hopelessness Theory of Suicide

In his influential work on the cognitive and behavioural mechanisms behind depression, Beck (1967) was the first to indicate hopelessness (defined as a negative emotional state characterized by negative expectations regarding oneself and the future as well as a lack of

ability to resolve problems) as a central cognitive vulnerability for suicide (Qiu et al., 2017). The hopelessness theory of depression was conceived partly as a reaction to Seligman's theory of learned helplessness (Liu et al., 2015; Seligman, 1972). Abramson et al. (1978) observed that individuals with a tendency to attribute negative events to internal, stable, and global causes had a higher risk for depression. They observed that such an attributional style was typical for people who had experienced emotional abuse or maltreatment in their childhood (Liu et al., 2015; Abramson et al., 1978). Research findings on hopelessness suggested that a combination of negative attribution styles and negative life-events could potentially result in a sense of hopelessness (Balsamo et al., 2020; Beck, 1967; Qiu et al., 2017). Beck further observed that people with high levels of hopelessness may start considering suicide as the only way out of problems when they encounter stressors or adverse life events (Beck et al., 1985; Qiu et al., 2017). Figure 1 depicts the hopelessness theory of suicide based on Liu et al. (2015).

Figure 1

The Hopelessness Theory of Suicide



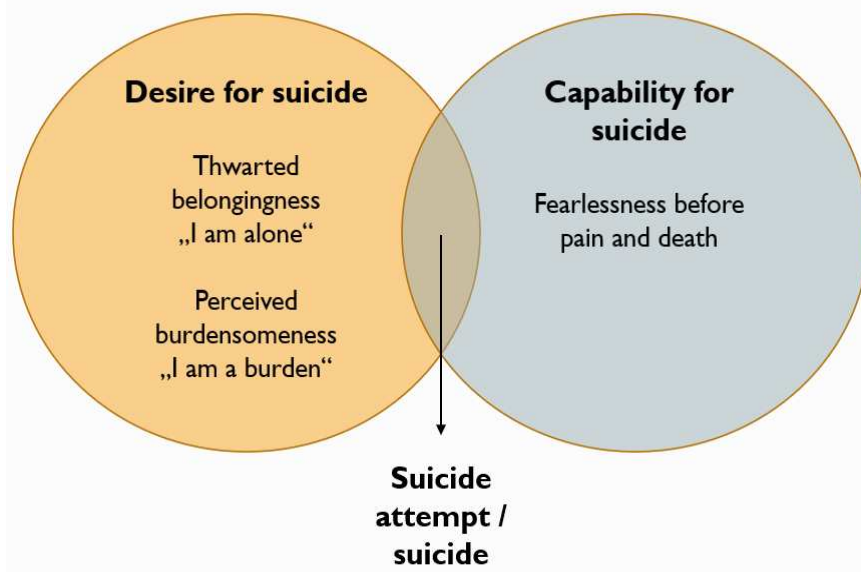
A significant body of empirical research confirms that hopelessness is a major internal risk factor for suicide ideation (Beck et al., 1985; Wasserman et al., 2021). This observation was also reproduced with populations of adolescents and young adults, showing a positive correlation between hopelessness and suicidal ideation (Tonkuş et al., 2022). However, hopelessness does not seem to differentiate between young people with suicide thoughts who attempt suicide and those who do not (Qui et al., 2017; Taliaferro & Muehlenkamp, 2014).

2.3.2 Interpersonal Theory of Suicide and Ideation-to-Action Framework

Acknowledging the connection between hopelessness and suicidal ideation, Joiner (2005) argued to recognize that multiple factors interplay with each other to explain the transition from suicidal ideation to suicide attempts. In his *Interpersonal Theory of Suicide* (ITS), he assumed that two conditions need to be met for someone to attempt suicide: the wish to die and the capability to make a suicide attempt (Figure 2) (Joiner, 2005; van Orden et al., 2010). Joiner's (2005) theory can be considered the first theory of the so-called *Ideation-to-Action-Framework*, a theoretical perspective that seeks to explain the interior processes in act as people decide to attempt suicide (Klonsky & May, 2015; O'Connor & Kirtley, 2018).

Figure 2

The Interpersonal Theory of Suicide



Social isolation and a lack of connectedness with others have been associated with suicidal ideation for decades (Calati et al., 2019; Durkheim, 1897; Schneideman, 1987). Joiner introduced the concept of *thwarted belongingness*, a negative cognitive-affective state characterized by a feeling of loneliness and the assumption of being disconnected from others. This state arises particularly in individuals who lack reciprocal caring relationships (van Orden et al., 2012; van Orden et al., 2010; Joiner, 2005). Earlier observations of suicidal behaviour among adolescents led to the assumption that young people attempt suicide when they feel like a burden for their families due to severe familial conflicts (Sabbath, 1969).

Joiner (2005) extended this concept to other groups of people who may experience to be negatively dependent on their social environment, such as homeless people, incarcerated people, people with severe physical and mental illnesses (see also van Orden et al., 2010). He coined the term *perceived burdensomeness* to indicate a negative cognitive-affective state that occurs when someone feels like a burden for others and that is characterized by self-hatred and the belief that others would be mostly relieved if the person died (van Orden et al., 2010; Joiner, 2005).

According to Joiner (2005), a desire for suicide is a necessary but not sufficient condition for a suicide attempt. Dying from suicide requires frightening, painful behaviours. People are instinctively afraid of engaging in acts that may result in pain or death. Nevertheless, repeated exposure to painful or scaring experiences (e.g., self-harm, combat experience) can lead to a tolerance to pain and fear of death through habituation (van Orden et al., 2010). The ITS states that the acquired capability to self-harm (*capability for suicide*) is the third prerequisite to initiate suicidal behaviours (van Orden et al., 2010; Joiner, 2005). Capability for suicide comprises fearlessness about death, pain tolerance and practical capability, e.g. the knowledge of and practical access to lethal means (Shahnaz et al., 2020).

Empiric research applying the ITS confirmed that thwarted belongingness and perceived burdensomeness were associated with suicidal ideation. Furthermore, these factors in connection to capability for suicide were associated to suicide attempts. These associations, however, were only moderate in magnitude (Chu et al., 2017). For adolescents and young adults, the evidence is much scarcer (Stewart et al., 2017; Kirshenbaum et al., 2024). The full theory has never been tested in/for adolescent populations; rather, single components have been assessed (Kirshenbaum et al., 2024). There is substantial evidence linking both thwarted belongingness and perceived burdensomeness to suicidal ideation (Barzilay et al., 2015; Calear et al., 2021; Glenn et al., 2022; Hill et al., 2017; Kirshenbaum et al., 2024; Meng et al., 2022; Rakoff et al., 2022; Sallee et al., 2021; Sallee et al., 2022; Vélez-Grau et al., 2023). Regarding which of both factors plays the most important role results are strongly mixed (Kirshenbaum et al., 2024). Among clinical samples and adolescents at high-risk of suicide, perceived burdensomeness was the variable that was connected to higher levels of suicidal ideation in most studies (Kirshenbaum et al., 2024). Several studies reproduced an association between capability of suicide and suicide attempts, stressing how self-harm and

habituation to pain are connected to pain tolerance (Stewart et al., 2017; Ren et al., 2019; May & Victor, 2018). It seems plausible that adolescents with high pain tolerance and fearlessness of death are particularly at risk for suicide behaviours when they have easy access to lethal means.

2.3.3 Integrated Motivational-Volitional Model of Suicide

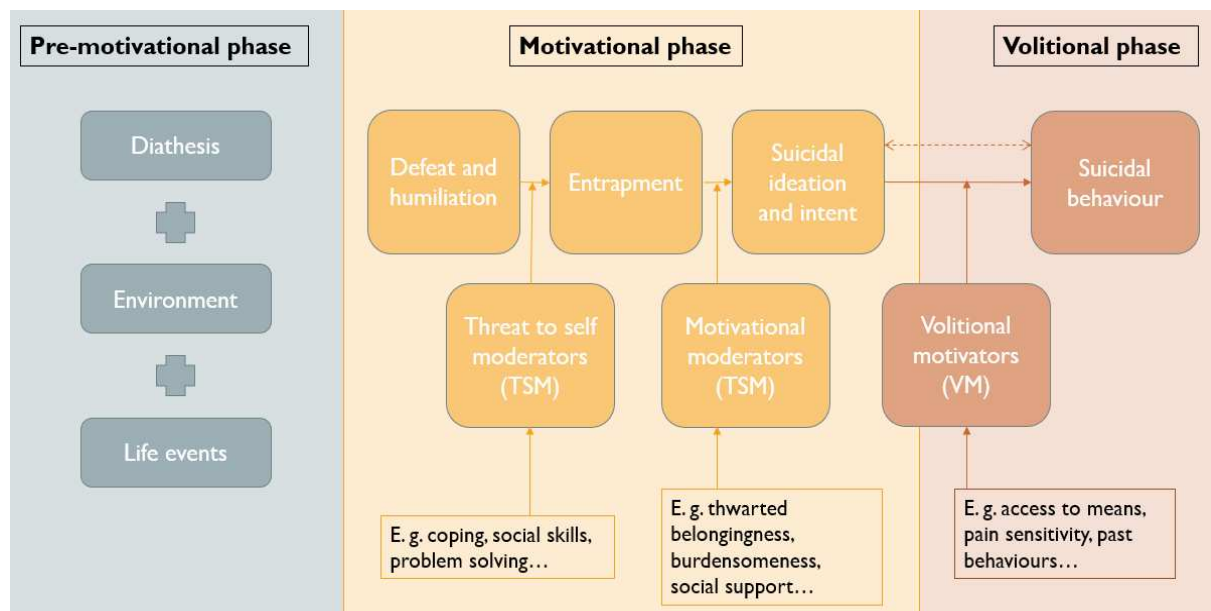
Joiner's Interpersonal Theory did not consider many of the empirically known risk factors for suicide. O'Connor (2011) sought to increase the predictive ability of theories of suicide by integrating several models and recent findings in a dynamic framework. The *Integrated Motivational-Volitional Model of Suicide* (IMV; Figure 3) describes the development of suicidal ideation and behaviour in a biopsychosocial framework as a process with three phases. These phases based on the theory of planned behaviour's assumption that intention and motivation are the strongest predictors of action (Ajzen, 1991). In the pre-motivational phase, personal vulnerabilities affect how individuals react to stressors (diathesis-stress-model) (Schotte & Clum, 1987). Vulnerability factors can be biological/genetic or cognitive. Suicidal ideation can emerge when there is a combination of individual vulnerability and stressors. Pre-motivational factors have a dynamic influence on variables in subsequent phases.

In the motivational phase, the authors describe how suicidal ideation emerges. This phase of the IMV is inspired by Williams' theory of suicide as a "Cry of Pain" (2002). Williams observed that extreme stress is a precursor of suicidal ideation (especially defeat or social rejection/humiliation). Suicidal ideation arises when individuals in such circumstances develop the perception that no escape or rescue is feasible (feeling of entrapment). However, not all individuals that experience defeats or feel entrapped in negative internal states or situations develops suicidal thoughts. The IMV provides an additional explanation for which factors promote the transition from defeat/humiliation to entrapment (*threat-to-self-moderators*) and from entrapment to suicidal ideation and intent (*motivational moderators*). For example, individuals with favourable emotional and social coping skills may be able to find adequate solutions for difficult situations. As already described in the IPS, feeling disconnected or feeling a burden for others could favour the development of suicidal ideation for people who are feeling entrapped in a negative state. Further motivational moderators are less negative attitudes towards suicide.

In the final phase, the volitional phase, *volitional moderators* moderate the transition between suicidal ideation and a suicide attempt. In addition to Joiners acquired capability to suicide, O'Connor and Kirtley (2018) included access to means, impulsivity, and exposure to suicide (among others) as volitional moderators. The transition between suicidal ideation and suicidal behaviours has a dynamic nature, as symbolized by the dotted line (Figure 3). The IMV is one of the most influential theories that describes the path to a suicide attempt through several motivational and volitional phases, highlighting numerous potential points for prevention and intervention.

Figure 3

The Integrated Motivational-volitional Model of Suicidal Behaviour



Note: Adapted from O'Connor & Kirtley (2018).

Several studies confirmed the relevance of the IMV model in the explanation and prediction of suicidal outcomes with adolescents and young adults (O'Connor & Kirtley, 2018; Kirshenbaum et al. 2024). Pre-motivational factors as vulnerability (e.g. perfectionism; Hewitt et al., 2014) and stressful life events (e.g. cyberbullying; Zhou et al., 2023) were linked to suicidal ideation and increased the probability of feeling entrapped or defeated (O'Connor et al., 2019; Kirshenbaum, 2024). Defeat and entrapment were connected to previous and future suicidal ideation in adolescent populations (Hollingsworth & Polanco-

Roman, 2022; Li et al., 2021; Park et al., 2009; Pollak et al., 2021; Ren et al., 2019). Several threat-to-self-moderators were found to have an impact on entrapment, like anger suppression (Park et al., 2009) and low self-esteem (Ren et al., 2019). As motivational moderators, Li et al. (2021) confirmed that thwarted belongingness, perceived burdensomeness, and low resilience moderated the relationship between entrapment and suicidal ideation in Chinese adolescents; reasons for living were found as a further moderator in a Taiwanese study (Ren et al., 2019). Hollingsworth and Polanco-Roman (2022) reported commitment to their ethnic identity as a motivational moderator for African American young adults. The IMV model could successfully differentiate between young people that reporter suicidal ideation or suicide attempts (O'Connor et al., 2012; Pollak et al., 2021; Wetherall et al., 2018). Exposure to self-harm of others, acquired capability, mental imagery about death and impulsivity were found as significant moderators between suicidal ideation and suicide attempts (Mars et al., 2019; Wetherall et al., 2018).

2.4 Educational Suicide Prevention

The reduction of suicide deaths is a crucial objective in public mental health and has been deemed a “global imperative” by the World Health Organization (WHO, 2014). Understanding the risk factors and mechanisms that lead to suicidal ideation and attempts allows to understand how prevention may to prevent them.

A widely used framework divides prevention strategies in three categories: *universal prevention* targets the whole population; *selective prevention* targets people with a higher risk to develop a determinate condition; *indicated prevention* targets people who already developed a symptom or condition to prevent an exacerbation or a relapse (Mrazek & Haggerty, 1994; Silverman & Felner, 1995). In the field of suicide prevention, universal suicide prevention strategies aim to improve the quality of the social environment, reduce environmental risks, or improve individual resilience in the general population to reduce overall suicide risk. Indicated interventions may target people with mental disorders connected to suicide or people from other societal groups with a higher (i.e. specific) risk for developing suicidal ideation (e.g. LGBTQ+ people). Indicated suicide prevention comprises psychotherapy, pharmacological therapy or social interventions (e.g. case management) for

people with suicidal ideation or after a suicide attempt to reduce the probability for a (further) suicide attempt (Turecki et al., 2019).

Young people spend most of their time at school. The aim of schools is not only to impart knowledge, but also to aid families in educating and safeguarding children and their wellbeing. Many countries offer health curricula in schools that focus on topics such as nutrition, sports, sexual and reproductive health, drug use and mental health (St Leger, 2001). Furthermore, schools can contribute to the mental health of their students by providing a safe environment that promotes personal growth and mutual support. Prevention programs delivered in schools can have a positive impact on several aspects of the mental health of students (Graczyk et al., 2003). For these reasons, schools are an obvious and promising setting for suicide prevention among young people (Calear et al., 2016; Robinson, Calear, & Bailey, 2018).

While indicated approaches mostly take place in other settings (e.g. psychiatric hospitals), both universal and selected prevention approaches are used in school settings (Miller et al., 2009). Traditionally, school-based suicide prevention programs have been divided into three categories (Gould et al., 2003; Katz et al., 2013; Robinson et al., 2018). *Educational* programs are universal prevention programs that comprise lessons, exercises, and discussions with young people in school-classes. The goal of these programs is often to enhance knowledge about mental health and how to maintain it, raise awareness of mental health problems and suicidality and encourage young people to adopt helpful coping mechanisms in case of suicidal ideation (including reaching out for help) (Gould et al., 2003; Katz et al., 2013). Educational programs have sometimes been further divided into *awareness* and *skill-training* programs (Katz et al., 2013). While awareness programs focus on conveying knowledge and favourable attitudes, skill-training programs focus mostly on enhancing coping and problem-solving skills. *Upstream prevention programs* have recently emerged as a trend in educational suicide prevention. These programs aim at improving overall mental health and addressing risk factors instead of thematising suicide thoughts directly (King et al., 2018; Wyman, 2014).

The most prominent selective prevention strategies are *screening programs* and *gatekeeper programs* (Katz et al., 2013). The purpose of screening programs is to detect students at risk of suicide through screening instruments and connect them with sources of

help (Katz et al., 2013; Pena & Caine, 2006). Gatekeeper programs aim to educate selected people on how to identify and approach students who may be suffering from suicidal ideation, and then direct them to appropriate sources of help or mental health services. Often, teachers and other school staff members are chosen as gatekeepers in schools. However, some programs also train peer helpers as gatekeepers (Isaac et al., 2009; Katz et al., 2013). Although this classification is useful in theory, several school-based prevention programs utilize a combination of the presented strategies and thus cannot be sorted into one single category.

While research on screening programs and gatekeeper programs could provide first promising results in suicide prevention (Isaac et al., 2009; Pena & Caine, 2006), studies and reviews comparing these strategies indicate that educational suicide prevention programs could be the most effective school-based suicide prevention strategy (Platt & Niederkrotenthaler, 2020; Wasserman et al., 2015; Callear et al., 2016; Cooper et al., 2011; Cusimano & Sameem, 2011; Gijzen et al., 2022; Katz et al., 2013; Miller et al., 2009; Robinson et al., 2018; Walsh et al., 2022).

2.4.1 Goals and Strategies of Educational Programs

In a recent review, Hill et al. (2022) observed that, up to date, there is no established theoretical rationale that guides suicide prevention interventions in schools. In practice, this results in a variety of programs being implemented with varying degrees of theoretical foundation and empirical evaluation. Although this situation makes it difficult to provide an exhaustive overview, the following section outlines some of the most common goals and strategies employed in educational programs.

2.4.1.1 Promote Mental Health Literacy

How young people react to mental health problems depends, among others, on their knowledge and beliefs of the subject of mental health (Jorm, 2000). The term *mental health literacy* (MHL) was introduced in 1997 by Antony Jorm, who defined it as “knowledge and beliefs about mental disorders which aid their recognition, management and prevention” (Jorm et al., 1997, p. 231). Historically, the study of MHL was initiated in response to research in the field of health literacy. Health literacy is the ability to find, understand and use

health information to obtain or maintain positive health (Apfel & Tsouros, 2013; Berkman et al., 2010; WHO, 2013; Sørensen et al., 2012).

Jorm originally defined MHL as a construct with multiple components, including:

(a) the ability to recognise specific disorders or different types of psychological distress; (b) knowledge and beliefs about risk factors and causes; (c) knowledge and beliefs about self-help interventions; (d) knowledge and beliefs about professional help available; (e) attitudes which facilitate recognition and appropriate help-seeking; and (f) knowledge of how to seek mental health information. (Jorm, 2000, p. 396)

In a later definition, Jorm revised the components of the construct, focusing on knowledge as the core component of MHL:

(a) knowledge of how to prevent mental disorders, (b) recognition of when a disorder is developing, (c) knowledge of help-seeking options and treatments available, (d) knowledge of effective self-help strategies for milder problems, and (e) first aid skills to support others who are developing a mental disorder or are in a mental health crisis. (Jorm, 2012, p. 231)

In other words, to react appropriately to mental health strain, adolescents need to recognize early signs of mental health problems. Furthermore, they should also be aware of how to help themselves or where to find help (or at least know where to find this information). Thus, MHL is “knowledge that a person can use to take practical action to benefit their own mental health or that of others” (Jorm, 2019 p. 53). Specific attitudes towards mental disorders and help-seeking likely affect how knowledge is applied to pursue a positive mental health.

To include all determinants of a positive mental health, other authors further developed and expanded this definition. Kutcher et al. (2016), for example, added stigma and the ability to effectively ask for help (help-seeking efficacy), defining MHL as:

Understanding how to obtain and maintain positive mental health; understanding mental disorders and their treatments; decreasing stigma related to mental disorders; and, enhancing help-seeking efficacy (knowing when and where to seek help and

developing competencies designed to improve one's mental health care and self-management capabilities). (Kutcher et al., 2016, p.155)

Bjørnsen et al. (2017) observed that MHL seemed to overly focus on seeking help for mental disorders instead of focusing on maintaining a positive mental health. Thus, they introduced the concept of “positive mental health literacy”, defining it as “knowledge of factors promoting good mental health” (Bjørnsen et al., 2017, p. 7).

A growing body of research demonstrated that higher levels of health literacy are related to more positive health outcomes (WHO, 2013). Improving MHL is considered crucial to promote help-seeking among youth, either by empowering adolescents themselves or their guardians to seek help for mental health problems (Kelly et al., 2007). In several studies, young people with a high level of MHL showed better mental health outcomes, e.g. lower levels of depression (Lam, 2014; Olyani et al., 2022). MHL has been found to be relevant in suicide prevention. Higher levels of MHL were associated, for example, to lower suicide-related outcomes in adult women (Guo et al., 2023). A large amount of research has been dedicated to explore and improve the level of MHL in different populations (Furnham & Swami, 2018).

Adolescents have shown deficits in several aspects of MHL (Kelly et al., 2007). Young people have difficulties in recognizing mental health disorders. When presented with a vignette describing a peer with mental health disorders, approximately half of the participants were able to identify the disorder, particularly in vignettes displaying moderate (vs. severe) symptoms (Burns & Rapee, 2006; Kelly et al., 2007; Melas et al., 2013). Only a minority of students believed that a peer with mental health problems would need professional help (Melas et al., 2013). Young people often have negative attitudes towards pharmacological treatment for mental health problems, do not know where to find professional help and tend to prefer informal (friends, parents) sources of help (Furnham & Swami, 2018; Kelly et al., 2006; Rickwood et al., 2005). In many low- and middle-income countries, adolescents often exhibit particularly low levels of knowledge, high levels of stigma and mistrust of mental health services (Renwick et al., 2022). Socio-economical differences exist in MHL level, with females and people with high education displaying higher levels of MHL compared to males and people with low education (Bennett et al., 2023; Kaneko & Motohashi, 2007).

Parents and caregivers are often considered to have limited levels of MHL as well (Hurley et al., 2020). Factors such as culture, religion, stigma towards mental health problems, and distrust of professional helpers and treatments can hinder their ability to offer adequate support when their children are distressed (Hurley et al., 2020). Parents with adequate MHL levels are likely to support their children more adequately when they show signs of mental distress, whereas parents with low MHL tend to react in an overprotective, distressed, or withdrawn way (Bennett et al., 2023; Johnco & Rapee, 2018).

Despite a growing body of research (Furnham & Swami, 2018; Spiker & Hammer, 2018), a lack of clarity regarding how MHL contributes to actual mental health remains. The inconsistent definitions and the use of many different measurement instruments with dubious validation (Wei et al., 2015) further exacerbate these issues. There is a need for a clearer understanding of how different components of MHL contribute to mental health outcomes and how they can prevent suicidality.

Even when facing these ambiguities and difficulties, most educational suicide prevention programs explicitly target MHL to reduce suicide risk. Some programs focus on educating about the warning signs of suicide and where to find appropriate help if you are having suicidal thoughts (Aseltine & DeMartino, 2004; Story et al., 2016; Wasserman et al., 2010). Other programs, such as teen Mental Health First Aid (teenMHFA; Hart et al., 2020), focus on increasing knowledge of how to help a friend who is contemplating suicide and assign teens to be gatekeepers to friends in need. Others again focus on attitudes, self-stigma and stigma towards people with suicidal ideation (Dreier et al., 2023). Overall, these programs are based on the belief that improving MHL would result in improved self-help strategies, better support for friends, and an increased likelihood of seeking help.

2.4.1.2 Reduce Barriers Towards Help-seeking

Research on MHL has primarily focused on understanding and improving how young people recognize and respond to signs of mental health problems. When other coping strategies prove insufficient to deal with mental health problems, it may be important to seek help (especially professional help). Due to the severity of the problem, this is particularly important for suicidality (Campo, 2009). However, only ca. 1/3 of children and adolescents with people with mental health problems (Niermann et al., 2021; Hintzpeter et al., 2015) and

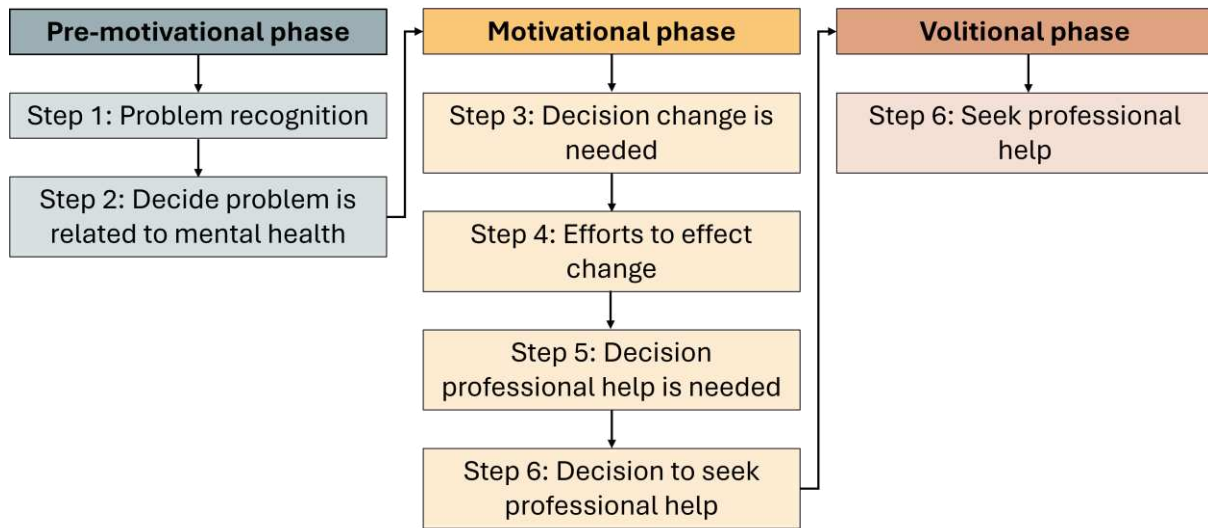
between 30 and 50% of young people with suicidal ideation receive professional help (Michelmore & Hindley, 2012; Pisani et al., 2012),

Help seeking is a dynamic and social process that comprises several stages (Saunders & Bowersox, 2007; Westberg et al., 2022). A classical model explaining help-seeking behaviour is the Anderson's (1968) Behavioral Model of Health Services Utilization. Anderson distinguished between predisposing factors, enabling factors and need factors. Predisposing factors are socio-demographic factors (i.e. gender, cultural norms) that increase the probability that somebody would seek help when needed (Anderson, 1968; see SoleimanvandiAzar et al., 2020). Enabling factors are factors that directly facilitate or hinder help seeking (i.e. wealth, distribution of services; Anderson, 1968; see SoleimanvandiAzar et al., 2020). Need factors are factors that influence how people perceive that they need help (i.e. knowledge about symptoms and health services, awareness of danger; Anderson, 1968; see SoleimanvandiAzar et al., 2020). Focusing on several decisional stages, Saunders & Bowersox (2007) developed a theory specific to mental health related help seeking. They described seven pre-motivational, motivational and volitional steps (Figure 4). At each stage, different barriers can hinder the process, like lack of knowledge, self-stigma or expected stigma, practical obstacles (i.e. costs, waiting times; Gulliver et al., 2010).

These models cannot be directly applied to adolescents. First, adolescents often need the assistance or support of their parents to access sources of help (Hassett et al., 2018). Second, several developmental peculiarities characterize help seeking behaviour in this age group (Rickwood et al., 2005) and adolescents are faced with limits in help-seeking capability (Levesque et al. 2013). Thus, specific models are needed to explain how adolescents decide

Figure 4

Saunders & Bowersox' (2007) Process of Help Seeking for Mental Health Problems

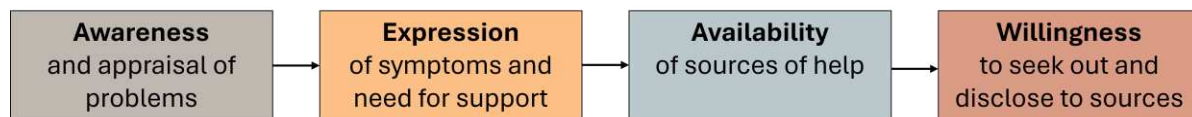


to reach out for help. Rickwood et al. (2005) describe help-seeking in this age group as a multi-step process and highlight both possible internal and external barriers in the process.

First, a young person needs to become aware of their mental health issues and decide that these issues may require outside help. The young person must then be able to express (find the right words to) their problems and their desire for help to potential helpers. Searching for help is only possible if sources of help are available, easily accessible, and familiar to the person seeking help. Finally, the young person must be willing to disclose their problems.

Figure 5

Rickwood's (2005) Process of Help Seeking for Mental Health Problems for Adolescents



Empirical research has confirmed the presence of several barriers indicated in Rickwood's model (Gulliver et al., 2010; Rickwood et al., 2005). Several studies suggested that young people find it difficult to recognize signs of mental health problems in both others and in themselves (Hellström & Beckman, 2021; Rickwood et al., 2005). Furthermore, adolescents often tend to appraise the symptoms of mental health problems as “normal” or “not serious

enough” to ask for help (Gulliver et al., 2010). Young people often feel insecure about how to express mental health issues out of the fear of not being taken seriously or of being misunderstood as exaggerated or attention-seeking (Hellström & Beckman, 2021). Lack of availability or accessibility of professional help-sources can be a problem in certain areas, for example among rural populations (Gulliver et al., 2010). Also, where help sources are available, they are not always known to adolescents and young adults (Gulliver et al., 2010). The strongest barriers to professional help, however, regard the willingness to seek out for help. It is a developmental task of adolescents to become increasingly independent. It is not surprising, thus, that adolescents prefer to rely on themselves than reach out for adult help during difficult times (Gulliver et al., 2010). When adolescents reach out for help, they prefer to disclose to peers and friends than to adults (Rickwood et al., 2005). Also, when young people perceive the need for external help, they often fear stigmatizing reactions from others (Gulliver et al., 2010). This is especially true for rural populations (Gulliver et al., 2010) and males (Hamilton & Klimes-Dougan, 2015). Finally, adolescents often fear the reaction of potential help providers and doubt their ability to help (Gulliver et al., 2010).

Internal and external barriers to help-seeking are particularly dangerous in the case of suicidal thoughts. Labouliere et al. (2015), for example, reported that self-reliance not only correlated with suicidality and severity of depression among a community sample, but also that it predicted suicidal ideation in a high-risk group. Of note, suicidal ideation seems to in fact reduce the readiness of help seeking among distressed young people (“help negation effect”; Yakunina et al., 2010). For these reasons, increasing help-seeking is one of the central goals of educational prevention programs (Kilmes-Dougan et al., 2013).

2.4.1.3 Reduce Risk Factors and Improve Coping Skills

A diverse range of skills can help young people to cope with distress and prevent the emergence of suicidal thoughts. Suicidal ideation often arises when young people experience a subjectively unbearable amount of mental pain and do not have any hope to change this situation (Liu et al., 2015). Other suicides are also due to impulsive, extreme reactions to strong emotions (McHugh et al., 2019). Among others, skills like mood management, stress-reduction, maintaining a good self-esteem, coping with addition, conflict management can reduce the risk of developing suicidal ideation (Robinson et al., 2018). Furthermore, ideation-to-action frameworks have identified several variables that increase the risk for suicide

attempts, like hopelessness, thwarted belongingness, burdensomeness and a feeling of entrapment (O'Connor, 2011). Reducing or preventing these mental states can help to reduce the risk of suicide attempts (Huen et al., 2015).

Suicide prevention programs focusing on these skills often offer practical training in the form of exercises or role-play in order to enhance these skills (Robinson et al., 2018; Wasserman et al., 2015). Ultimately, skills training is believed to improve young people's ability to respond to stress, which in turn prevents not only suicidal ideation and suicide attempts, but also leads to a better mental health status in general. (Robinson et al., 2018).

2.4.2 Educational Prevention Program Evaluation

School-based suicide prevention is a rather young field in public health research (Cusimano & Sameem, 2011). The first documented efforts to prevent suicide in schools began in the USA in 1985 with the Youth Suicide Prevention Act (Cooper et al., 2011). Research on suicide prevention in schools increased from 2000-2010 (Cooper et al., 2011). Early programs aimed to raise awareness, often discussing signs of suicide and appropriate responses. These programs aimed to destigmatize suicide by presenting it as a normal reaction to stress (Cusimano & Sameem, 2011). The first-generation awareness programs showed mixed results, with some improvements in knowledge and attitudes but also negative effects reported (Gould et al., 2003; see Section 2.4.2.3). Because of mixed results and insufficient evaluation studies, schools have been warned to adopt awareness suicide prevention programs (Katz et al., 2013; Kutcher et al., 2017).

Two prominent prevention programs contributed to a more optimistic view of educational prevention programs. The Signs of Suicide (SOS) program was the first educational suicide prevention program that assessed the effects on suicide attempts with a randomized controlled study for high-school (Aseltine & DeMartino, 2004) and middle-school students (Schilling et al., 2014). The program contains educational videos and interviews about depression and suicidal ideation. Students are encouraged to follow the ACT action steps: acknowledge suicide thoughts, care for friends with suicidal thoughts, and tell a trusted adult. Several randomized-controlled trials have demonstrated the efficacy of the SOS program (Aseltine & DeMartino, 2004; Aseltine et al., 2007; Schilling et al., 2016; Schilling et al., 2014). The program has shown significant improvements in suicide knowledge, attitudes, and

a reduction in suicide attempts. However, it had limited effects on help-seeking behaviours and suicidal ideation. Mediation analyses suggested a partial mediation: higher knowledge and more adaptive attitudes lead to less suicide attempts (Aseltine & DeMartino, 2004). These findings have been consistent across different study designs and samples, including students with a history of suicide attempts (Aseltine et al., 2007; Schilling et al., 2016).

A decisive support for educational programs resulted from the Saving and Empowering Young Lives in Europe study (SEYLE, Wasserman et al., 2015). It involved a multi-centred study involving 12 European countries and comparing a screening program, a gate-keeper program, an educational program, and a minimal intervention control group (posters in the classroom). The Youth Aware of Mental Health (YAM) program, an educational intervention for adolescents, was mainly based on information on depression and role plays where adolescents trained to solve several social difficult situations. The YAM program showed a significant reduction in suicidal ideation and suicide attempts after 12 months compared to the control group. Other intervention groups did not have a significant impact on these outcomes (Wasserman et al., 2015). Later studies supported these findings and demonstrated higher help-seeking behaviours, mental health literacy, and lower stigma among participants of YAM (Lindow et al., 2020; McGillivray et al., 2021).

2.4.2.1 Current State of the Research: Evaluation Studies

Several reviews on the efficacy of suicide prevention programs among youth were conducted over the years (Calear et al., 2016; Cooper et al., 2011; Cusimano & Sameem, 2011; Gijzen, 2022; Gould et al., 2003; Katz et al., 2013; Miller et al., 2009; Robinson et al., 2018; Singer et al., 2019; Walsh et al., 2022; Walsh, 2023). In their narrative systematic review, Robinson et al. (2018) identified seven RCTs that evaluated school-based suicide prevention programs; three of them evaluated universal, educational interventions (Aseltine et al., 2007; Orbach & Bar-Joseph, 1993; Wasserman et al., 2015). These studies reported significant effects of the programs on suicidal tendencies (Orbach & Bar-Joseph, 1993), suicidal ideation (Wasserman et al., 2015) and suicide attempts (Aseltine et al., 2007; Wasserman et al., 2015) compared to a control group at post-test (Orbach & Bar-Joseph, 1993), 3-months (Aseltine et al., 2007) or 12-months follow-up (Wasserman et al., 2015). A further 14 trials with a different design (no randomization, no control group or only pre-post design) revealed additional evidence for a reduction of suicide attempts and suicidal ideation.

Gijzen et al. (2022) conducted a meta-analysis that included all randomized-controlled trials that reported the effects of specific and upstream prevention programs on suicidal ideation or suicide behaviours. Eleven studies that fit their search criteria, out of them, ten were universal prevention programs (five upstream interventions, five specific programs for suicide prevention). Three were conducted in elementary school, the remaining programs in secondary schools. Six out of eleven studies only reported a pre-post-comparison, three a 3-month follow-up and only four had longer follow-up periods (6 months until 20 years). The meta-analysis showed small effects both on suicidal ideation post-test (Hedges' $g = 0.15$, 95% CI [.06, 0.24], $p = .001$) and on suicide behaviours (Hedges' $g = 0.30$, 95% CI [.15, 0.45], $p < .001$) at post-test and at follow-up ($g = 0.22$, 95% CI [.05, 0.39], $p = .01$; ($g = 0.22$, 95% CI [.05, 0.39], $p = .01$)).

Walsh et al. (2022) took a similar approach and reviewed all RCTs targeting suicidal thoughts and suicide behaviours both as a primary or secondary outcome. They retained 12 studies for their analysis. Walsh et al. (2002) calculated the effect size as OR. The intervention group exhibited a 13% decrease in the likelihood of suicidal ideation when compared to the combined control group (OR = 0.87 [95%CI: 0.78, 0.96]) and a decrease of 35% for the likelihood of suicide attempts (OR = 0.66 [95%CI: 0.47, 0.91]). The authors also calculated that every 47 students who participate in the program, one case of suicidal ideation can be prevented (25 for suicide attempts).

Examining the effects of prevention programs on suicidal ideation and suicide attempts requires large populations, since these events are rather rare (Nordentoft, 2011). For these reasons, many studies focused on assessing the effects of the programs on alternative outcomes. Educational programs have been shown to improve knowledge and attitudes towards suicidality, improve skills that decrease suicide risk (Robinson et al., 2013; Singer et al., 2019; Katz et al., 2013). Based on the Oxford Centre for Evidence-Based Medicine 2009 Levels of Evidence (Phillips et al., 2009), Katz et al. (2013) reported a grade of recommendation B/C for school-based prevention programs regarding an improvement of knowledge and attitudes (13 studies) and general skills that reduced suicide risks (4 studies). For help-seeking behaviour, the evidence was inconsistent (Grade D; 2 studies). This last finding was reinforced in a review on the effects of school-based prevention programs on

help-seeking (Klimes-Dougan et al., 2013) that revealed mixed effects on help-seeking intentions and behaviours.

The research on moderators and mediators of the effects of suicide prevention programs in school is still scarce (Miller et al., 2009; Musci et al., 2018; Walsh et al., 2022). Musci et al. (2018) observed in a systematic review that only a minority of evaluation studies on suicide prevention programs (24.6%) analysed potential moderators. The most explored moderators were gender, further demographic variables (age, income, ethnicity), mental health conditions, previous trauma, personality and cognitive characteristics (like problem solving abilities; Musci et al. 2018). Prevention programs partly have different effects on participants with different socio-economic characteristics (Klimes-Dougan et al., 2013; Miller et al., 2009; Musci et al. 2018). Especially, first generation programs seemed to have a more negative effect on males and on populations at risk (Klimes-Dougan et al., 2013; Musci et al., 2018). In several studies, females adopted more adaptive attitudes and behaviour after prevention programs than males (Hamilton & Klimes-Dougan, 2015). Negative reactions by students with a history of suicide were reported in first generation suicide prevention programs (i.e., the feeling that it would be more difficult to disclose suicidal ideation after these programs) (Klimes-Dougan et al., 2013). Universal programs seemed to have differential effects for ethnicity (less effective for African-American participants) but did not have differential effects depending on aggressivity or depression (Musci et al., 2018). Walsh et al. (2022) suggested some promising characteristics of the programs for the prevention of suicide attempts, i.e. one week or less of duration, involving multiple-stake-holders and long-term follow-ups (1 year or more).

There are evident limitations in the current literature evaluating educational suicide prevention programs (Miller et al., 2009). Only a minority of the studies (30%) used valid and reliable questionnaires. Many of the chosen outcomes were not relevant from a clinical point of view; e.g. it was unclear, if an improvement in knowledge really contributed to suicide prevention. Furthermore, none of the examined studies did account for the nested nature of the data in their data analysis (students nested in classes and/or in schools). Only one study (Orbach & Bar-Joseph, 1993) examined moderating effects of relevant demographic variables like gender, age or risk level. Pivotal data for the distribution in schools like costs, required materials or personnel were reported only sporadically. Cusimano & Sameem (2011) further noted that the external validity of most of the longitudinal studies

examined may have been undermined by notable attrition. Also, contamination effects may have reduced internal validity when the study recruited the intervention and control group in the same school. These problems have been only partly addressed in the following decade (Robinson et al., 2018). Only a small number of studies with small sample sizes targeted relevant outcomes such as risk-factors for suicide attempts (Gijzen et al., 2022). Walsh et al. (2023) reported that 20 out of 28 studies on school-based upstream suicide prevention had a moderate to high risk of bias. The causes were incomplete data, incorrect reporting of results, deviations from planned interventions, and the design of the randomization, particularly for non-RCTs. Funnel analysis suggested some publication bias in Gijzen's et al. meta-analysis (2022).

2.4.2.2 Acceptability and Cost-effectiveness

Overall, only a few studies examined the acceptability of educational programs by young people (Walsh et al., 2023). In a sample of older adolescents in the USA, 85.9% considered suicide a relevant topic for school prevention (Eckert et al., 2006). Several studies reported that students considered educational suicide prevention programs to be useful and worthwhile and would recommend them to friends (Bailey et al., 2017; Walsh et al., 2023). The satisfaction seemed to be higher for programs that required students' active participation and feedback (Walsh et al., 2023). Female students, however, rated these programs as more acceptable, less intrusive, and less demanding than male participants (Eckert et al., 2006). Although, some evidence showed that the interventions were perceived to be upsetting for students with previous suicidal ideation (Walsh et al., 2023).

School superintendents and school psychologists seem to show a higher acceptability of educational programs and gate-keeper programs compared to screening programs (Eckert et al., 2003; Miller et al., 1999; Scherff et al., 2005). Only limited evidence exists about the acceptability of suicide prevention programs by parents. The YAM prevention program, for example, was considered highly acceptable by parents of adolescents (Lindow et al., 2020). Screening programs, on the contrary, seem to be less acceptable for parents (Robinson et al., 2011).

There are only a few studies on the cost-effectiveness of educational programs. Ahern et al. (2018) analysed the cost-effectiveness of the interventions in the SEYLE-study. They

calculated that the YAM-program (educational) was more cost-effective than a screening or a gate-keeper program. However, the costs-effectiveness of the program still seems moderate, with a probability of 39% for the program to be considered cost-effective for preventing suicide attempts at a willingness to pay of 47 000 Euros (43% at 48 000 Euro for suicidal ideation).

2.4.2.3 Unwanted Negative Effects

In a narrative review focusing on unwanted negative effects, Kuiper et al. (2019) found 22 studies reporting negative effects of suicide prevention programs. Among educational programs, occasional negative effects were reported especially for the first generation of educational programs (Kuiper et al., 2019). Among those were: a slight increase in the attitude that suicide may be a solution for problems (Shaffer et al., 1991; Shaffer et al., 1990), particularly among males and ethnic minorities (Kuiper et al., 2019); the perception of study participants with previous suicidal ideation that students with suicidal ideation may be more prone to commit suicide after the program (Shaffer et al., 1991; Shaffer et al., 1990); the perception of male participants that the program may be upsetting and that it would be difficult to deal with suicidal peers (Kuiper et al., 2019; Shaffer et al., 1991; Shaffer et al., 1990); a higher number of students from ethnic minorities that did not know how to get help for suicidality after the program compared to before (Kuiper et al., 2019; Shaffer et al., 1991; Shaffer et al., 1990). In a further first-generation study, the authors reported an increase in hopelessness in male students after an educational program (Kuiper et al., 2019; Overholser et al., 1989). A minority of students (3%) reported finding a first-generation prevention program upsetting (Kuiper et al., 2019; Shaffer & Craft, 1999).

Kuiper et al. (2019) did not report any negative effects for more recent educational prevention programs. However, since those negative effects are seldom assessed, unwanted negative effects may be underreported (Kuiper et al., 2019).

2.5 Development of the Research Questions

2.5.1 Theoretical Framework: Research Questions 1.1 & 1.2

The field of school-based suicide prevention is characterized by a wide variety of prevention approaches; up to date, it is unclear which theoretical approach is the most effective in preventing suicide among young people (Hill et al., 2022). Educational programs have shown promising results in the prevention of suicidality among adolescents (Wasserman et al., 2015; Gijzen et al., 2022; Walsh et al., 2023). Ethical (i.e. randomization of young people to conditions that may not prevent suicidality) and practical concerns (i.e. need for very large samples) make it difficult to examine and understand their working mechanisms using experimental designs (Nordentoft et al., 2011). Still, it is crucial to understand what is really effective in preventing suicidal thoughts and attempts and how to design good, feasible evaluation studies to prove their effectiveness and safety.

In this thesis, the following research question has been examined:

- (i) What contents, methods and outcomes characterize safe and effective school-based, educational school prevention programs?

In fields for which empirical research is scarce or difficult to realize, expert opinions can be a first valuable base for the development of further research (Jorm et al., 2015). The following research question was examined through a Delphi-expert survey (Grosselli et al., 2021):

- Research Question (1.1):** What do experts recommend regarding outcomes and methods of school-based, educational prevention programs?

Improving MHL is considered a key outcome of educational programs targeting mental health in general and suicidality in particular (Grosselli et al., 2021; Reis et al., 2022; Robinson et al., 2018). However, it is not clear to which extent improving knowledge and MHL really leads to better mental health outcomes. We need more research to understand how MHL relates to other constructs more proximal to positive mental health, as the mechanisms underlying these relationships remain unclear (Spiker & Hammer, 2017). Thus,

the following research question has been examined in a systematic review of correlations (Grosselli et al., 2024b):

Research Question (1.2): How is mental health literacy related to more direct predecessors of mental health, like mental-health related stigma and help seeking?

These research questions will be addressed respectively in Chapter 3 and 4.

2.5.2 Program Development and Evaluation: Research Question 2

Overview works and calls to action on suicide prevention research have observed a lack of high-quality randomized, controlled studies. Furthermore, many studies did not explicitly assess acceptability and adverse events (Kuiper et al., 2019; Walsh et al., 2023).

The HEYLiFE program was developed during the NeSuD Project, basing on expert recommendations obtained with a three-staged-Delphi-study (Grosselli et al., 2021). For the evaluation study (Grosselli et al., 2024a), a randomized, controlled study (RCT) design was selected, one of the most solid study designs in the Hierarchy of Evidence (Howick et al., 2011). Since high practicability barriers like the large number of participants required made it unrealistic to investigate direct effects on suicidal thoughts and suicide attempt, expert's recommendations were used to choose the most relevant program outcomes related to suicidality (Grosselli et al., 2021). Furthermore, adverse events and acceptability were assessed. The research question regarding (ii) program development and evaluation (Grosselli et al., 2024a) was:

Research Question (2): Does the HEYLiFE suicide prevention program prove to be an effective, safe, and acceptable intervention for school-based suicide prevention in a randomized-controlled trial?

This research questions will be investigated in Chapter 5.

2.5.3 Differential Results: Research Questions 3.1 & 3.2

There is first evidence that educational programs can have differential effects for different groups of young people depending, for example, on gender, age, and risk status (Hamilton & Klimes-Dougan, 2015; Musci et al., 2018).

The following research question on iii) differential effects was examined in two empirical studies (Grosselli et al., 2024a; Knappe et al., 2024):

Is the HEYLiFE program effective for all students in secondary school? In particular:

Research Question (3.1): Does the HEYLiFE prevention program have differential effects on students with different demographic characteristics (gender, age)?

Research question (3.2): Does the HEYLiFE prevention program have differential effects on students with varying risk for suicidality?

These research questions will be examined respectively in Chapter 5 and Chapter 6.

Chapter 3 Dos and Don'ts in Designing School-Based Awareness Programs for Suicide Prevention

Abstract

Background: Despite the promising evidence for the effectiveness of school-based awareness programs in decreasing the rates of suicidal thoughts and suicide attempts in young people, no guidelines on the targets and methods of safe and effective awareness programs exist. *Aims:* This study intends to distill recommendations for school-based suicide awareness and prevention programs from experts. *Methods:* A three-stage Delphi survey was administered to an expert panel between November 2018 and March 2019. 214 items obtained from open-ended questions and the literature were rated in two rounds. Consensus and stability were used as assessment criteria. *Results:* The panel consisted of 19 participants in the first and 13 in the third stage. Recommended targets included the reduction of suicide attempts, the enhancement of help-seeking and peer support, and the promotion of mental health literacy and life skills. Program evaluation, facilitating access to health care, and long-term action plans across multiple levels were among the best strategies for the prevention of adverse effects. *Limitations:* The study is based on the opinions of a rather small number of experts. *Conclusions:* The promotion of help-seeking and peer support, as well as facilitating access to mental health care utilities, appear pivotal for the success of school-based awareness programs.

Background

The incidence of suicidal thoughts and suicide attempts increases steeply from the age of 12 (Cha et al., 2018). Although the suicide rate in young people is about half the suicide rate in older adults (Bertolote & Fleischmann, 2002), suicide is nevertheless the third most common cause of death for adolescents aged 15 to 19 years worldwide (World Health Organization [WHO], 2019).

School-based prevention programs are often considered among the key strategies of prevention among adolescents (Surgenor et al., 2016). School-based suicide prevention

programs can be categorized as awareness/education programs, gatekeeper education and screening programs (Robinson et al., 2013). Awareness programs are universal prevention strategies that aim to raise awareness of suicidality and provide education regarding recognition and help-seeking. Gatekeeper education and screening programs aim at identifying young people that may be suicidal through trained individuals or screening instruments and referring those in need to appropriate services (Gould et al., 2003; Robinson et al., 2013). Wasserman et al. (2015) demonstrated in a multi-centered randomized-controlled trial (RCT) that the Youth Aware of Mental Health (YAM-) program reduced suicide thoughts and attempts after 12 months compared to a minimal intervention. Meanwhile, a gatekeeper education program for school personnel and a screening program had no such effect. Similarly, the authors of the program Signs of Suicide (SOS) reported the reduction of suicide attempts in several RCTs (Katz et al., 2013). In a recent systematic review of reviews, Platt and Niederkrotenthaler (2020) reported that awareness programs seem to be the type of school-based prevention with the highest level of evidence in suicide prevention. However, further high-quality evidence is required to prove their effectiveness and usefulness. This is especially important in light of the substantial amount of evidence currently supporting the use of other universal prevention strategies, such as restrictions on common methods of suicide.

Several studies have reported unexpected negative effects of awareness programs, such as higher rates of negative attitudes towards help-seeking (Kuiper et al., 2019). Research on awareness programs has been further hampered by the lack of consensus regarding the safest and most effective methods, the need for large sample sizes and follow-up periods, as well as ethical concerns (Nordentoft, 2011). Evidence-based guidelines could therefore help to inform the quality and safety of future programs. Surgenor et al. (2016) developed ten general recommendations for school-based suicide prevention programs based on a scoping review. In this study, we used the expert Delphi survey method to formulate recommendations focusing on school-based awareness programs for suicide prevention, more specifically targeting: 1) which contents should be included and what would constitute favorable outcomes, 2) what precautions could prevent adverse effects and 3) what formats and techniques would be particularly useful?

Methods

A Delphi survey is a multi-stage survey incorporating multiple rounds of questionnaires administered consecutively to a panel of experts (Jones & Hunter, 1995; Jorm, 2015). After each round, participants are provided with individualized feedback containing the overall response of the panel. Experts are then asked to re-evaluate their initial responses. The Delphi process is repeated until a pre-arranged criterion is achieved. The most common criteria are consensus among participants or stable responses between subsequent rounds (von der Gracht, 2012). The Delphi survey in this report was conducted from November 2018 to March 2019 (Round 1: Nov. 20 to Dec. 06, 2018; Round 2: Dec. 21, 2018, to Jan. 09, 2019; Round 3: Feb. 14 to Mar. 3, 2019).

Formation of the Delphi Panel

We recruited international researchers in the fields of suicidality and suicide prevention. We aimed to reach a sample size of seven or more, as this number has been suggested to be the minimum required for stable group decisions (Häder, 2014). Researchers were considered to be experts if they contributed significantly to research on suicidality or had specific knowledge in awareness programs for suicide prevention in schools, which means: - they were the first authors of two or more research papers on suicidality or suicide prevention AND - had a Web of Science H-Score > 10 OR - led at least one research project on a school-based awareness program. To identify participants, one of the authors (KHe) conducted a literature search on GoogleScholar, Hogrefe, eLibrary and PsycINFO with the search terms: ["suicide*" OR "suicide prevention"] AND ["youth" OR "adolescent*" OR "school"] AND ["awareness" OR "curriculum" OR "program"]. The same author screened the results for relevant articles and generated an initial list of 76 researchers active in suicide research. Sixty-three researchers met the inclusion criteria and were invited via email to participate in the survey. Asking the candidates to suggest further experts in the field did not produce any further names.

Qualitative Survey (Round 1)

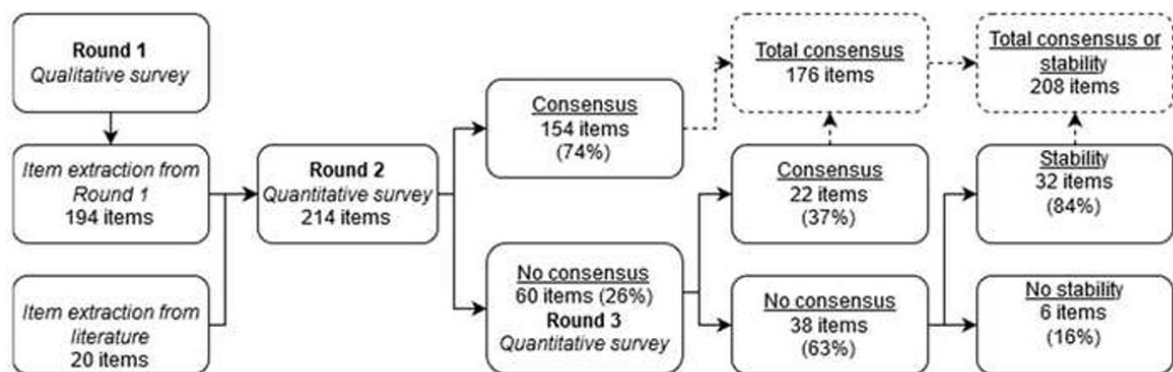
In the first round of the survey, the expert panel received open-ended questions generated by the research team (Table 1). Participants were encouraged to record up to five answers per question. The panel members completed the questionnaire via the online platform SoSci Survey (Leiner, 2016).

Quantitative Survey (Round 2)

Two of the authors (LG, KHe) reviewed the responses to Round 1. Similar answers were aggregated, duplicates were removed from the data. Disagreements were resolved through team discussions (LG, KHe, JH, SKn). Through use of this method, the research team created a quantitative questionnaire. To enhance its exhaustiveness, the authors supplemented the questionnaire with items derived from the literature (see Figure 6).

Figure 6

Overview of the Delphi Process



We opted for items referring to widely accepted theories of suicidality (as described in Teismann & Dorrman, 2014), as well as the methods of successful programs evaluated with RCTs (Aseltine & DeMartino, 2004; Wasserman et al., 2012). The questionnaire was administered online via SoSci Survey (Leiner, 2016). All 63 members of the original panel were invited to participate. Participants were asked to comment on the correctness and completeness of the questionnaire and to rate the items with regard to different criteria adapted from the ROAMER Expert-Survey (Elfeddali et al., 2014) and the indications of Häder (2014) about the conception of expert Delphi surveys (see Table 1).

Table 1

Questions and Rating Criteria of the Delphi Quantitative Survey

Theme	Question (qualitative survey)	Criteria & rating scales (quantitative survey)
Contents	Essential topics you recommend including in an awareness program?	Effectiveness for: a) mental health promotion; b) suicide prevention ¹ .
Favorable outcomes	Behavioral, emotional, and psychological effects that should be achieved?	a) Feasibility in a short intervention ² ; b) Effectiveness in reducing suicidality in the long term ² ; c) Importance in awareness programs (5 most important outcomes).
Adverse effects	Precautions to prevent unanticipated consequences?	a) Agreement with general statements on the safety of awareness programs ³ ; b) Importance of precautions for the prevention of adverse effects ⁴ .
Formats and techniques	Recommended intervention techniques?	a) Usefulness of techniques ⁵ ; b) Characteristics of educators ⁶ ; c) Appropriate group characteristics (min. and max. age and group size).

Note: The questions in this table are a short version of the original ones 1 Scale: 1 = very detrimental to 5 = very effective; 2 Scale: 1 = not at all to 4 = to a great extent; 3 Scale: 1 = strongly disagree to 4 = strongly agree; 4 Scale: 1 = I do not recommend doing this to 4 = very important; 5 Scale: 1 = Not necessary to 5 = very useful; 6 Scale: 1 = Detrimental to 5 = very important; ranking of profession from the most to the last indicated.

Statistical Analysis and Re-Rating (Round 3)

The research team analyzed survey responses (medians, interquartile range, kurtosis) using IBM Corporation's software SPSS, edition 25. Consensus was defined as an interquartile range (IQR) of 1 or below (see von der Graacht, 2012). An $IQR \leq 1$ indicates that 50% of the experts' responses are within an interval of one point of the Likert-scale, whereby the median indicates which point of the scale contains the majority of answers. Participants received the questionnaire in PDF-form via email. Each participant received personalized feedback for each of the items where consensus was not reached and was asked to re-rate those items on the same criteria and scales used in Round 2.

After completion of Round 3, IQRs and medians were computed again to determine consensus, while the Wilcoxon matched-pairs signed-ranks test was used to determine stability. This is a non-parametric equivalent of the paired t-test and is used to test for a difference in the mean tendency (median) of paired observations (here: pairs of responses from Rounds 2 and 3; Trevelyan & Robinson, 2015). To avoid unnecessary repetitions, the iterative process was terminated when items reached either consensus or stability (cft. von der Graacht, 2012). Items for which the participants reached consensus and had a median higher than the middle value of the scale were used for content analysis (LG, SKn) to delineate recommendations for school-based awareness programs.

Results

Panel Description

Of the 63 international experts approached, 36 did not respond to the invitation, and four declined participation due to lack of time or because they did not feel they had enough expertise. Twenty-three participants took part in at least one round of the survey: 19/63 (30.2%) participated in the first, 16/63 (84.2% of Round 1 participants) in the second, and 13/63 (81.3% of Round 2 participants) in the third round of the survey. Participants in the first round originated from 12 different countries, while participants in the second and third rounds originated from eight (overall: Australia, Austria, Canada, Germany, Iran, Israel, Italy, Hungary, Netherlands, Norway, Sweden, the United Kingdom and the USA). Three experts were contacted because of their specific knowledge as leaders of at least one awareness program, and all of them participated in all three rounds. The other participants were authors

of influential articles on suicidality and had a H-index > 10 on Web of Science (range: 14 to 99).

Delphi Process

Given the small number of items that did not reach the criteria of stability or consensus at Round 3 (6 items, 2,8% of total), we decided to terminate the survey, as a further round would not have added substantial findings.

Contents and favorable outcomes

In the quantitative survey, the experts were asked to rate the effectiveness of awareness programs when specific types of content were included (30 items). Only one item was rated as very effective for suicide prevention (Median = 5, IQR = 1), namely “Information about where to find help (in the community, at school)”. A further 27 items were considered somewhat effective (Appendix A, Additional Table 1).

We also asked participants to rate the importance, effectiveness, and feasibility of outcomes of awareness programs. Three out of 38 outcomes related directly to suicide (reduction of severe suicidal thoughts, fatal and non-fatal suicide attempts); the others were secondary outcomes. The panel expected awareness programs to affect suicide-related outcomes to a small extent (Median = 2, IQR = 1). The five items chosen by at least one third of the participants as the most important outcomes included the prevention of suicide attempts and the increase of both help-seeking and peer support. Ten secondary outcomes were identified to be both effective and feasible for suicide prevention in the long term (Median \geq 3, IQR \leq 1; Appendix A, Additional Table 2).

A content analysis of recommended types of content and outcomes resulted in eight central goals for awareness programs: 1. Fostering help-seeking (attitudes, behaviors); 2. Improving peer support for suicidal youth; 3. Improving mental health literacy including knowledge on mental health, mental health disorders and their treatments; 4. Education about suicidality (warning signs, real experience reports, false beliefs) and fostering helpful attitudes towards it; 5. Informing about issues related to suicidality (e.g. bullying, risk-taking behavior); 6. Improving life skills (coping with stress, communication, problem-solving); 7. Reducing stigma towards mental health disorders and help seeking; and 8. Reducing risk factors for suicide attempts (hopelessness, social isolation).

Prevention of adverse effects

We initially formulated 16 general statements regarding the safety of awareness programs. Although participants argued in favor of school-based awareness programs, they highlighted the need for both adapting these programs to the audience, as well as implementing plans to prevent adverse effects (Appendix A, Additional Table 3). In the subsequent rounds, the panel agreed that “The benefits of suicide prevention programs outweigh the unanticipated consequences” (Median = 3, IQR = 1). Of note, two items suggesting that talking about suicide with young people could increase suicidality did not reach consensus, although their median suggested rejection by most of the participants (Median = 2, IQR = 2). A further 27 items about precautions were rated as very or moderately important for preventing adverse effects (Median \geq 3, IQR \leq 1; Appendix A, Additional Table 4). Interestingly, to describe suicidality as a symptom of psychopathology (Median = 2.5, IQR = 2) and to focus on biological causes of mental health disorders (Median = 2, IQR = 2) were rated to be not so important by many of the participants. Overall, participants suggested to: 1. Embed suicide prevention in more general prevention programs; 2. Develop, evaluate and choose programs according to adequate scientific standards; 3. Follow guidelines for safe communication about suicide; 4. Facilitate access to treatment for participants; 5. Prepare long-term action plans to react to suicidality in the schools; 6. Train school personnel and parents to recognize and react to suicidality; 7. Create an appropriate setting (trained personnel, no punctual intervention); 8. Include types of content considered effective for suicide prevention.

Formats and Techniques

The appropriate age-range of the target population was estimated to be between 12 (M = 12.2, SD = 2.2) and 17 years (M = 16.5, SD = 6.9), with a group size between 8 (M = 8.4, SD = 5.8) and 20 individuals (M = 19.2, SD = 8.9). Among 17 intervention techniques, participants rated videos, skills trainings, signaling the presence of gatekeepers, web-based self-management components, and group discussions as the most useful techniques (Median \geq 4, IQR \leq 1; Appendix A, Additional Tables 5 and 6). The program should preferably be led by school-psychologists, psychologists, or trained teachers (mean ranks: 1.9, 2.9 and 4; school social workers and school guidance counselors were not included in response formats; Appendix A, Additional Table 7).

Discussion

Using a 3-stage expert Delphi survey, we developed recommendations about content types, outcomes, formats, and techniques of awareness programs, as well as precautions to prevent negative effects. These findings aim to inform the development, refinement, and dissemination of school-based awareness programs for youth suicide prevention.

In this study, participants rated the prevention of suicide attempts and increasing help seeking behavior as pivotal targets for prevention programs. This is in line with the idea that improving access to treatment for mental health disorders could be one of the most powerful suicide prevention strategies (Hegerl & Heinz, 2018). Mental health literacy, favorable attitudes towards help-seeking and communication skills are antecedents of help-seeking behaviors (Rickwood et al., 2005). Hence, the inclusion of this kind of content could be an important step to lower the barriers for access to mental health care. However, further research is needed to determine how awareness programs can promote actual help-seeking behavior (Platt & Niederkrotenthaler, 2020).

The expert panel also suggested that awareness programs should educate young people to react helpfully when peers show signs of suicidality. This seems particularly important since teenagers often disclose suicidal thoughts only to their friends (Rickwood et al., 2005). The “teen Mental Health First Aid” program, a program teaching young people to react appropriately to peers with mental health problems, has already been shown to increase the quality of support intentions towards suicidal peers (Hart et al., 2020). Future studies could investigate if programs focusing on peer support skills can also directly reduce suicide attempts and suicidal thoughts in participating schools. Furthermore, the expert panel recommended to “...embed suicide prevention in more general mental health fostering programs”. Future studies should consider the effects of more general prevention programs (e.g., programs educating about mental health) on suicide attempts and suicidal thoughts.

Overall, most of the survey participants supported the use of school-based awareness programs, stressing that the positive effects outweigh potential negative effects. Interestingly, some of the experts in our study did not support the suggestion to depict suicidality as a symptom of psychopathology, compared to a more normalizing explanation that suicide is the result of extreme stress. This may reflect the assumption that potential stigmas could dissuade young people from talking about their suicidal thoughts. However, Ciffone (2007) did not

find any decrease in help seeking attitudes among those who came to view suicide as a symptom of psychopathology. In fact, Ciffone (2007) asserts that associating suicide with psychopathology could increase the cognitive dissonance in people who were otherwise complacent with their own suicide thoughts, thereby increasing help-seeking. Future studies could investigate which of these two causal explanations is less adverse and more effective.

Nevertheless, the most common recommendation among panel members to minimize any potential adverse effects was to implement evidence-based prevention methodologies that are innocuously effective. The panel also suggested adopting multiple prevention strategies at schools, for example, developing school protocols and educating parents and teachers. Research shows multilevel interventions generally outperform single interventions (Hofstra et al., 2019). Future studies could test if this is also true for school-specific interventions. According to the expert panel, the ideal age for awareness programs should be between 12 and 17 years. Since most prevention programs that have been implemented up to now have been targeted towards 14- to 16-year-olds, it may be necessary to additionally develop and test programs for younger people. Recommendations from this expert Delphi survey should be interpreted against some caveats. First, these results depend on panel formation and on the information upon which participants based their judgment. The panel represents only a small number of experts in the field of suicide prevention. The research team also chose not to provide literature to the panel prior to the survey, mostly because the literature found failed to address the majority of our research questions. Thus, participants' answers are based on their own knowledge and experience. Second, a systematic literature search or a focus group prior to the survey could have improved its exhaustiveness. Third, for economic reasons, the research team decided to let experts re-rate only those items for which participants did not reach consensus. It is possible that a new rating of all items would have changed the results. Fourth, the inclusion of practitioners and stakeholders with experience in suicide prevention could likely add to our findings.

Conclusions

This Delphi survey is, to our knowledge, the first of its kind to explore contents, goals, and methods most suited for effective and safe awareness programs for youth suicide prevention. The improvement of help-seeking and peer support were recommended as key elements of awareness programs. A methodologically sound and long-term evaluation of programs, in

combination with long-term interventions in schools that help facilitate access to mental health care for students in need, could further help to prevent the occurrence of negative effects.

Chapter 4 Beyond Knowledge: A Systematic Review on the Correlation of Mental Health Literacy with Stigma and Help Seeking

Abstract

Improving Mental Health Literacy (MHL) is considered important to facilitate help-seeking for mental health problems. However, it is crucial to ascertain the true significance of increasing mental health knowledge (the central component of MHL) for prevention efforts. This systematic review analyses the direction and effect size of the correlations between knowledge and different facets of stigma (personal, public, self) and help-seeking (attitudes, intention, behaviour), highlighting current research gaps.

We conducted a PRISMA-based systematic analysis of quantitative cross-sectional or longitudinal data on the associations between mental health knowledge and mental health related stigma or help-seeking in Western populations. Peer-reviewed articles published since 1997 were retrieved via PubMed, PsycINFO and Web of Science, theses via DART-EUROPE, EBSCO-OpenDissertation and Google. The number of studies, types of outcomes, country, population, effect direction and size (median, range) are reported.

We identified 48 studies on the association between knowledge and stigma, and 39 on its association with help-seeking. Knowledge showed a medium-sized association with personal stigma (*Mdn r* = -.28; range -.54; -.06) and attitudes towards help-seeking (*Mdn r* = .29; range .04; .58) and a small association with self-stigma (*Mdn r* = -.18; range -.39; -.02), help-seeking intention (*Mdn r* = .15; range -.16; .40) and help-seeking behaviour (*Mdn r* = .15; range -.04; .68). Knowledge was not consistently related to perceived stigma (*Mdn r* = -.01; range -.29; .16).

While the direction of the correlations meets expectations, the only small to moderate effect sizes indicate that knowledge is relevant but by far not sufficient for effectively supporting lower self-stigma and more adequate help-seeking. We identified several research

gaps, such as a scarcity of studies with rigorous methodological standards and with older or clinical populations. We also propose to include a broader range of possibly empowering variables in future studies.

Introduction

More than 1 billion people worldwide suffer from mental disorders each year (The Lancet Global Health, 2020). Mental disorders make up for 32.42% of years lived with disability (Vigo et al., 2016). The economic burden of mental illness has been estimated as high as \$2.5 trillion per year (The Lancet Global Health, 2020) and originates both from both direct costs for health care and indirect costs due to the inability to work. This burden can be reduced through preventive action, for example providing fast access to appropriate care (McDaid et al., 2019). However, up to 54% of people with a mental illness in the last year used mental health services in Europe (European Commission, 2023). Reasons can be structural (i.e. lack of access to treatment, associated costs) but also related to the individual, such as lacking skills to recognize mental disorders, negative attitudes towards help-seeking or scarce knowledge about where to seek help (Gulliver et al., 2010).

To reduce the burden of mental illness, it is necessary to empower the population to take care of their own mental health needs (see the Ottawa Charta Statement; WHO, 1995). Awareness campaigns, prevention programs and capacity-building (e.g. EU-promens, 2024) improving *Mental Health Literacy* (MHL) are key strategies to improve early intervention for mental health problems (Kelly et al., 2007). Jorm et al. (1997, p. 231) coined the term MHL to indicate the “knowledge and beliefs about mental disorders which aid their recognition, management, or prevention“. They described MHL as a multifaceted construct encompassing 7 components: recognition of mental disorders, knowledge of how to seek mental health information, knowledge of mental health risk factors, knowledge of aetiology/causes of mental illness, knowledge of self-treatment, knowledge of professional help available, and attitudes that promote recognition of appropriate help-seeking behaviour (Jorm et al., 1997). In the following years, a broad body of research developed around MHL, giving birth to more than 500 articles examining *general* MHL as well as MHL regarding *specific* mental disorders, such as depression or anxiety literacy (Furnham & Swami, 2018). MHL research has proven extremely useful for mental health prevention. Nevertheless, its definition and measurement varied considerably among studies (Wei et al., 2015) and provided mixed results on the predictive value of MHL for prevention effects (Coughlan et al., 2024).

The primary facet of the construct is *mental health knowledge*, encompassing knowledge about mental disorders that can be used for prevention or for choosing effective treatment (Spiker & Hammer, 2019; Jorm et al., 2000). However, several later definitions and instruments measuring MHL also included further facets related to mental health, like attitudes, stigma and self-efficacy in seeking help (Wei et al., 2015; Spiker & Hammer, 2019). This broad and somewhat vague definition of MHL makes it challenging to isolate the specific role of mental health knowledge in preventing mental health disorders (Spiker & Hammer, 2018). To develop more effective interventions for enhancing mental health, it is essential to understand how mental health knowledge is related to other relevant constructs such as stigma and help-seeking as opposed to subsuming them into an overarching construct (Spiker & Hammer, 2018; Kutcher et al., 2016). By studying these relationships, we can better comprehend the specific contributions of mental health knowledge to overall mental health and develop targeted strategies to improve it.

Mental health related stigma has been defined as stereotypes, prejudice, and discrimination against the mentally ill (Correll et al., 2010; Corrigan, 2004). *Personal stigma* comprises stigma towards other people with mental disorders or people who seek aid for mental health problems (Correll et al., 2010; Corrigan et al., 2011). The term *perceived stigma* indicates the perception of the level of stigma in the society. Personal and perceived stigma can lead to *self-stigma* when people project these stereotypes to themselves (Sheehan et al., 2017; Vogel et al., 2013; Corrigan et al., 2011). Mental health related help-seeking has been conceptualized as a multi-stage-process, with the recognition of a mental health problem and the decision to reach out for help being predecessors of help-seeking behaviour (Saunders & Bowersox, 2007; Webb & Sheeran, 2006). Addressing the different motivational stages of this process, we can differentiate between *attitudes towards help-seeking* (pre-decisional beliefs regarding the action of seeking help), *help-seeking intentions* (propensity to seek help when needed) and *help-seeking behaviour* (the action of seeking help) (Rickwood & Thomas, 2012). Differentiating among these components is crucial to allow for more precise conclusions about the role of MHL for reducing stigma and increasing help-seeking; furthermore, it could highlight gaps in the body of research and help to inform future studies.

While numerous studies reported correlations between knowledge, stigma and help-seeking, there are only few studies synthesizing this wide body of research. Meta-analyses of interventions targeting MHL reported a contingent increase of MHL levels (Mills et al., 2023;

Amado-Rodríguez et al., 2022; Freţian et al., 2021). However, educational interventions do not always seem to have a comparable impact on stigma and help-seeking (Amado-Rodríguez et al., 2022). Several reviews and meta-analyses confirmed the correlation between mental health related stigma and help-seeking (Clement et al., 2015; Schnyder et al., 2017; Lien et al. 2004). A recent meta-analysis reported a negative, small correlation between recognition of mental health disorders (a specific facet of mental health knowledge) and mental health stigma as well as a positive, medium size correlation between recognition and attitudes towards help-seeking (Lien et al., 2024). Özparlak et al. (2023) reported a very large correlation of MHL with attitudes towards help-seeking, as well as a medium-sized correlation with help-seeking intentions in young people. The direction and magnitude of the correlation between other facets of mental health knowledge, stigma and help-seeking, as well as the correlation in other populations have not been investigated in reviews or meta-analyses so far.

This study aims to fill this gap, by examining the correlation of mental health knowledge with mental health related stigma and help-seeking. We conducted a systematic review of quantitative studies that report relevant correlations, extracting the direction and effect size of these correlations. We defined *mental health knowledge* as knowledge of at least one of the mental health literacy factors included in the original MHL definition (knowledge about recognition, causes, risk-factors, self-help interventions, treatments, sources of information; Jorm, 1997). We differentiated between different facets of mental health related stigma (personal, perceived, and self-stigma) and help-seeking (attitudes, intentions, and behaviour). Due to the large extent of culture-specific influences on MHL (Furnham & Swami, 2018; Lien et al., 2024), we limited this systematic review to studies with Western, industrialized populations. For the same reason, we aimed to report demographic characteristics of the study populations and the type of MHL assessed in each study, distinguishing between disorder-specific and general instruments. We aimed to summarize the present body of evidence, as well as point out possible areas that have not been yet investigated. Basing on existing literature (see Furnham & Swami, 2018), we hypothesize that knowledge has a negative correlation with all facets of stigma, as well as a positive correlation with all facets of help-seeking.

Methods

A systematic review in accordance with the PRISMA statement for reporting systematic reviews and meta-analyses was conducted (Liberati et al., 2009). In advance, a protocol for

this review was registered in the international database PROSPERO (Record ID: 218821). This article reports the results of the analysis of quantitative studies. The changes between the preregistration and this article can be found in the Appendix B (Appendix B, Additional Table 1).

Inclusion Criteria

Eligibility criteria were formulated basing on the PICOS study characteristics (Liberati et al., 2009). Only studies with Western populations (USA, Canada, Europe, Australia, and New Zealand) excluding samples with more than 50% indigenous and first-generation immigrant populations were included (*Populations*). For mental health knowledge we used Jorm's definition (1997) and included studies assessing one of following knowledge related facets of MHL: knowledge of mental disorders, recognition of disorders, knowledge of risk factors and causes, knowledge of self-treatment, knowledge of professional help available, knowledge of how to seek information, knowledge of prevention. We included only studies that assessed the correlation between mental health knowledge and at least one of the following variables: mental health related personal stigma, self-stigma, perceived stigma, attitudes towards help-seeking for mental disorders, help-seeking intentions, help-seeking behaviours (*Outcomes*). For MHL, only instruments assessing actual knowledge (as opposed to self-estimated knowledge, e.g. "I know much about mental illness") were included. To enhance the reliability of this review, only studies using more than one item to measure the outcomes of interest were included. An exception was made for help-seeking behaviour, since this is mostly a binary (yes/no) variable. As relevant coefficients we only considered first order correlations (see Savitz & Olshan, 1995) and coefficients that could be translated into first order correlations (*OR*, *t* and *F* values, chi-square value). *OR*, T-test or χ^2 -test statistics were transformed into *r* coefficients with the help of an effect size conversion software (Lenhard & Lenhard, 2016). As suggested by Savitz and Olshan (1995), we reported only the data of the baseline measurement in case of multiple measurements. No restrictions were made about *Interventions* or *Comparators*. Quantitative studies, observational and experimental cross-sectional and longitudinal studies were included (*Study designs*). Papers published between 1997 (year of the first definition of the concept of MHL) and June 4th, 2024 and which were fully available in languages that could easily be translated into English through Google

Translator were included. For more detailed inclusion and exclusion criteria, please see the registration protocol (Grosselli et al., 2021).

Information Sources and Search Strategy

Studies were identified by searching the electronic databases PubMed, PsycINFO (via EBSCO) and Web of Science. To counterbalance publication bias, DART-EUROPE, EBSCO-OpenDissertation and Google were searched for grey literature in form of theses and dissertations. The search was conducted first on October 20, 2020, and then repeated on March 19th, 2023 and June 04th, 2024. The search strategy was based on MeSH words / thesaurus vocabulary and keywords in the title and abstract (available at request to first author). One author (LG) first developed a search strategy for PubMed. The Polyglot tool (Systematic Review Accelerator; Clark et al., 2020) was used to facilitate the translation of a PubMed search syntax into Web of Science and PsycINFO. A librarian of the university library of the Technische Universität Dresden was consulted for clarifications. In DART-EUROPE we used the keyword Mental Health Literacy. The EBSCO-OpenDissertation database was searched for “Mental Health Literacy” AND (“Help-seeking” OR Stigma). To find further theses, a search was performed on Google for "Mental Health Literacy" AND "Master Thesis" AND (Stigma OR "Help-seeking") and the first 10 hits were included.

Study Selection

The software Rayyan (Ouzzani et al., 2016) was used to manage the study selection. Duplicates were removed. To avoid multiple reporting from the same database, two authors (HB, LG) compared the authors and sample-sizes of articles. Data from different articles deriving from the same study was extracted only once. Two collaborators independently examined the title of the results of the literature search and removed all clearly irrelevant reports based on the inclusion criteria. After that, abstracts were screened and, when appropriate, the full text was read. In the case of exclusion, the reason was documented. Discrepancies were resolved by discussion within the study team (LG, JB, HB). Neither of the review authors were blinded to journal titles, study authors or institutions. If the full text of an article was not accessible to the author, the first author was contacted to gain access; in case of no answer after 2 weeks, the study was excluded. When the article reported on the correlation between the constructs of interest, but it was not possible to extract first order

correlations (e.g. only regression coefficients of a multiple regression reported), the corresponding author of the paper was asked per e-mail to provide the correlations.

Data Extraction Process

For data collection (including the documentation of the selection process), a Data Extraction Protocol adapted from the Cochrane Public Health Group Data Extraction and Assessment Protocol Template (Cochrane Public Health Group, 2011) on the Excel Online platform was used. After 1-day training consisting of an introduction to the Data Extraction Protocol and jointly coding 5 articles, two authors (LG, HB) piloted the article selection and data extraction process with 20 articles and made further adaption of the protocol. Two authors cooperated in the data collection process (HB, LG). The following information was extracted: year, country, study design, sample size, sample description (age, gender, type), type of stigma or help-seeking variables included, size and direction of correlation.

Risk of Bias in Individual Studies

The Study Quality Assessment Tools (NHLB-Institute, 2018) were used to evaluate the risk of bias of individual studies. These tools offer checklists to evaluate the quality of quantitative studies with different designs as good, fair or poor. Since we only observe correlations and not causal relationships, non-relevant categories were not considered. Two team members pro article conducted the assessment independently in a non-blinded manner. Disagreement was resolved through discussion. The assessment was first piloted on 20 articles to ensure sufficient reliability. Study quality was taken into account by testing whether the median correlation in each category differed significantly when eliminating studies with poor quality from the review.

Data Synthesis

We used a systematic approach for data interpretation. We reported all results separately for different facets of stigma (personal stigma, perceived stigma, self-stigma) and help-seeking (attitude, intention, behaviour). We reported the number of studies and described their country of origin, the type of MHL analysed (general vs. specific disorder), age and mental health status of the population, and the study design (cross-sectional vs. longitudinal). For each study, we extracted first order correlations or related coefficients (OR, t-test or χ^2 -test statistics) between the constructs of interest. When a study reported multiple correlations

between variables of the same type (e.g. personal stigma measured through two different questionnaires), we pooled them using the metaanalysis for correlations with random effects procedure using the MedCalc software (Schoonjans et al., 1995). To visualize the effect size of the correlation r , we used Forest plots (Aloe, 2015; Combs et al., 2019). We refrained from conducting a meta-analysis to calculate pooled correlations between MHL and the constructs of interest since previous studies reported a very high heterogeneity in the construct definitions, questionnaires, and samples (Lien et al., 2024; Özparlak et al., 2023, Wei et al., 2015). To avoid producing a highly unreliable score by merging diverse coefficients, we chose a descriptive approach and reported the number of studies with a positive, negative or non-significant correlation, their effect sizes as well as their median and the range for each type of outcome. Effect sizes were interpreted following Funder and Ozer (2019) indications (very small: $r < .10$; small: $.10 \leq r < .20$; medium $.20 \leq r < .30$; large $.30 \leq r < .40$; very large $r \geq .40$).

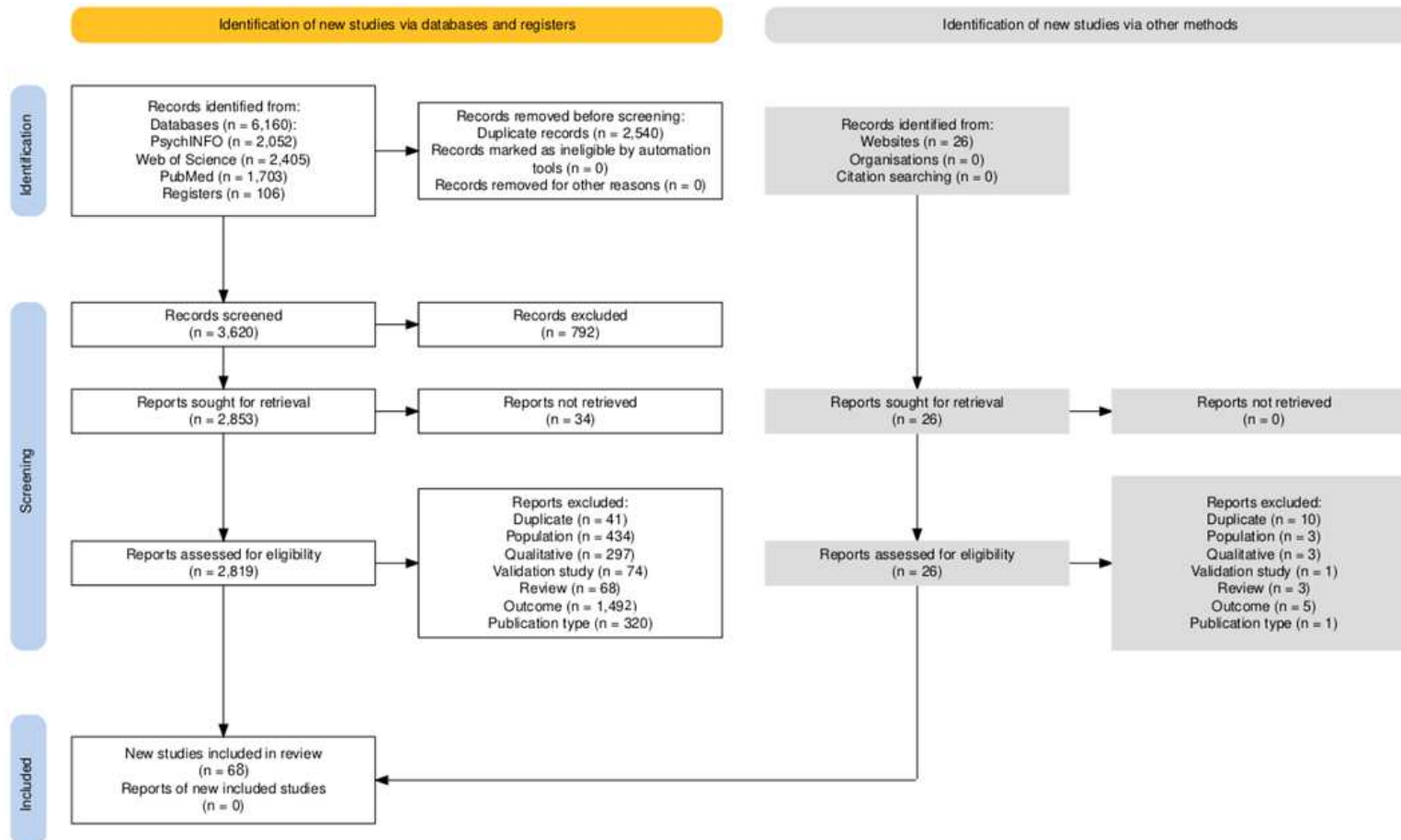
Results

The systematic search produced a total of 3636 unique entries (Figure 7) of which 2202 were identified at first search, and another 961 and 497 at second and third search, respectively.

After a thorough examination, 64 publications were included immediately, 4 after the authors provided first order correlations via e-mail (33 further requests for correlations remained unanswered). This produced a total of 68 publications (59 peer reviewed articles, 9 doctoral thesis) included in the search results; 48 publications reported the correlation between knowledge and stigma, 39 between knowledge and help-seeking.

Figure 7

Prisma Flow Diagram of the Systematic Review



Most studies were conducted in the USA ($k = 26$ studies), followed by Australia ($k = 13$), the UK ($k = 10$), Canada ($k = 8$), Germany ($k = 6$), Portugal ($k = 2$), Italy ($k = 2$) and Slovakia ($k = 1$). In total, 50446 subjects (48.35% males) participated in the studies included. Eighteen studies were conducted with adolescents, 17 with students or young adults, 8 with a general population, 6 with a clinical population, 4 with athletes, 4 with public workers, 4 with people with a social profession, 3 with a rural population, 3 with other populations (veterans, leaders, researchers, parents of adolescents). Forty-four studies assessed general knowledge about mental health; 11 studies assessed specific knowledge about depression (incl. postpartum depression), 6 anxiety disorders (incl. PTSD), 4 suicidality, 2 eating disorders and 2 psychotic disorders. We found $k = 53$ cross-sectional studies, $k = 4$ longitudinal studies, $k = 6$ randomized-controlled trials (RCT), $k = 3$ non-randomized controlled trials, $k = 2$ intervention trials without control group (pre-post). Table 2 summarizes the number of non-significant and significant correlations (with their effect sizes) reported in the examined studies. Figures 8 to 11 contain the forest plots of the correlations. The extraction protocol with the included studies, their characteristics, the quality rating, and the correlations extracted as well as funnel plots can be obtained by asking the first author.

Personal Stigma

The pooled correlations between knowledge and personal stigma for each study is depicted in Figure 8. Of the 37 studies on personal stigma, 32 studies reported significant, negative correlations, while five reported non-significant correlations with knowledge. Most correlations had a medium ($k = 10$) or large ($k = 9$) effect size. The median effect size suggested a medium, negative correlation ($r = -.28$).

Perceived stigma

Figure 9 shows the pooled correlations of knowledge with perceived and self-stigma. Four out of 15 studies found a significant correlation between perceived stigma and knowledge; two of them reported a negative small to medium correlation, two a positive very small to small correlation. Most of the studies ($k = 11$) reported non-significant correlations and the Median r was near zero ($r = -.01$), suggesting no correlation between knowledge and perceived stigma.

Table 2

Number of Studies (k), Sample Size (n), Direction and Effect Size (r) of the Associations of Mental Health Knowledge with Mental Health Related Stigma and Help-seeking

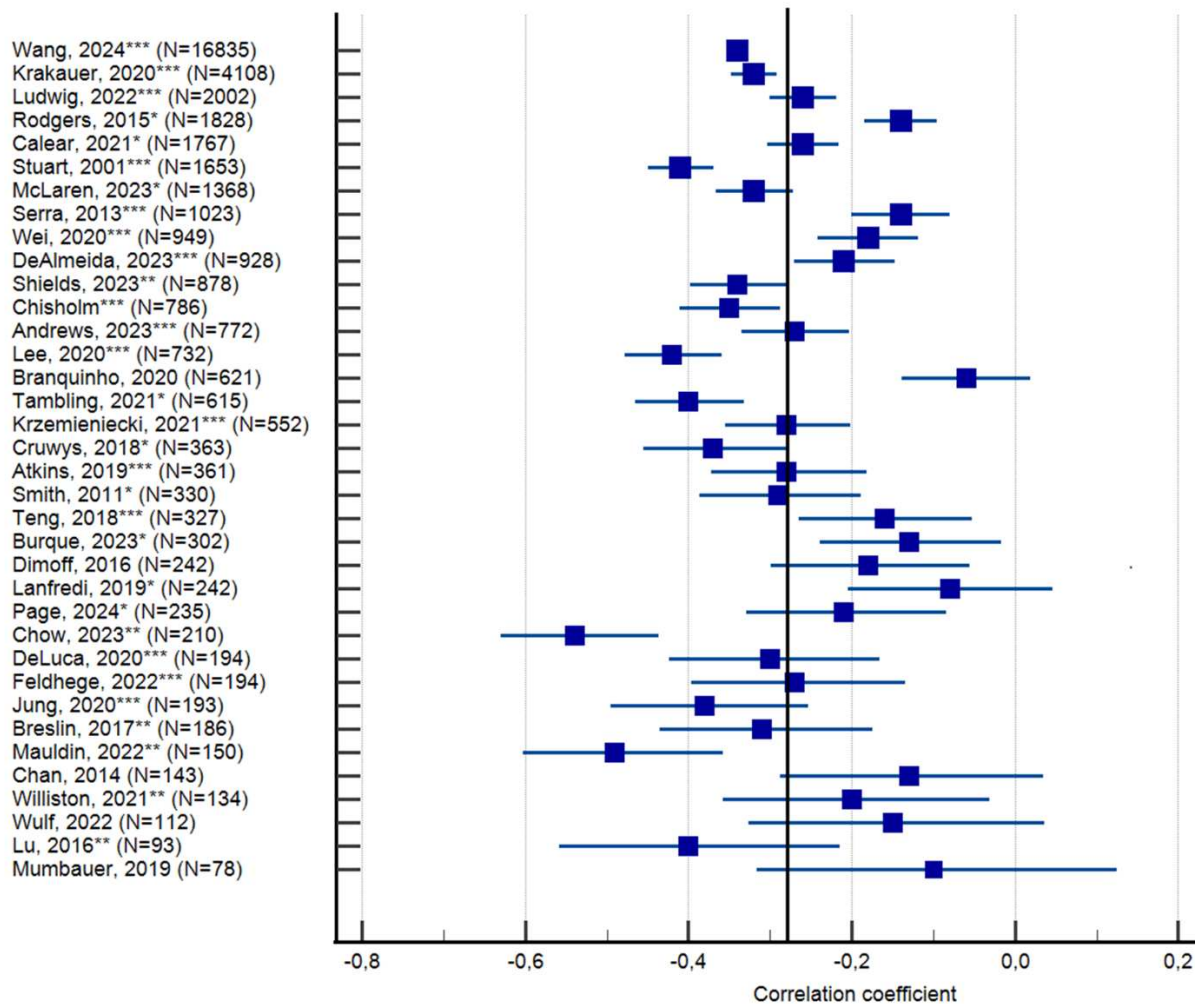
<i>Effect size</i>	Negative correlations <i>k (n)</i>					Positive correlations <i>k (n)</i>					Non-significant correlations <i>k (n)</i>	<i>Mdn r (Min r; Max r)</i>
	<i>Very small</i>	<i>Small</i>	<i>Medium</i>	<i>Large</i>	<i>Very large</i>	<i>Very small</i>	<i>Small</i>	<i>Medium</i>	<i>Large</i>	<i>Very large</i>		
Stigma												
Personal stigma	1 (242)	5 (4429)	10 (7275)	9 (24911)	6 (3453)	/	/	/	/	/	5 (1196)	-.28 (-.54; -.06)
Perceived stigma	/	1 (361)	1 (99)	/	/	1 (1767)	1 (552)	/	/	/	11 (3191)	-.01 (-.29; .16)
Self-Stigma	/	1 (230)	4 (2925)	3 (454)	/	/	/	/	/	/	6 (870)	-.18 (-.39; -.02)

Help-Seeking

Attitudes	/	/	/	/	/	/	4 (4488)	1 (168)	3 (457)	3 (394)	1 (285)	.29 (.04; .58)
Intention	1 (32)	1 (369)	/	/	/	/	11 (8923)	3 (704)	2 (431)	1 (203)	8 (4167)	.15 (-.16; .40)
Behaviour	/	/	/	/	/	/	2 (504)	/	1 (114)	1 (28)	3 (1655)	.15 (-.04; .68)

Figure 8

Correlations (r) between Mental Health Knowledge and Personal Stigma (Vertical Line = Median)

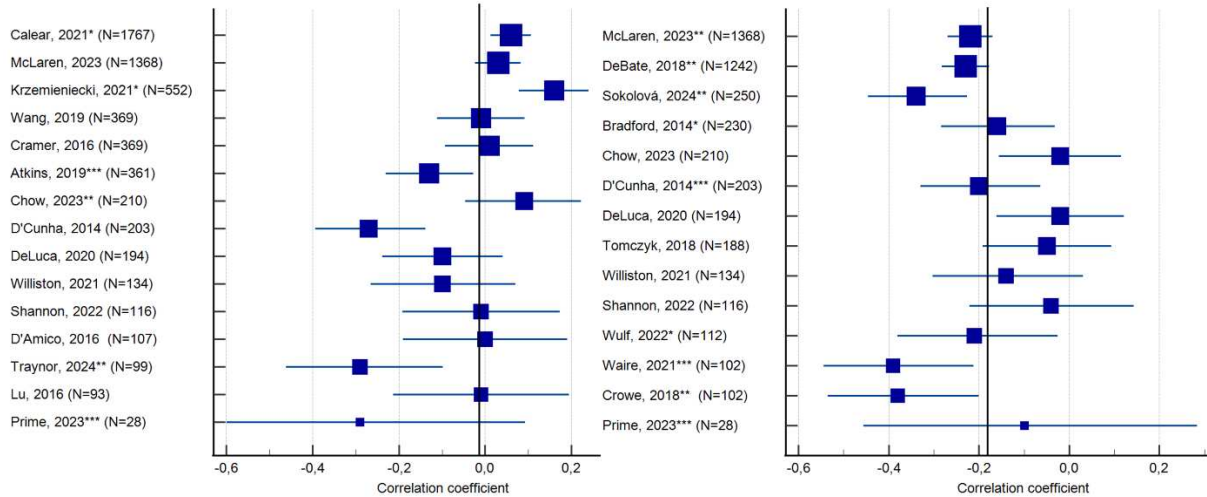


Self-stigma

Eight out of 14 studies measuring the relationship between self-stigma and knowledge found negative significant correlations, most of them ($k = 4$) with a medium effect size. The remaining six reported non-significant correlations. The median effect size was small ($r = -.18$), suggesting a small sized, negative correlation between knowledge and self-stigma.

Figure 9

Correlations (r) of Mental Health Knowledge with Perceived Stigma (Left) and Self-Stigma (Right; Vertical Line = Median)

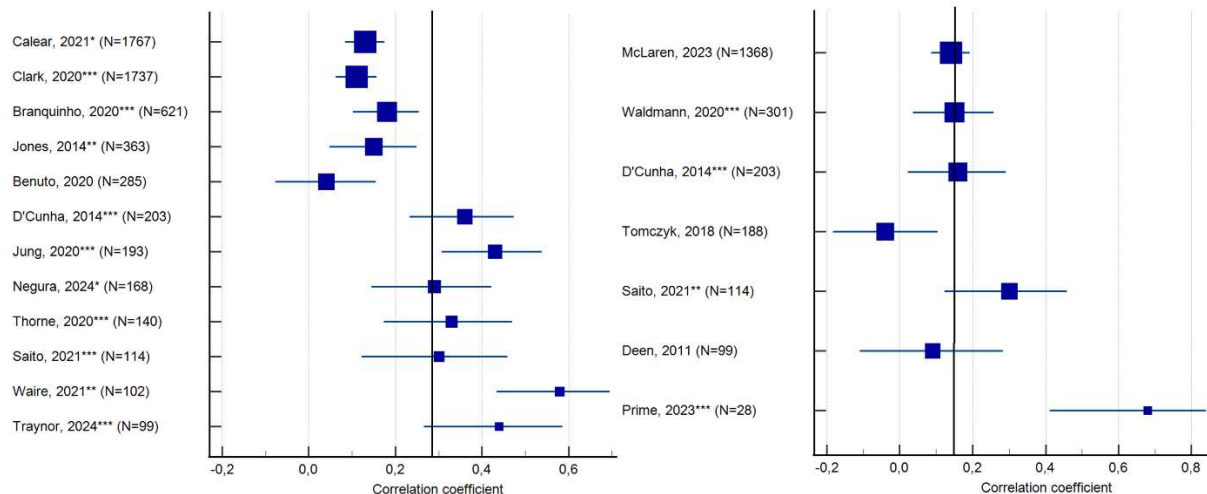


Attitudes towards help-seeking

Figure 10 shows the pooled correlations of knowledge with attitudes towards help-seeking.

Figure 10

Correlation (r) of Mental Health Knowledge with Help-Seeking Attitudes (Left) and Behaviour (Right; vertical line = Median)



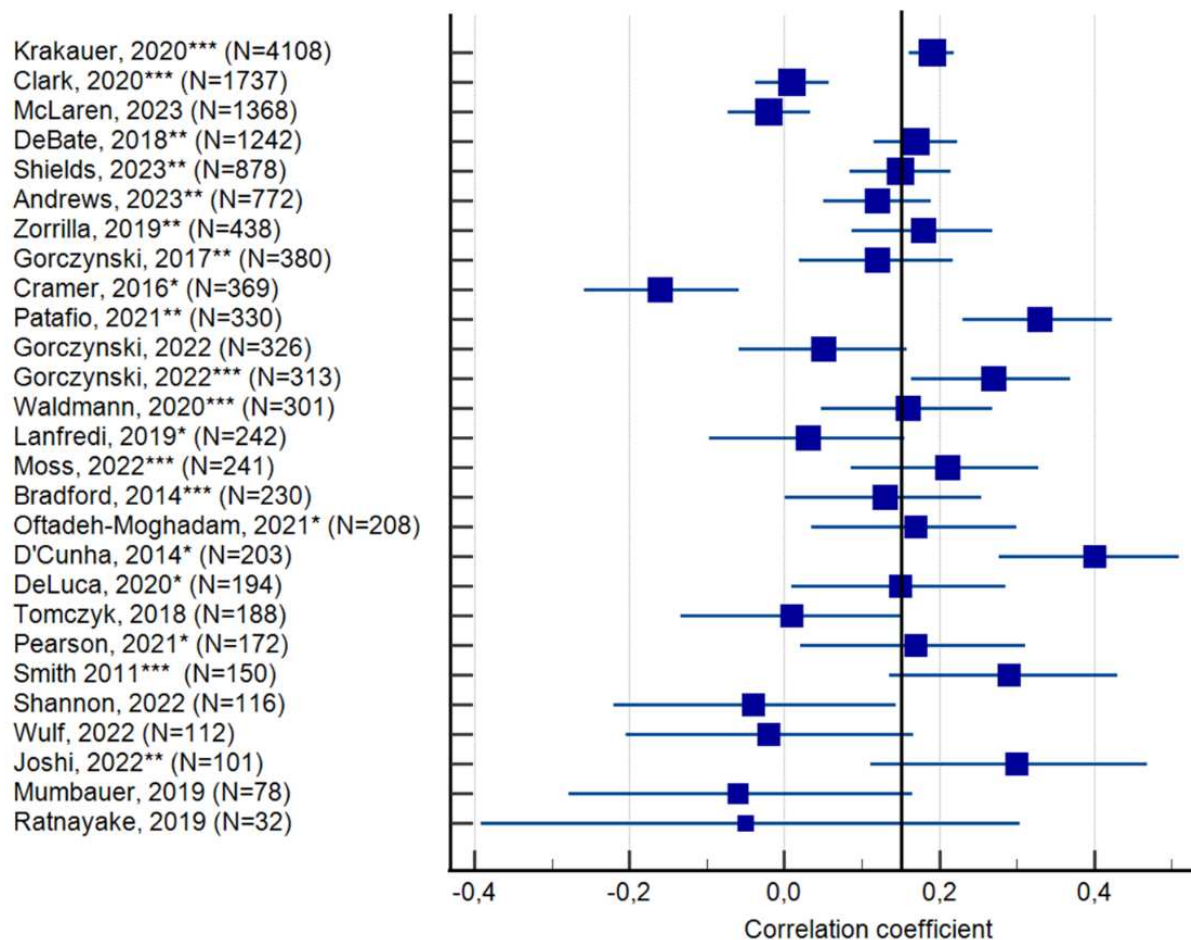
Eleven out of 12 studies found a significant, negative correlation, with effect sizes ranging from small ($k = 4$) to very large ($k = 3$). The median effect size was medium ($r = .29$). The overall data suggest a positive, medium size correlation between knowledge and attitudes towards help-seeking.

Help-seeking intentions

Twenty-seven studies reported the correlation between knowledge and help-seeking intentions (Figure 11). Two studies found a very small or small significant, negative correlation. Seventeen studies found a significant, positive correlation. Most of these studies reported small effect sizes ($k = 11$) and the median effect size was small ($r = .15$), suggesting a small, positive correlation between knowledge and help-seeking intentions.

Figure 11

Correlations (r) between Mental Health Knowledge and Help-Seeking Intentions (vertical line = Median)



Help-seeking behaviour

Three out of seven studies measuring the relationship between knowledge and help-seeking behaviour found a non-significant correlation (Figure 10). Two studies reported small correlations, one study a large and one a very large correlation. The median effect size was small ($r = .15$). Although the number of measured correlations is small, these data could suggest a small, positive correlation between knowledge and help-seeking behaviour.

Overall study quality and publication bias

The quality of nine studies was evaluated as “poor”. After eliminating these studies, results changed marginally, mostly towards slightly weaker associations (Appendix B, Additional Table 2) but not changing the magnitude or direction of the results. It is notable, however, that only one study remained that found a significant association between mental health knowledge and help-seeking behaviour.

The funnel plots mainly suggest substantial heterogeneity of methods, instruments and populations, since the range of results is often wide, even in large studies. Publication bias seems possible for attitudes towards help-seeking, since the funnel plot shows a distribution that is skewed to the right side (i.e. positive/significant results seem more likely to be published).

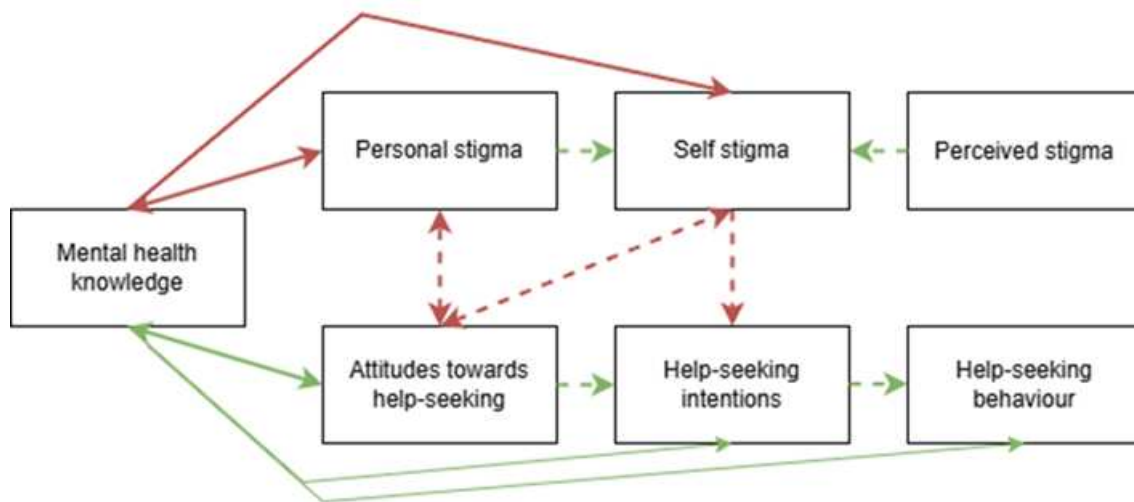
Discussion

To our knowledge, this is the first systematic review that examines the relationship of mental health knowledge with different aspects of mental health related stigma (personal, public, self-stigma) and help-seeking (attitudes, intention, behaviour) in Western countries. As expected, mental health knowledge was observed to negatively correlate with some, though not all, facets of stigma; also, mental health knowledge was positively correlated to all facets of help-seeking. However, the effect size of these correlations is only moderate. In particular, findings indicate that people who know more about mental health hold less stigmatizing attitudes towards others and towards themselves due to mental disorders (personal stigma, self-stigma). These correlations have a small (self-stigma) to medium (personal stigma) effect size. Mental health knowledge and perceived stigma seem to be unrelated. Furthermore, mental health knowledge is positively associated with help-seeking, with a medium association with attitudes and a small association with intentions and behaviours. Relating these findings with earlier research (Clement et al., 2015; Saunders &

Bowersox, 2007; Vogel et al., 2013) we delineated a conceptual model for the association between mental health knowledge, mental health related stigma and help-seeking for mental disorders (see Figure 12).

Figure 12

Conceptual Model of the Association between Mental Health Knowledge, Mental Health Related Stigma and Help-Seeking



Note: Green= positive association; red=negative association. Dashed lines are based on knowledge from other studies. Thinner lines represent a smaller effect size.

Mental Health Knowledge and Stigma

The best documented association in this review was the medium-sized, negative association between mental health knowledge and personal stigma (with $k = 36$ studies, $k = 31$ with significant results). This is consistent with the meta-analysis of Lien et al. (2024) that reported a small correlation between recognition of mental disorders and stigma (without differentiating for stigma type). Thus, we assume that knowledge about their distribution, course, and treatment could add to a normalization of mental disorders and to the correction of negative stereotypes. This assumption is supported by the fact that numerous interventions promoting MHL also lead to a reduction of stigma (mainly personal stigma; Ma et al., 2023).

Self-stigma seems also to be related to mental health knowledge, even if the magnitude of this relationship is smaller. The relative scarcity of studies examining mental health

knowledge and self-stigma highlights an important research gap. Understanding this association is particularly important since self-stigma is a central barrier to help-seeking behaviour for people suffering from mental disorders (Clement et al., 2015; Heinig et al., 2021). Thus, it seems crucial to understand if specific knowledge on the nature of mental disorders, as well as on how to access mental health interventions could help to reduce self-stigma in individuals suffering from mental disorders.

Associations between perceived stigma and mental health knowledge were mixed and often non-significant. Hence, a further differentiation of the construct could lead to a clearer picture. Both studies reporting a positive correlation investigated specific knowledge and stigma about anxiety disorders (GAD, PTSD; Calear et al., 2021; Krzemieniecki et al., 2021). The perception that people don't consider anxiety as a mental disorder but rather as a sign of weakness is common in rural and in older populations (Curcio & Corboy, 2020). Also, even when people assumed a high level of stigmatization for anxiety disorders, they do not share these prejudices on a personal level (*pluralistic ignorance*; Curcio & Corboy, 2020). People with a higher knowledge of anxiety disorders may be especially sensitive to discrimination, leading to exaggerated assumptions about public stigma. Further research is needed to investigate this hypothesis. The decision to seek help for mental disorders, however, does not seem to depend much on the level of perceived stigma by others (Schnyder et al., 2017; Golberstein et al., 2008). As stated in the Theory of Planned Behaviour, the perception of stigma by subjectively important persons (*subjective norm*) could be more important than perceived stigma by society (Ajzen, 1991). Thus, correcting perceptions about public stigma appears an unlikely strategy for the prevention and management of mental disorders.

Overall, the correlation between mental health knowledge and stigma (personal, self-stigma) has only a small to moderate effect size. Although awareness rising and education are a common method employed for stigma reduction, the often small and sometimes even mixed effects of awareness campaigns and educational courses on stigma show that improving literacy alone does not necessarily lead to greater tolerance in society (Rüsch & Xu, 2016; Stuart, 2016). Other prevention strategies may be more relevant; for example, personal contact with people suffering from mental disorders since positive and meaningful interactions can implicit associations between members of stigmatized groups and favorable traits (Collins et al., 2013; Rüsch & Xu, 2016). Furthermore, organizational and political

strategies improving the participation of stigmatized people to social life may be far more influential to enhance stigma-reduction and equality (Stuart, 2016).

Mental Health Knowledge and Help-seeking

The largest number of studies ($k = 27$) assessing help-seeking focused on help-seeking intentions. We also found several studies on knowledge and attitudes towards help-seeking ($k = 12$). Our results suggest that knowledge is associated with more favourable help-seeking attitudes (medium effect size) and help-seeking intentions (small effect size). This result is also consistent with previous reviews and meta-analyses (Lien et al., 2024; Özparlak et al., 2023). Our research thus implicates that people with larger knowledge on mental health have higher intentions to seek help in case of need. Our study is the first review to report a small correlation between knowledge and actual help-seeking behaviour; however, this result is based on a small number of studies ($k = 7$, four of which with significant correlations). First longitudinal studies seem to confirm that knowledge can causally lead to actual help-seeking behaviour (Waldmann et al., 2020); however, not all longitudinal studies report significant results (Tomczyk et al., 2020; McLaren et al., 2023). More prospective studies assessing the impact of knowledge on the probability of getting appropriate treatment, especially for populations at risk for mental health problems, would be needed to determine the content and putative effect of knowledge for effective prevention.

In the behavioural process of seeking help, intentions represent a more advanced stage of decision-making and are better predictors of actual behaviour (Sounders & Bowersox, 2007). Given the numerous barriers to seeking help (e.g., Gulliver et al., 2010; Heinig et al., 2021), other factors, like self-efficacy (belief in the capacity to ask for and receive appropriate help), are way more critical in the process than mental health knowledge alone (Kauer et al., 2016; Zhang et al., 2019). Thus, prevention programs are an invaluable resource, but they should also address these central motivational and volitional factors.

Limitations

Although this is a systematic review, it is possible that not all studies measuring the association between the construct of interest were found through our search strategy. However, the use of multiple keywords and the search in different databases reduced this risk. Only studies that reported correlations that could be translated into Persons's r were

used to depict the effect sizes. Even among the manuscripts we found, we could not obtain correlations or had access to all articles identified. Hence, the reader should consider a possible publication bias when interpreting the results; funnel plots suggested this possibility, especially for attitudes towards help-seeking. Since unpublished theses have been included and a high number of non-significant correlations were included in published works, we assume that conclusions from this study are sufficiently robust against such bias. The variation in the results is partly due to the use of numerous questionnaires with varying psychometric properties to measure the examined constructs. Some of the constructs measured seemed to have overlapping definitions. In particular, knowledge of mental health treatment, treatment stigma and attitudes towards help-seeking seem to be highly interwoven. Studies linking these constructs could, in part, report tautologic correlations. To overcome these limitations, future studies could employ instruments that specifically measure one or more facets of mental health knowledge, stigma and help-seeking. When assessing help-seeking, we did not differentiate between different sources of help and treatment (professional, semi-professional, informal; see Rickwood et al., 2005). The association with MHL may differ between these sources. The results did not change substantially after emanating studies with poor quality; the results of this review, thus, seem to be sufficiently valid.

Implications for Research and Prevention Practice

This study represents an important addition to research on MHL. Reporting distinct effect sizes for different facets of stigma and help-seeking informed a conceptual model for constructs aligned with mental health knowledge (see Spiker & Hammer, 2018). This model should be tested and refined in future empirical studies, for example using structural equation models.

While our results show that mental health knowledge is clearly connected to stigma and help-seeking, this variable should not be overestimated in its impact. Mental health knowledge exhibits only small to moderate correlations with stigma and help-seeking, with the smallest correlation observed for actual behaviour. Therefore, while enhancing mental health knowledge is undoubtedly a relevant prevention strategy, it is not sufficient on its own or as a general approach. Additional factors likely play a crucial role in reducing stigma and encouraging help-seeking behaviours. Previous work showed that contact with people with

lived experience can help to reduce stigmatizing attitudes (Collins et al., 2013; Rüsçh & Xu, 2016). Enhancing self-efficacy in seeking help (e.g. hearing of positive experiences with the help-system) is crucial for fostering help-seeking behaviours (Kauer et al., 2016; Zhang et al., 2019). Prevention strategies combining different strategies could maximize their effectiveness.

This review gives an overview of the existing research on this topic and highlights research gaps. Only few studies measured the association between mental health knowledge and self-stigma, perceived stigma, help-seeking attitudes, and help-seeking behaviours. Knowledge on mental health disorder in general was assessed more often than knowledge of specific disorders. Depression was the most common specific disorder, data on specific knowledge of other disorders is still scarce. How knowledge of other disorders influences stigma and help-seeking seems to need more research, also because specific mechanisms underlying stigma towards specific disorders seem to differ (see Callear et al., 2021). Most of the studies were conducted with young people (adolescents or students). Other populations were strongly underrepresented. Older adults and people in rural areas are reported to have lower MHL and higher stigma (Furnham et al., 2018). A probable reason is that mental health promotion campaigns are often targeted towards young people and messages delivered by modern media, which may be less attractive to older generations (Farrer et al., 2008). It is crucial to explore the role of mental health knowledge, and particularly knowledge about mental health services, for individuals from generations who have not been exposed to early prevention messages, since these populations may profit most from educational campaigns. Additionally, considering the reported discrepancy between the onset of mental disorders and the initiation of treatment (Hansen et al., 2021), it is important to investigate whether early exposure to mental health knowledge influences help-seeking behaviours in later adult life.

Only six studies that measured prospective associations could be found. The causality of the associations reported in this review remains unclear. The few existing longitudinal studies suggest a bidirectional relationship between mental health knowledge and help-seeking intentions. With their intervention study, Dimoff et al. (2016) suggest that higher knowledge can help to decrease personal stigma towards mental illness. However, it is also possible that people with higher stigmatizing attitudes are less open to information about mental health (Skre et al., 2013).

Since culture plays an important role in mental health prevention (Furnham et al., 2014; Lien et al., 2024; Stuart, 2016), we also focused specifically on Western countries. Previous works suggest, for example, that helpers outside of the medical system (e.g. traditional healers) can have a much higher importance for people seeking help for mental health problems in some developing countries (Ganasen et al., 2007) and that cultural values (e.g. East Asian values) can have a negative influence on acceptability of professional psychological treatment (Gao et al., 2024). Future reviews could summarize the rising number of empirical studies from other cultural backgrounds. A comparison of the results could help to understand the influence of culture on MHL and prevention mechanisms.

Although our work provides an important contribution to MHL theoretical framework, further work must be done to understand the importance of knowledge in mental health promotion. This paper focuses on quantitative studies and contains only information in the direction and effect size of the associations. An analysis of qualitative studies on MHL was originally planned in the pre-registration protocol and could not be conducted yet due to limited resources. Such analysis could help to identify mechanisms that connect mental health knowledge to stigma and help-seeking.

Some of the studies in this review reported mediator effects. For example, Zorrilla et al. (2019) suggested attitudes towards help-seeking, perceived behavioural control and subjective norms as mediators of the correlation between knowledge of depression and help-seeking intentions. Lian et al. (2024) also reported how self-efficacy and stigma are mediators between MHL and help-seeking attitudes, while positive mental health is not. Future studies (including a review of the insights from qualitative studies) could identify further possible mediators.

Conclusion

It is evident that knowledge alone is not, and cannot be, the sole foundation of effective prevention. This review shows that mental health knowledge is related to less stigmatizing attitudes towards people with mental health problems and to less self-stigma. Also, mental health knowledge seems to be linked to favourable attitudes towards help-seeking, help-seeking intentions and, ultimately, to more help-seeking behaviour. These correlations are small (behaviour, intention, self-stigma) to medium size (attitudes, personal stigma). Our results provide a theoretical model that should be tested and confirmed by future research.

Basing on our results, educational interventions improving MHL are a useful (but not sufficient) tool to enhance, and most probably, start help-seeking. Further research is needed to understand the impact of other variables and how knowledge impacts on those, as well as on different aspects of stigma and help-seeking in different cultures. For Western cultures, more longitudinal studies as well as studies assessing self-stigma and help-seeking behaviour are missing.

Chapter 5 Addressing Help-seeking, Stigma and Risk Factors for Suicidality in Secondary Schools: Short-term and Mid-term Effects of the HEYLiFE Suicide Prevention Program in a Randomized Controlled Trial

Abstract

Background: Suicidal ideation and suicide attempts pose a serious public health concern among adolescents and young adults. School-based suicide prevention programs are a key tool for addressing this problem. However, more research is necessary to assess their effectiveness, acceptability, and safety. In response, the HEYLiFE suicide prevention program was developed to enhance help-seeking, reduce stigma towards suicidal peers and diminish risk factors for suicidality. This article presents the evaluation findings of the HEYLiFE program in German secondary schools. *Methods:* We conducted a randomized-controlled trial measuring short-term pre-post within-group effects in the intervention group only and mid-term effects at 6-months-follow-up compared to a waitlist-control group. Schools were assigned randomly to the intervention or control group (no blinding). We recruited students ≥ 12 years of age. Primary outcomes were knowledge about suicidality, attitudes towards suicidality, stigma towards a suicidal peer, help-seeking intentions and behaviours, risk factors for suicidality. The data were analysed with linear mixed models and generalized linear mixed models. *Results:* $N = 745$ students participated ($n = 353$ intervention group, $n = 392$ control group). We observed favourable short-term effects on knowledge, attitudes towards suicidality and fear towards a suicidal peer. Unexpectedly, the program also led to an increase in desire for social distance and a decrease in prosocial emotions towards a suicidal peer. The mid-term effects of the program were exclusively favourable, resulting in enhanced attitudes towards help-seeking while protecting from a sharper rise in risk-factors for suicidality and from an increase in social distance. The program had more favourable

effects on females than on males. The program was well-received by the students, and no serious adverse events were reported. *Conclusions:* These findings demonstrate the efficacy of the HEYLiFE universal suicide prevention program in addressing variables associated with suicidal ideation and suicide attempts among adolescents on the mid-term. Short-term negative effects on stigma and more negative effects on males should be addressed in the future. Future evaluation studies should examine the effects on suicidality and its efficacy on populations at high risk.

Trial registration: The study was preregistered in the German Clinical Trials Register (registration number: DRKS00017045; registration date: 02/04/2019).

Background

Suicidality is a major topic of concern for adolescents' mental health. The cumulative incidence at the age of 21 was estimated at 13.5% for any suicidal behaviour (12.7% for ideation, 6.6% for plans, and 4.0% for attempts) (Voss et al., 2019). While suicidal thoughts and suicide attempts are rare before the age of 10, their incidence increases steeply after the age of 12 (Cha et al., 2018). Adolescents with suicidal ideation face numerous barriers to accessing mental health services, with approximately 28% receiving any professional assistance (Hom et al., 2015). Beyond structural barriers, individual factors like fear of hospitalization or stigmatization can also hinder help-seeking behaviours (Hom et al., 2015; Michemore et al., 2012; Rasmussen et al., 2018).

Suicidal behaviour is a complex phenomenon that is influenced by a multitude of factors, including mental disorders, adverse life events, challenging familiar situations, and personality traits (Carballo et al., 2020). Several theories explain the emergence of suicidal ideation and the transition from ideation to attempts (e.g., Interpersonal Theory of Suicide Joiner, 2005; Integrated Motivational-Volitional model O'Connor, 2011). The cognitive and emotional risk factors for suicide attempts with the most robust empirical support include hopelessness, feeling of being disconnected from others (thwarted belongingness), feeling of being a burden for others (burdensomeness), and feeling defeated or trapped in a negative situation (entrapment; Klonsky, 2018).

It is crucial to target these risk factors related to suicidality as early and systematically as possible for suicide prevention (Grosselli et al., 2021). Fortunately, respective activities in

schools have been developed over the past decade (Robinson et al., 2018; Walsh et al., 2022). Preventive measures include educational programs (e.g., Youth Aware of Mental Health, YAM; Wasserman et al., 2015) screening programs for suicide risk (e.g., Columbia Suicide Screen; Scott et al., 2009), gatekeeper education for school personnel, parents, and peers (e.g., Question Persuade and Refer, QPR; Wyman et al., 2008; Bockhoff et al., 2021), as well as postvention strategies (Cox et al., 2012). In a large multinational randomized-controlled trial, the YAM program was effective in reducing suicide attempts and suicidal thoughts, while a gatekeeper training (QPR) and a screening program (ProfScreen) did not (Wasserman et al., 2015). Recent meta-analyses have supported the efficacy of educational suicide prevention programs targeting risk and protective factors (Walsh et al., 2022; Gijzen et al., 2022).

Despite the evidence indicating the beneficial effects of educational suicide prevention programs, certain limitations have been raised. Not all implemented prevention programs in schools have proven effective (Calear et al., 2022) and some programs seem to have differential effects for specific groups (e.g. more favourable outcomes for females than for males) (Hamilton & Klimes-Dougan, 2015). Also, there is substantial variation and uncertainty regarding their theoretical foundation (Hill et al., 2022). Although reduced suicide attempts and suicidal ideation are the main outcomes of a suicide prevention program, these are rare phenomena and considerable sample sizes are required to detect changes (Nordentoft et al., 2011). Therefore, there has been a call to identify the most appropriate alternative suicide-related outcomes (Klimes-Dougan et al., 2013; Surgenor et al., 2016). Although adverse effects have been reported (Kuiper et al., 2019), evaluation studies rarely explicitly assess unwanted side effects (USE) and serious adverse events (SAE) (Robinson et al., 2018) raising doubts about the safety of prevention programs. Ultimately, the implementation of evidence-based programs is hindered by significant practical barriers, such as low acceptability and high costs (Walsh et al., 2022; Kasal et al., 2023). Accessible and acceptable interventions with a solid empiric foundation are urgently needed and should be evaluated in high-quality trials with adequate outcomes considering both positive and negative effects (Robinson et al., 2018; Nordentoft et al. 2011).

In response to these challenges, the HEYLiFE educational suicide prevention program for secondary schools was developed. A Delphi survey with leading suicide prevention experts was conducted beforehand to obviate the lack of coordination regarding the theoretical basis

of prevention programs (Grosselli, 2022). The HEYLiFE program was developed and evaluated according to these recommendations.

This paper describes the evaluation of the HEYLiFE prevention program in a longitudinal, randomized controlled trial (RCT). We hypothesized that participation in the program would lead to (1) an increase in mental health knowledge, (2) lower levels of maladaptive attitudes towards suicidality and stigma towards suicidal peers, (3) increased intentions for help-seeking, and (4) attenuation of risk factors for suicide ideation. We evaluated the efficacy of both short-term (pre-post) and mid-term (6 months follow-up) and compared the results of an intervention group (IG) with changes in a waiting-control group (CG) at follow-up (parallel design, allocation ratio 1:1). Furthermore, we examined program acceptance and safety as a critical hallmark for later transfer into routine application in educational settings. Finally, we also explored program efficacy relative to gender.

Methods

Study Program and Recruitment

The study was conducted as part of the activities of NeSuD (Baumgärtel et al., 2020), a research and prevention initiative aimed to increase awareness of suicidality and to promote access to sources of help (funding no. ZMVI1-2517FSB148, German Federal Ministry of Health). Since late 2017, the network has arranged meetings and workshops for local mental health care providers. Our team developed the HEYLiFE universal educational suicide prevention program for secondary schools (≥ 12 years) with support from the network.

To evaluate the HEYLiFE program, all secondary schools from the city of Dresden (Saxony, Germany; $n = 165$) were invited via email and telephone to participate in a randomised-controlled trial in April and May 2019. After primary school (4 years), students in Saxony can enrol in an academic secondary school (*Gymnasium*, 8 years), which prepares them for university, or in a general secondary school (*Oberschule*, 6 years), which prepares for vocational training in secondary education (*Berufsschule*, 2–3 years). While many students enrol in the *Berufsschule* directly after completing the *Oberschule*, there is no limit of age for the *Berufsschule*. We recruited schools of both the academic (*Gymnasium*) and vocational school types (*Oberschule*, *Berufsschule*). Schools were randomly assigned to either the IG or a waitlist CG with computer-generated random numbers a priori. Schools and participants were informed about the randomization process and the condition they were

randomized to (no blinding). The schools were free to decide which classes would participate in the program. For the evaluation study, we included all students from the participating classes who were 12 years or older and had sufficient knowledge of the German language. We decided not to establish a maximum age limit to ensure that our sample would be representative of the German secondary school student's population.

A Priori Sample Size Calculation

For our primary outcomes (knowledge, attitudes, stigma, risk-factors for suicidality and help-seeking intentions), small to medium effects through preventive interventions were reported in previous studies (Gulliver et al., 2010; Wei et al., 2013). Power calculations using simulations (1000 repetitions) of variance analyses with three time-points and two groups in R indicated that a total sample of $n = 534$ participants (baseline to follow-up) was needed to detect small effects (given $\alpha = .05$, $\beta = .80$ and $ES = .30$) (Rutterford et al., 2015). Considering possible design effects (cluster randomization) and a drop-out rate of 15% from T0 (baseline) to T1 (post-assessment) and 15% from T1 to T2 (follow-up-assessment), we aimed to recruit $N = 744$ students at baseline.

Study Sample

Overall, 54 classes from 19 schools participated in the study. The first school enrolled in June 2019 and the last in September 2020 (last school out: 16.02.2021). The study ended as planned in March 2021. See Figure 13 for participation rates, loss-to-follow-up and drop-out reasons for schools, classes, and students.

At baseline, $n = 353$ and $n = 392$ students, respectively, were enrolled in the IG or CG. Gender proportions were almost balanced at baseline, with $n = 308$ (41.3%) males. Mean age was 15.5 years ($SD = 2.3$ years; $min = 12$, $max = 42$ years; $n = 21 > 25$ years old; Table 3). The IG and the CG had no significant difference regarding age, gender, migration background and mental health status. The CG, however, had a significant higher proportion of students in the academic school type. Given this imbalance, analyses were adjusted for school type.

Table 3

Demographic Data and Group Differences at Baseline (T0) of the HEYLiFE Evaluation Trial

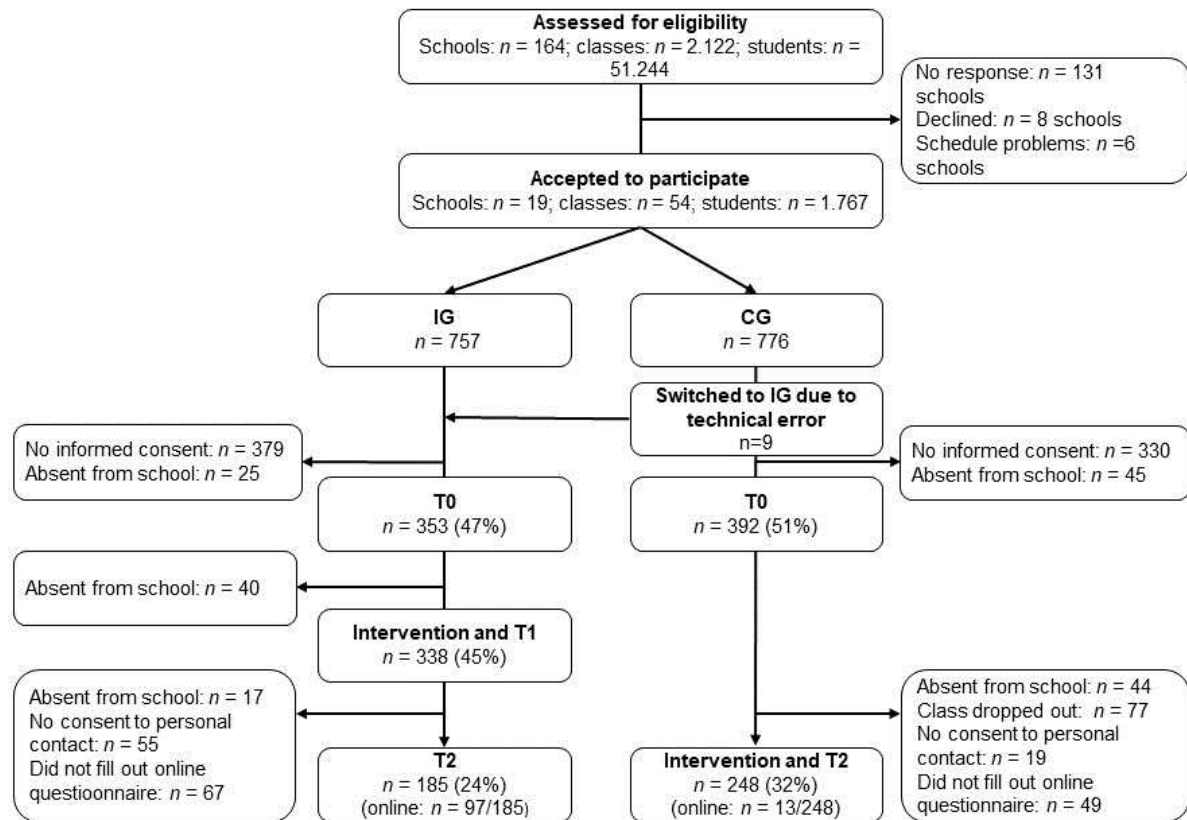
Variable	Total (N = 745)	IG (n = 353)	CG (n = 392)	Comparison
Age in years M (SD)	15.5 (2.3)	15.91 (3.9)	15.89 (3.4)	$T = .08, df = 742, p = .93$
12-13 years <i>n</i> (%)	205 (27.5)	103 (29.2)	102 (26.0)	$X^2 = 2.39,$ $df = 3, p = .50$
14-15 years <i>n</i> (%)	319 (42.8)	146 (41.4)	173 (44.1)	
16-17 years <i>n</i> (%)	104 (14.0)	53 (15.0)	51 (13.0)	
18+ years <i>n</i> (%)	116 (15.6)	50 (14.2)	66 (16.8)	
Gender				
Females <i>n</i> (%)	427 (57.3)	205 (58.1)	222 (56.6)	$X^2 = .91,$ $df = 2, p = .64$
Males <i>n</i> (%)	308 (41.3)	142 (40.2)	166 (42.3)	
Non-binary <i>n</i> (%)	10 (1.3)	6 (1.7)	4 (1.0)	
School type				
Academic/Gymnasium <i>n</i> (%)	248 (33.3)	89 (25.2)	159 (40.6)	$X^2 = 19.70,$ $df = 1, p < .001$
Vocational <i>n</i> (%)	497 (66.7)	264 (74.8)	233 (59.4)	
<i>Oberschule n</i> (%)	356 (47.8)	211 (59.8)	145 (37.0)	
<i>Berufsschule n</i> (%)	141 (18.9)	53 (15)	88 (22.4)	
Migrant background <i>n</i> (%)	106 (14.2)	46 (13)	60 (15.3)	$X^2 = .73,$ $df = 1, p = .39$
Mental health status				
Depression (PHQ-9 => 11) <i>n</i> (%)	70 (9.4)	36 (10.2)	34 (8.7)	$X^2 = .33,$ $df = 1, p = .57$
Emot./behav. Problems (SDQ)				
Abnormal <i>n</i> (%)	46 (6.2)	23 (6.5)	23 (5.9)	$X^2 = 2.74,$ $df = 2, p = .25$
Borderline <i>n</i> (%)	42 (5.6)	15 (4.2)	27 (6.9)	
Suicidal ideation (PSS Item 4)				
Last 2-weeks <i>n</i> (%)	26 (3.5)	16 (4.5)	10 (2.6)	$X^2 = 3.91,$

	<i>In the past n (%)</i>	136 (18.5)	57 (16.1)	79 (20.2)	<i>df</i> = 2, <i>p</i> = .14
Suicide attempts (PSS Item 5)					
	<i>Last 2-weeks n (%)</i>	3 (0.4)	2 (0.6)	1 (0.3)	<i>X</i> ² = 1.48, <i>df</i> = 2, <i>p</i> = .48
	<i>In the past n (%)</i>	54 (7.2)	22 (6.2)	32 (8.2)	

Note. **Bold** prints indicate **statistical significance** at $p < .05$. CG: Control Group, IG: Intervention Group, PHQ: Patient Health Questionnaire, SDQ: Strengths and Difficulties Questionnaire, PSS: Paykal's Suicide Scale.

It is important to note that the onset of the SARS-Cov-2-pandemic affected study participation (Figure 13). Because of the pandemic, four classes from the CG dropped out from the study before T2. Other schools found alternative solutions to allow participation despite school closures, reduction of class hours and contact limitations during the pandemic. The school personnel of 4 classes in the IG administered the T2 survey online during school hours. Further, we invited the students of 9 classes in the IG and 7 classes in the CG to participate singularly in our online-assessment from home. A portion of the study participants of those classes had previously agreed to personal contact with the study team (IG: $n = 91/146$; CG: $n = 62/81$). We invited those students per e-mail or per mail to fill-up T2 online from home. Three tablet computers, five e-watches and 20 vouchers worth 15 Euros were offered as an incentive.

There was no substantial group difference in the proportion of students that completed T0 assessments *after* the SARS-Cov-2-outbreak in Germany between IG ($n = 87, 24.6\%$) and CG ($n = 105, 28.0\%$). The proportion of completed T2 assessments was, however, clearly higher in the IG 2019. Moreover, measurement intervals between T0 and T2 assessment differed between the IG ($M = 282$ days, $SD = 80$) and in the CG ($M = 160$ days, $SD = 51$).

Figure 13*Flow Diagram of Participants and Drop-Out Reasons*

Note. Technical error: Typing error in the invitation of the school (IG instead of CG).

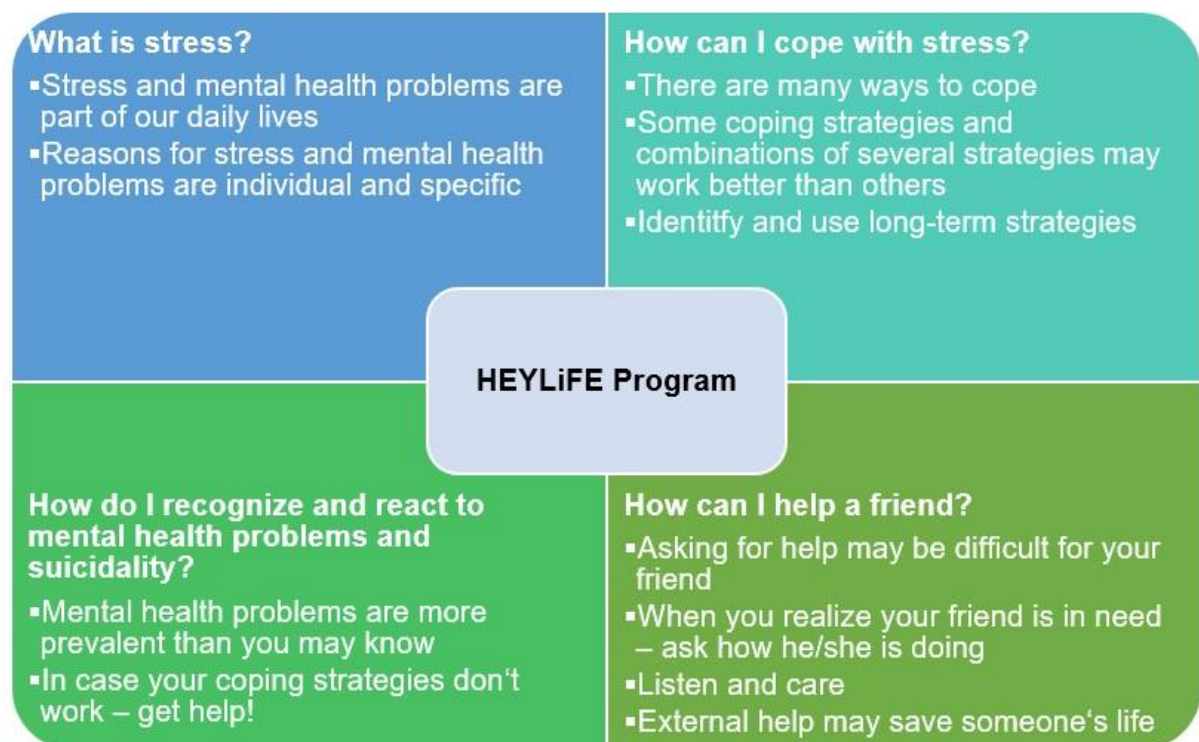
Intervention

HEYLiFE is a school-based suicide prevention intervention for students aged >12 years with a duration of 180 minutes deliverable in one or two sessions. It was developed by the first and second author, who have expertise in cognitive-behavioural therapy for children, adolescents, and adults. Beforehand, we conducted an international three-stage Delphi survey with experts of suicide prevention (Grosselli et al., 2021) to gather suggestions about effective contents and methods in school-based suicide prevention. Following the suggestions of this survey, HEYLiFE was designed to reduce barriers to help-seeking, unfavourable attitudes towards suicidality and stigma towards suicidal peers. Furthermore, the program aims to promote mental health literacy, enhance coping strategies for difficult situations and mitigate individual risk factors for suicide attempts (feelings of hopelessness, isolation,

burdensomeness, entrapment). The initial program was piloted in two classes of 14-year-olds. Students' and teachers' written and oral feedback was considered for revisions, resulting in an adaptation of wording and in the use of more interactive methods. Figure 14 depicts the contents of the final program. After an oral presentation on stress and mental health, students receive a booklet with information and are instructed to work individually and in small groups on exercises and discussions about stressors and coping mechanisms supported by the trainers. Reading case vignettes of teenagers in their same age, they are asked to detect the signs of mental strain, depression and suicidal behaviour, while engaging in discussions on potential means of offering assistance.

Figure 14

Contents of the HEYLiFE Prevention Program



The program also contains quizzes on myths and facts about suicidal behaviours and mental health care, provides information on local sources of help. Students finally engage in an exercise on how to ask for and offer support. The program was administered by master's degree students in Clinical Psychology and related fields, who were trained in a one-day workshop. Overall, 13 trainers were involved. Teachers are not allowed in the room to allow students to open up; schools do not need to provide any technical support or personnel.

HEYLiFE only uses few and inexpensive materials, namely a 5-page booklet, postcards on local health services for students, an instruction manual and re-usable case vignettes for program trainers. Although additional costs may originate in the future (costs for the 1-day training of new trainers), we wish to keep the program costs at a minimum in the future to assure the accessibility and facilitate implementation.

Program Safety

To ensure program safety, a masked procedure was used to identify students who reported suicidal behaviour in the past two weeks. At the beginning of the assessment, students were informed that some of them would be selected randomly to provide feedback after program administration. When items on severe suicidal ideation, or suicide attempts (Paykel's Suicide Scale, PSS; Items 4 or 5) (Paykel et al., 1974) were positively affirmed ($n = 46$ students), trainers registered the students' code ("index students"). In addition, the code of the same number of non-suicidal students was listed. Students with the selected codes were then asked to enter separate rooms for the feedback interview. While index students were evaluated by at least one trainer to determine their suicide risk, non-suicidal students were interviewed about satisfaction with the program. When acute suicidality was given, further steps were taken (informing legal guardians, school social workers or therapists).

Assessment Procedures

Administration of the intervention was accompanied by assessments at T0 (1 week before intervention), T1 (immediately after intervention) and T2 (6-month-follow-up-assessments) in the IG. The CG completed the assessments at T0 and T2. This means that short-term effects are assessed in a pre-post design without CG, while we can compare both groups for the mid-term effects. Knowledge, attitudes, stigma, help-seeking intentions, and suicidality were measured at T0, T1 and T2. Demographics, help-seeking behaviours, risk-factors for suicidality, depression and mental health problems were only measured at T0 and T2 since no note-worthy changes were expected between T0 and T1. Data collection was predominantly based on paper-pencil assessments in class; due to the SARS-Cov-2-pandemic T2 assessments were occasionally administered online via the SoSci platform (Leiner 2016).

Assessments on knowledge, attitudes towards suicidality and the case-vignettes used for stigma assessments were available only in English and were thus translated in two steps. First, two people with German mother tongue and excellent English knowledge translated the

English items into German. Then, a bilingual person compared both versions and opted for the most adequate translation. The vignettes were slightly adapted to fit the German culture.

Primary Outcomes

Knowledge on suicidality was assessed by the Signs-of-Suicide-knowledge-questionnaire (SOS-k) (Aseltine & DeMartino, 2004). The SOS-k consists of 7 dichotomous items (true or false). The 3-month test-retest reliability was low in a group of middle-school-students ($r = .33$) (Schilling et al., 2014). For our study, items 1 to 6 were used, since item 7 (alcohol consumption and suicidality) was beyond the focus of our intervention. The six-months test-retest reliability in the CG in our study was $r = .50$.

Attitudes towards suicidality were measured using the attitudes scale of the SOS questionnaire (SOS-a) (Aseltine & DeMartino, 2004) with 10 Likert-Scale items ranging from 1 “not at all” to 5 “definitely”. Higher values indicate more adaptive attitudes (e.g., “If a friend told me he/she is thinking about committing suicide, I would tell it to an adult at school”). The authors reported acceptable internal consistency ($\alpha = .73$) (Schilling et al., 2014). The internal consistency in our sample was low ($\alpha = .56$).

Stigma: Emotional reactions and social distance towards a suicidal peer were assessed using a case vignette depicting an adolescent with depression and suicidal thoughts (Coles et al., 2015). The Emotional Reactions towards the Mentally Ill Scale (ERMIS) (Angermeyer & Matschinger, 2003) presents 12 adjectives indicating emotional reactions to the peer in the vignette, rated from 0 “not at all” to 4 “extremely”. As suggested by the authors, we ran a confirmative factor analysis and used the factor scores for further analysis. This scale was found to have a good construct validity (Angermeyer & Matschinger, 2003). Reproducing the structure of the original article, we obtained the three latent factors “rejection”, “fear” and “prosocial reaction”. The *CFI* of the model was satisfactory ($CFI = .93$). The internal consistency of the scales was acceptable ($\alpha = .65$, $\alpha = .64$, $\alpha = .63$). Furthermore, we assessed social distance with the 5-item social distance scale (SDS) (Link et al., 1999; Jorm et al., 2007). Participants rated how likely they are willing to engage in a social activity with the depressive peer in the vignette from 0 “not at all likely” to 4 “yes, definitively”. Higher sum scores indicate higher levels of willingness to engage (i.e., less social distance). The scale demonstrated good construct reliability, internal consistency ($\alpha = .89$) and discriminant validity for the use with adolescents (Yap et al., 2014). Internal consistency was good ($\alpha = .87$) in this study.

Help-Seeking intentions and behaviour: We used the General Help-Seeking Questionnaire (GHSQ) (Wilson et al., 2005) to assess how likely someone would seek help for a mental health problem from different help sources on a scale from 1 “very unlikely” to 7 “very likely” (*help-seeking intention*). The authors report a sufficient internal consistency ($\alpha = .70$) and 3-weeks test-retest-reliability ($r = .86$) for help-seeking intention for “emotional and mental health problems”. The authors encourage users to adapt the items regarding the specific problem and help sources. Likewise, we asked for the intention to seek help for an emotional or mental health problem. Since we aimed to encourage participants to specifically seek professional help in case of suicidality, we only considered professional help sources (psychologist, doctor, social worker, e-mail counselling service, telephone counselling service) in the analyses and used the highest score among these items to determine the intention to seek professional help (Smith & Sochet; 2011). The Actual Help-Seeking Questionnaire (AHSQ) (Rockwood et al., 2005) was used to assess *help-seeking behaviours*. The AHSQ contains the same items as the GHSQ, and participants indicate whether they did (“yes”; 1 point) or did not (“no”; 0 points) reach out for help for emotional or mental health problems to each source of help in the last 6 months. For analyses, we considered whether any professional help resource was sought (1-yes, 0-no).

Risk factors for suicidality: We developed a 4-item Risk Factor Scale (RFS; Appendix C, Additional Table 1) based on items from the BeMind-study (Beesdo-Baum et al., 2020). The items represented feelings of burdensomeness, thwarted belongingness, hopelessness, and entrapment over the last two weeks on a scale between 0 “not at all” and 3 “nearly every day”. We selected these items since they depict central concepts of widely accepted theories on the development of suicidal ideation and suicide attempts (Joiner, 2005; O’Connor, 2011; Klonsky et al., 2018). A sum score across all items was calculated, higher scores indicating higher risk for suicidality in the past two weeks. Good internal consistency at $\alpha = .81$, as well as positive moderate correlations with depression (Patient Health Questionnaire, PHQ-9; $r = .66$; $p < .001$) (Kroenke et al., 2001) and suicidality (PSS suicidal ideation, $r = .30$, $p < .001$; suicide attempts, $r = .23$, $r < .001$) indicating good convergent validity were observed in our study.

Secondary Outcomes

Mental health status was measured using the PHQ-9 for depression in the past two weeks (Kroenke et al., 2001; Löwe et al., 2004) and the Strength and Difficulties Questionnaire to screen for emotional and behavioural problems (SDQ) (Goodman et al., 1998; Becker et al., 2018). Suicidality was assessed using the five-item PSS (Rutterford et al., 2015). The scale was proven to have good internal consistency ($\omega = .82$) and acceptable test-retest reliability with adolescents ($r = .61$) (Fonseca-Pedrero et al., 2020). For this study, participants indicated presence of suicidality “in the past 2 weeks”, “any time before” or “never”. Lifetime suicidality was defined as suicidality in the past 2 weeks or before. The internal consistency for the whole scale in our study was $\omega = .85$ (in the past two weeks) and $\omega = .80$ (lifetime). We used item 4 (severe suicidal ideation) and item 5 (suicide attempts) as indicators for severe suicidality (Wasserman et al., 2015).

Acceptability: A 7-item scale (range: 1 “not at all” to 5 “very”) to evaluate program acceptability was developed based on the theoretical framework by Sekhon, Cartwright and Francis (Sekhon et al., 2017). The scale demonstrated good internal consistency in this study ($\alpha = .79$).

Unwanted side effects and serious adverse events: Concordant with clinical studies, trainers documented USE and SAE observed by the trainers or by school personnel during and immediately after assessment procedures (see Appendix C, Additional Table 2 for a list of USEs and SAEs).

Statistical analyses

IBM SPSS Statistics 27 (IBM, 2020) and R (lavaan, lme4; Rossel, 2012; Bates et al., 2014) were utilized for statistical analyses. Hypotheses were tested two-sided using linear mixed models (LMM) for ordinal outcomes and generalized linear mixed models (GLMM) for binary outcomes. For short-term effects, we compared the score of the IG before and after the intervention (fixed effect of time). For mid-term effects (6 to 9 months follow-up), we compared changes in the IG with changes in the CG (fixed effects and interaction group*time). To achieve better interpretation, we computed separate models for each group when the interaction group*time was significant. We controlled for school type. In further exploratory analyses, we added gender and the interaction between gender*time (short-term) or between gender*time*group (mid-term) as fixed effects. The data of students was nested in school-classes to control for random effects at student and class-level. A-priori alpha level was set at $p < 0.05$. Reporting an effect size for the difference between groups as Cohen’s d would not

have been appropriate for our data because most of our outcome variables were not normally distributed. Instead, we determined the odds ratio (*OR*) of the IG achieving favourable values for each variable, comparing the IG to both its own results at T0 (short-term) and to the results of the CG (mid-term). For ordinary variables, a participant was considered to reach a favourable value if their (rounded) score could be interpreted as “rather good” or “very good” on the Likert-scale it referred to (e.g., a score ≥ 3.5 on a 1-5 Likert-scale). No adjustments were made for multiple testing because the individual tests were related to individual hypotheses and adjustment would have treated them as a global hypothesis (Savitz & Olshan, 1995).

To explore intervention efficacy by pandemic onset, we compared mental health indicators (depression; emotional or behavioural problems according, suicidality, risk-factors for suicidality) between participants with T2 assessments before ($n = 164$) and after ($n = 270$) the onset of the pandemic in Germany (first known Corona case in Germany on 28th January 2020). We conducted the analysis using Chi-squared-test, t-test or Mann-Whitney-U-Tests according to requirements for level of measurement, homoscedasticity or normal distribution.

Results

Primary outcomes

See Table 4 for descriptive statistics at T0. The results of the GLM and GLLM for the primary outcomes are shown in Table 4.

Table 4

Overall Group and Time Differences in Primary Outcomes

Variables and Group	T0		T1		T2	
	<i>M (SD)</i>	<i>N</i>	<i>M (SD)</i>	<i>N</i>	<i>M (SD)</i>	<i>N</i>
Mental Health Knowledge (SOS-k)						
Knowledge						
IG	3.80 (1.23)	339	4.57 (1.28)***	327	4.17 (1.24)	175
CG	3.92 (1.23)	377	/	/	4.09 (1.23)	246

Attitudes Towards Suicide (SOS-a)						
IG	3.36 (.58)	335	3.45 (.55)**	319	3.41 (.61)	176
CG	3.43 (.52)	362	/	/	3.37 (.55)	245
Stigma Rejection (ERMIS) ^a						
IG	.01 (.40)	351	.05 (.45)	335	-.01 (.33)	181
CG	-.04 (.26)	391	/	/	-.02 (.26)	248
Stigma Fear (ERMIS) ^a						
IG	.07 (.94)	351	-.21 (.93)***	335	-.12 (.97)	181
CG	.16 (.90)	391	/	/	.04 (.97)	248
Stigma Prosocial Reactions (ERMIS) ^a						
IG	.03 (.74)	351	-.15 (.83)***	335	-.10 (.80)	181
CG	.18 (.61)	391	/	/	-0.3 (.68)	248
Stigma Willingness for Social Contact (SDS)						
Intervention	8.33 (3.84)	344	7.84 (4.10)*	325	7.94 (4.17)	181
Control	8.89 (3.50)	378	/	/	7.87 (3.85)***	243
Risk Factor Scale (RFS)						
IG	.30 (1.11)	331	/	/	2.15 (2.71)***	172
CG	.23 (.85)	357	/	/	3.48 (3.26)***	243
Intention to Seek Professional Help (GHSQ)						
IG	4.25 (1.86)	345	4.00 (1.91)	331	4.44 (1.86)	176

CG	4.47 (1.78)	383	/	/	4.21 (1.82)*	247
Help-Seeking Behaviour (AHSQ)	<i>n (%)</i>	<i>N</i>			<i>n (%)</i>	<i>N</i>
IG	61 (14.9)	340	/	/	27 (6.6)	172
CG	82 (19.8)	379	/	/	45 (10.8)	241

Note. Significant effects of the intervention (main effect of time at T1; interaction between time*group at T2) at $p < .05$ are highlighted in bold. CG: Control Group, IG: Intervention Group, SOS-k: Signs of Suicide Questionnaire, knowledge scale, SOS-a: Signs of Suicide Questionnaire, attitudes scale, ERMIS: Emotional Reaction to the Mental Ill Scale, SDS: Social Distance Scale, RFS: Risk Factors Scale, GHSQ: General Help Seeking Questionnaire, AHSQ: Actual Help Seeking Questionnaire.

^a weighted sum score (weight: CFA loading on latent factor).

* $p < .05$ ** $p > .01$ *** $p < .001$ (significant effect of time/change from T0 for each group).

Knowledge on Suicidality.

At T0, knowledge on suicidality in the total sample was moderate ($M = 3.86$, $SD = 1.23$; scale: 0-6), with only 31.6% of the students reaching a high level of knowledge (≥ 5 out of 6 points). Analyses revealed a significant increase in knowledge at T1 in the IG (SOS-k; Table 3). The odds ratio (OR) for attaining a high level of knowledge after the training as compared to before was $OR = 3.57$ ($p < .001$; 95% $CI [2.58, 4.93]$). At T2, there was a significant main effect of time ($p < .001$), but no significant interaction between time and group ($p = .15$). In comparison to a student in the CG, a student belonging to the IG exhibited an $OR = 1.11$ (95% $CI [.75, 1.64]$) of achieving a high level of knowledge at the follow-up stage.

Attitudes Towards Suicidality.

Students' attitudes towards suicidality were mixed at baseline ($M = 3.39$, $SD = .55$; M range for SOS items = 2.24 – 4.66). Since the internal consistency of the scale was low, we also computed the analysis at the item level (Appendix C, Additional Table 3).

There was a small, but significant increase in total adaptive attitudes towards suicidality at T1 in the IG ($p = .01$; SOS-a, Table 3), with an $OR = 1.10$ (95% $CI [.81, 1.50]$) to have overall adaptive attitudes after the program compared to before. At the item level, significant changes were reached for the reversed items “[If a friend told me they were feeling suicidal...] I would not know what to do” ($p < .001$; $OR = 1.88$, 95% $CI [.138, 2.58]$) and “...I would keep it a

secret” ($p < .001$; $OR = 1.32$, 95% $CI [.96, 1.80]$; Additional file 3). At T2, there was no significant main effect or interaction of time and group (interaction: $p = .12$; $OR = 1.00$, 95% $CI [.68, 1.47]$). At the item level, a significant time*group interaction in the hypothesized direction was found only for the reversed item: “If someone wants to take their own life, there is no much I can do” ($p = .04$; $OR = 1.18$, 95% $CI [.78, 1.78]$; Appendix C, Additional Table 3).

Stigma Towards a Suicidal Peer.

At T0, students displayed a low to medium stigma level regarding emotional reactions towards a suicidal peer. Specifically, they showed low levels of rejection (91.5% of students with a low rejection level), as well as medium levels of fear (42.6% with a low fear level) and prosocial emotions (45% with a high level of prosocial emotions). For the IG, there was no significant main effect of time at T1 ($p < .23$; low levels of rejection: $OR = .76$, 95% $CI [.46, 1.24]$). The students of the IG reported significantly less fear after intervention ($p < .001$; low levels of fear: $OR = 1.73$, 95% $CI [1.28, 2.34]$). Unexpectedly, there was a significant main effect of time with a *decrease* on the prosocial emotions scale ($p < .001$; high levels of prosocial emotions; $OR = .77$, 95% $CI [.56, 1.06]$). At T2, the interaction time*group was not significant for all three scales (anger: $p = .27$; $OR = 1.36$, 95% $CI [.63, 2.90]$; fear: $p = .40$; $OR = 1.26$, 95% $CI [.85, 1.84]$; prosocial emotions: $p = .35$; $OR = .93$, 95% $CI [.61, 1.42]$; Table 4), while there was a significant, negative main effect of time on fear ($p < .001$) and prosocial emotions ($p < .001$).

The desire for social distance was at a moderate level before the intervention, with 42.5% of the students showing low levels on this variable. A short-term effect in the IG was observed at T1, showing a *decrease* in willingness to interact with a peer with suicidal thoughts ($p = .02$; $OR = .92$, 95% $CI [.68, 1.26]$; Table 3). On the other hand, in addition to a significant, negative main effect of time ($p < .001$) there was a significant group*time interaction at T2 ($p = .03$). A significant decrease in willingness to interact with a suicidal peer was found only in the CG ($p = .03$; $OR = 1.17$, 95% $CI [.79, 1.75]$; Table 2; Appendix C, Additional Table 4).

Table 5

Short- (T1) and Mid-term Effects (T2) of HEYLiFE

Variables and Group	T1				T2			
	Estimate	F	p	CI (95%)	Estimate	F	p	CI (95%)
Mental Health Knowledge (SOS-k)								
Time ^a	.84	131.34***	<.001	.70, .98	.19	17.42***	<.001	.01, .37
School Type ^b	-.51	4.08	.06	-1.04, .02	-.25	3.42	.07	-.51, .02
Group ^c	/	/	/	/	.08	.02	.90	-.23, .40
Time*Group	/	/	/	/	.20	2.05	.15	.07; .46
Attitudes Towards Suicide (SOS-a)								
Time ^a	.08	6.55*	.01	.02, .14	-.03	.13	.71	-.11, .03
School type ^b	.13	1.85	.19	-.07, .33	.07	1.67	.20	-.04, .19
Group ^c	/	/	/	/	.02	.25	.61	-.12, .15
Time*Group	/	/	/	/	.09	2.45	.12	-.02, .20
Stigma Rejection (ERMIS)								
Time ^a	.03	1.47	.23	-.02, .09	.02	.04	.85	-.02, .07
School type ^b	.10	2.06	.17	-.05, .26	.07	7.74**	.009	.02, .11
Group ^c	/	/	/	/	-.002	.46	.50	-.07, .06
Time*Group	/	/	/	/	-.04	1.22	.27	-.10, .03
Stigma Fear (ERMIS)								
Time ^a	-.29	38.29***	<.001	-.39, -.20	-.12	12.89***	<.001	-.01, -.24
School type ^b	-.16	.88	.36	-.53, .20	-.08	.73	.40	-.27, .11
Group ^c	/	/	/	/	-.16	1.88	.18	-.38, .05
Time*Group	/	/	/	/	-.08	.71	.40	-.25, .10
Stigma Prosocial Reactions (ERMIS)								

Time ^a	<i>-.17</i>	<i>17.41***</i>	<i><.001</i>	<i>-.25, -.09</i>	-.19	22.44***	<.001	-.16, .09
School type ^b	-.20	2.02	.17	<i>-.51, .10</i>	-.07	1.11	.30	-.21, .07
Group ^c	/	/	/	/	-.08	2.85	.10	-.24, .08
Time*Group	/	/	/	/	.06	.88	.35	-.07, .19
Stigma Willingness for Social Contact (SDS)								
Time ^a	<i>-.46</i>	<i>5.93*</i>	<i>.02</i>	<i>-.84, -.09</i>	-1.05	16.09***	<.001	-1.51, -.60
School type ^b	-.55	.68	.42	<i>-1.97, .86</i>	-.19	.26	.61	-.93, .55
Group ^c	/	/	/	/	.12	.44	.51	-.72, .97
Time*Group	/	/	/	/	<i>.71</i>	<i>4.32*</i>	<i>.03</i>	<i>.04, 1.40</i>
Intention to Seek Professional Help (GHSQ)								
Time ^a	-.18	2.59	.11	<i>-.39, .04</i>	-.26	.01	.92	-.51, -.003
School type ^b	-.14	.30	.59	<i>-.69, .41</i>	.09	.44	.51	-.19, .37
Group ^c	/	/	/	/	.15	.54	.47	-.22, .51
Time*Group	/	/	/	/	<i>.49</i>	<i>6.38*</i>	<i>.01</i>	<i>.11, .88</i>
Help-Seeking Behavior (professional help; AHSQ)								
Time ^a	/	/	/	/	.48	8.53**	.004**	-.04, .98
School type ^b	/	/	/	/	-.72	4.45*	.04*	-1.40, -.05
Group ^c	/	/	/	/	.48	1.59	.21	-.33, 1.30
Time*Group	/	/	/	/	-.11	.10	.75	-.59, .82
Risk Factor Scale (RFS)								
Time ^a	/	/	/	/	3.39	442.52***	<.001	3.06, 3.73
School type ^b	/	/	/	/	-.06	.05	.82	-.59, .47
Group ^c	/	/	/	/	-1.36	6.12*	.02	-1.97, -.74
Time*Group	/	/	/	/	<i>-1.44</i>	<i>31.85***</i>	<i><.001</i>	<i>-1.94, -.94</i>

Note. Results of LMM and GLMM; **bold prints indicate significant effects of the intervention at $p < .05$ in the desired direction** (main effect of time for T1, interaction time*group for T2); ***bold italics are significant effects in an unwanted direction***; CG: Control Group, IG: Intervention Group, SOS-k: Signs of Suicide Questionnaire, knowledge scale, SOS-a: Signs of Suicide Questionnaire, attitudes scale, ERMIS: Emotional Reaction to the Mental Ill Scale, SDS: Social Distance Scale, RFS: Risk Factors Scale, GHSQ: General Help Seeking Questionnaire, AHSQ: Actual Help Seeking Questionnaire.

^a Reference category for the estimates: T1 or T2

^b Reference category for the estimates: Professional school branch

^c Reference category for the estimates: IG.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Help-seeking.

At baseline, 48.6% of students would rather get professional help if experiencing mental or emotional problems, while 19.9% had received professional help in the past 6 months. The main effect of time on help-seeking intention was not significant at T1 in the IG ($p = .11$; $OR = .93$, 95% $CI [0.69, 1.26]$; Table 3). The interaction between time*group was significant at T2 ($p = .01$; Table 3), with a significant decrease in help-seeking intention in the CG only (Table 2; Appendix C, Additional Figure 1). The OR for a student to have high seeking intentions at T2 was 1.53 for the IG compared to the CG (95% $CI [1.04, 2.26]$). The time*group interaction had no significant effects in terms of the number of students receiving actual professional help at T2 ($p = .75$; $OR = .81$, 95% $CI [0.48, 1.36]$; Table 3).

Risk Factors for Suicidality.

Please note that the risk factors were assessed at T0 and T2 only. At T0, 89.9% stated that they did not experience any of the suicide-related mental states described in the past 2 weeks. At T2, we found a significant effect of time and a time*group interaction ($p < .001$; Table 3). While both IG and CG showed a significant increase in risk factors over time, the increase in the IG was significantly less pronounced (Table 2; Appendix C, Additional Figure 1). The OR for not experiencing any of the described suicide-related mental states was 1.87 for students in the IG compared to students in the CG at T2 (95% $CI [1.23, 2.85]$).

Secondary Outcomes

Program Acceptance and Safety.

Students indicated high acceptance of the prevention program ($M = 3.97$, $SD = .66$; range 1 to 5). Based on safety procedures, $n = 46$ students ($n = 22$ IG, $n = 24$ CG) were evaluated after reporting acute suicidality. None of these interviews revealed any relationship between

program participation and suicidality. Regarding USE, negative emotional reactions were observed twice during or immediate to the program (crying, leaving the room for some time). According to participants, their reactions have been related to emotional problems or bereavement or suicide in the family. Across the study period, no SAE was observed or has been reported to the study team. Table 5 depicts the number of students who reported suicidal ideation and suicide attempts in the last 2 weeks or lifetime at T0, T1 or T2. Of note, one further suicide attempt of a student who did not participate in T2 has been reported to the study team between T1 and T2 in the IG.

Table 6

Suicidal Ideation and Suicide Attempts (in the Past two Weeks and Lifetime)

	T0 (Baseline)		T1 (Post)		T2 (Follow-up)	
	<i>n</i> (%)	<i>N</i>	<i>n</i> (%)	<i>N</i>	<i>n</i> (%)	<i>N</i>
Suicidal Ideation Past 2 Weeks (PSS Item 4)						
Intervention	16 (4.6)	346	18 (5.5)	329	9 (5.1)	175
Control	10 (2.6)	379	/	/	13 (5.3)	243
Suicide Attempts Past 2 Weeks (PSS Item 5)						
Intervention	2 (.6)	348	4 (1.2)	329	2 (1.1)	176
Control	1 (.2)	383	/	/	2 (.8)	242
Suicidal Ideation Lifetime (PSS Item 4)						
Intervention	73 (21.1)	346	58 (17.6)	329	29 (16.6)	175
Control	88 (23.2)	379	/	/	52 (21.4)	243
Suicide Attempts Lifetime (PSS Item 5)						
Intervention	24 (6.9)	348	32 (9.7)	329	11 (6.3)	176
Control	32 (8.4)	383	/	/	15 (6.2)	242

No cases of suicide during the study period are known to the study team. There were no significant mid-term effects on acute or life-time severe suicidal ideation or suicide attempts (Appendix C, Additional Table 4).

Effects of the Pandemic Onset on Mental Health.

Suicidal ideation (PSS Item 4; $\chi^2 = .37$, $p = .54$) and suicide attempts (PSS; $\chi^2 = .64$, $p = .42$) as well as emotional and behavioural symptoms (SDQ; $t = -.24$, $p = .81$) did not differ

between students completing T2 before and after the onset of the Sars-Cov2-pandemic in Germany. However, students completing T2 after the onset of the pandemic reported higher levels of depression ($U = 33259.5, p < .001$) and a higher risk factor score for suicidality (RFS, $U = 24806.0, p < .001$) than students completing it before.

Exploring Intervention Efficacy by Gender.

The complete results of GLMs and GLLMs with gender as a further predictor are shown in the Appendix C, Additional Table 5. Gender had a main effect on rejection, fear, and prosocial emotions ($p < .001$), with males showing more stigmatizing emotional reactions than females. A significant time*gender interaction was found for rejection ($p = .004$) and prosocial emotions ($p < .001$) whereby only males showed a significant increase in rejection (males: $p = .02$; females: $p = .21$) and decrease in prosocial emotions (males: $p > .001$; females: $p = .06$) from T0 to T1 (Appendix C, Additional Table 5; Appendix C, Additional Figure 2).

At T2, gender had a significant main effect on rejection, fear, and prosocial reactions ($p < .001$), with males showing more stigmatizing emotional reactions than females. A significant effect of the interaction time*group*gender was found for prosocial reactions ($p = .01$), social distance ($p = .04$) and help-seeking behaviour ($p < .001$) with more favourable results for females than for males of the IG (Appendix C, Additional Table 5; Appendix C, Additional Figure 3).

Further Exploratory Analyses.

Although we did not have any hypothesis in this regard, we explored the effects of the program on different age groups after noticing some pattern in our data (Appendix C, Additional Table 6). To do so, we created 3 age groups (<14 y., $N = 205$; 14-16 y., $N = 398$; >16 y., $N = 141$). First, we added age group (and its interaction with group and time) as a fixed factor (Supplementary materials 8). In a second step, we ran all analyses for each age group separately. The short-time increase in knowledge was significant for all age-groups ($p < .001$). Only the age group 17+ had a significant improvement in attitudes towards help-seeking ($p = .01$) and prosocial reactions ($p < .001$) in the short term. Time had a negative effect on social distance ($p = .004$) and help-seeking ($p = .05$) intention in the 12-13 y. group in the short term. As for mid-term effects, in the 12-13 group the IG had an increase on prosocial reaction on the mid-term, while the CG had a decrease ($p = .05$). Furthermore, there

was a mid-term increase in knowledge only for the youngest group in the IG compared to the CG ($p < .01$); in contrast, in the age-group 17+ the CG had a higher increase in knowledge than the IG ($p = .02$). Nevertheless, the CG only had higher risk factors for suicidality (RFQ) than the IG for the age groups 14-16 ($p < .001$) and 17+ ($p = .004$).

Discussion

The prevention of suicidality is a fundamental topic in the field of adolescent mental health (Walsh et al., 2022). Given the significant amount of time adolescents spend in school, it is an obvious setting for implementing suicide prevention strategies. The present school-based RCT examined the effects of the HEYLiFE suicide prevention program on a sample of $n = 745$ German secondary school students (≥ 12 years). Effects were assessed immediately following the intervention (short-term) and compared to a waiting-control group at follow-up (6-9 months later, mid-term). Our analyses revealed favourable short-term effects, including an enhancement in suicide knowledge and adaptive attitudes towards suicidality and a decrease in fear towards a suicidal peer. Prosocial emotions and willingness to interact with a suicidal peer, however, were reduced immediately after the intervention. No effects were observed for rejection towards a suicidal peer and help-seeking intention. Despite we observed an increase in knowledge and a decrease in fear and prosocial emotions at follow-up, this effect was not limited to the IG and thus not attributable to our intervention. Nonetheless, the program had a favourable effect on help-seeking intentions, risk-factors for suicidality and social distance at follow-up. No effects at follow-up were found for attitudes towards suicidality, rejection and prosocial emotions towards a suicidal peer and help-seeking behaviours. Interestingly, the program seemed to have a less favourable impact on males than on females for rejection and prosocial reaction in the short-term, and on social distance and help-seeking behaviours in the mid-term. The HEYLiFE intervention was rated positively by participants. No SAEs related to the intervention were documented.

Overall, the HEYLiFE prevention programs showed positive effects on the suicide related variables risk factors for suicide and help-seeking in the mid-term. These results support recent reviews and meta-analyses that suggest that curriculum-based prevention programs in schools are a valuable tool for suicide prevention among adolescents (Gijzen et al., 2022; Robinson et al., 2018; Walsh et al., 2022). While our sample was insufficient to examine direct effects on suicidality, our study showed a favourable, mid-term impact on mental states directly related to suicide attempts, such as burdensomeness and entrapment. This suggests

that HEYLiFE successfully improves skills to deal with stress and crises, and therefore could prevent the transition between suicidal ideation and suicide attempts Klonsky, 2018.

Furthermore, the program seemed to reduce internal barriers for help-seeking, which could contribute to protecting young people at risk. The significance of this outcome is heightened by its alignment with expert recommendations for suicide prevention programs (Grosselli et al., 2021).

However, we also observed mixed effects immediately after the intervention. Unwanted side effects after suicide prevention programs have also been documented in earlier studies; these effects were particularly evident among males, racial minorities, and students at risk of suicide (Klimes-Dougan et al., 2013; Overholser et al., 1989; Shaffer & Craft, 1999). In our case, students (especially males and 12–13-year-olds) showed greater emotional distance from a suicidal peer immediately after the intervention compared to T0. Since we did not have a control group at T1, and we found more emotional distance in both groups at T2, this could also be an effect of weariness due to the repetition of the assessments. The set of questionnaires was rather time-consuming, and students complained that it was difficult to relate to the hypothetical person described in a vignette. The inclusion of a control group and the use of alternative instruments could ensure that the intervention does not cause discomfort towards suicidal peers. Importantly, any unwanted negative effect was short-lived; at follow-up, only positive effects were documented.

Further potential for improvement was found regarding the effects on knowledge and attitudes, since these did not last over time. Longer programs or a repetition of the contents over time could be necessary to achieve more durable changes. Similar to previous studies (Hamilton & Klimes-Dougan, 2015), males appeared to benefit less from the intervention. These results reassert the importance of crafting tailored interventions for male students (Hamilton & Klimes-Dougan, 2015). While the 12-13 age group did have mid-term benefits for knowledge and pro-social reactions, it was the only age group with negative short time effects and the only group where the intervention did not have protective effects for risk-factors. For this reason, the HEYLiFE intervention seems more promising for students >13 years of age. In addition, no changes in actual help-seeking behaviour towards professional help resources were observed. This may be due to the low base rate of such events (as the analyses were conducted in a general population sample with a limited need for professional

help) or an insufficient sample size or time-interval (Nordentoft et al., 2011). Likewise, it is possible that changing help-seeking *intentions* is not sufficient to promote actual help-seeking activities in young people. Interventions targeting systemic barriers (such as difficult accessibility and low availability of help) seem to be important here. Consequently, future studies should thus investigate the effects of HEYLiFE on a larger time-interval, assess pathways to help, and to examine effects on populations at risk.

This evaluation study significantly adds to the knowledge about school-based suicide prevention, particularly as RCTs as the one presented are still rare (Zalsman et al., 2016). To our knowledge, the HEYLiFE prevention program is the first, which followed expert suggestions for the selection of contents and methods (Kasal et al., 2023) since no accepted theoretical base for such programs existed up to date (Hill et al., 2022). Of note, there is still limited empirical evidence regarding what exactly works in curriculum-based suicide prevention (Walsh et al., 2022), thus expert knowledge is a very good starting point to generate programs that reflect the state of the art (Jorm, 2015). Program development was further informed by feedback from pilot runs. As one of a few studies (Robinson et al., 2018), we explicitly assessed SAEs and USEs. We did not register any SAE, despite a few short-term USEs in the form of negative emotional reactions to a suicidal peer. Furthermore, the HEYLiFE program was conceived to be affordable and easily deliverable. HEYLiFE was also well-accepted among adolescents, thus substantially enhancing the options for effective prevention, at least in German-speaking countries.

This study has several limitations. The effects of the SARS-CoV2-pandemic on mental health may have confounded the outcomes of our evaluation. Previous findings suggested an increase in depression, anxiety, and PTSD among adolescents after pandemic onset (Miranda et al., 2020). Lower rates of inpatient care, but higher use of crisis services, were reported in Germany (Mauz et al., 2021). Consistently, students in our sample who completed follow-up after the onset of the pandemic compared to before had higher levels of depression (PHQ-9) and risks factors for suicidality. Even if more students of the IG completed T2 after the onset of the pandemic compared to the CG, the IG did have a less steep increase in risk factors of suicidality than the CG from T0 to T2. This could indicate that the HEYLiFE prevention program promoted problem-solving and coping with difficulties, ultimately preventing students from reacting with an elevated level of suicidality to the pandemic. However, it is not possible clear how the pandemic affected mental health related outcomes and help-

seeking in our sample. To reduce barriers to study participation, data collection on T1 took place only in the IG. 15.6% of the sample was aged >18 years. We decided to keep all participants independently of age to keep a sample representative for the German school system and sufficient power in our analyses. Although the number of older adults was limited, it may have affected the results, since some of the outcomes vary by age groups (Farrer et al., 2008; Mackenzie et al., 2022). The analyses with age-group as predictor were post-hoc and exploratory, the results must be interpreted with caution. The short-term effects are based on a pre-post comparison, and effects of repeated measurements cannot be ruled out. The psychometric properties of our German translation of the questionnaires could differ from the original instruments. Following the recommendations about appropriate cross-cultural adaptation and translation of questionnaires, the use of focus groups or more extensive back-translation procedures could have improved the quality of our translations of the stigma, knowledge, and attitudes questionnaire (Epstein et al., 2015). The internal consistency of the attitudes and stigma scores were rather low, which hampers the interpretability of the results. Our questionnaire on risk-factors showed promising psychometric properties in this study but depicted only a part of the mental states that contribute to suicidality. These observations on the psychometric properties of our questionnaires should be considered a source of potential bias. Moreover, sample selection may be biased since 42% of eligible students participated in the study, mainly due to lack of parental consent. This indicates a moderate level of acceptance for suicide prevention programs among parents, albeit concurrent data collection may pose a further obstacle to participant rates. As an alternative, passive parental consent forms should be explored, as well as the embedding of suicide prevention interventions in communal or national prevention strategies. Another selection bias occurred for T2 assessments, which were more likely to be completed when administered during school hours. Furthermore, the Covid-19-pandemic resulted in a significant dropout rate and a reduction in comparability between the IG and the CG. Besides, it caused a significantly longer time-interval between T0 and T2 in the IG (mean: 9 months ca.) than in the CG (mean: 6 months ca.). However, this does not undermine the interpretation of our findings: in fact, the significant effects observed after 9 months suggest that the HEYLiFE program can have an impact on outcomes across an even longer period.

Conclusions

HEYLIFE is a promising intervention for suicide prevention in secondary schools. The level of acceptance in adolescents was high, and we found mid-term positive effects on suicide related variables, such as help-seeking intentions and risk-factors for suicidality. These results, along with the absence of SAEs, encourage the further development and dissemination of the HEYLIFE prevention program. Further development of the program should focus on minimizing unwanted short-term negative effects on stigma, targeting the needs of younger students and male students, and stabilizing the effects on knowledge and attitudes over time. The program was developed as a universal prevention approach. In the forthcoming evaluation phase evaluation, crucial steps will encompass examining efficacy within subgroups with different levels of risk for suicidality or different age. Further perspectives include the combination of the program with an education program for teachers and social workers, or the analysis of health-economic benefits.

Chapter 6 Promoting Protective Factors for Suicidal Behavior in Adolescents at Risk: Differential Efficacy of the HEYLiFE Suicide Prevention Program

Abstract

Theoretical Background: Suicide is among the leading causes of death for young people and a major public health concern. While intervention programs targeting youth at risk seem promising, more research is warranted to determine what works for whom. The HEYLiFE universal school-based suicide prevention program aims to promote three putative protective factors, namely, knowledge about mental health, agency, and help-seeking intention in students aged 14 years and older. While its overall efficacy was confirmed previously, specific effects in adolescents with different risk profiles remain to be determined. *Objective:* We explored whether program efficacy differed for students aged 14–18 years (mean age $M=16.2$ years, $SD=1.2$ years) at low, medium, and high risk for suicidality. *Method:* A pre–post within-group comparison trial was designed to evaluate the HEYLiFE suicide prevention program in a convenience sample of 304 adolescents from five public schools. The data of 218 adolescents (45.2 % female) with completed data sets were analysed. Using a two-step cluster analysis, we identified three distinct at-risk clusters for suicidality based on self-reported suicidality, depression, impulsivity/carelessness, and avoidance. We then applied a mixed-model analysis of covariance to evaluate program efficacy in these clusters. *Results:* While knowledge improved to a similar degree across all clusters, agency and help-seeking intentions improved in the low- and medium-risk cluster but not in the high-risk cluster. Efficacy across time ranged from small to medium

effects. *Conclusion:* Our results confirm that the HEYLiFE suicide prevention program is efficacious for the majority of students. The promotion of protective factors among students with different risk profiles is a viable strategy for universal suicide prevention, although efforts are warranted to specifically target individuals exhibiting the greatest risk for suicide.

Introduction

Adolescence and emerging adulthood are vulnerable periods for the development of mental health problems, including suicidal behaviours (Cha et al., 2018; WHO, 2021). The lifetime prevalence rates of suicide attempts among adolescents and young adults range from 3.1 % to 8.8 % (Cha et al., 2018; Mortier et al., 2018), and the rate for suicide deaths in this age group is 3.77:100 000 (Glenn et al., 2020). Suicide is one of the leading causes of death in this age group (Glenn et al., 2020), and data suggest there has been an increase in suicide in this group in the past 20 years (Glenn et al., 2020; Kirič et al., 2022; Padmanathan et al., 2020). Moreover, the consequences of the Covid-19 pandemic have significantly worsened these trends, as a recent meta-analysis on suicidal behaviour during the pandemic suggests a rise in suicidal thoughts and behaviours, as well as in self-harm compared to pre-pandemic studies (Dubé et al., 2021).

Suicidal behaviour is most likely caused by a multitude of factors (Ati et al., 2021; Carballo et al., 2020; Wasserman et al., 2021), including past and present suicidal ideation and past suicide attempts as well as previous and current mental disorders. That is, suicide attempts frequently originate from the backdrop of mental disorders (Cavanagh et al., 2003; Favril et al., 2022); more specifically, suicidal ideation is strongly linked to depression (Wasserman et al., 2021). As evidenced, a notable percentage (17.0 %–35.1 %) of young individuals transit from ideation to action within one year (Voss et al., 2020). Furthermore, personality traits linked to suicidal behaviour are neuroticism, aggressivity, perfectionism, and low self-esteem (Carballo et al., 2020; Wasserman et al., 2021). Literature reviews particularly highlight impulsivity as a central risk factor for suicidal behaviour among adolescents (Carballo et al., 2020; Wasserman et al., 2021). Also, poor emotional coping and problem-solving skills have been shown to moderate the effect of life stress on suicidal behaviour in this age group (Grover et al., 2009). An avoidant social problem-solving style may limit negative emotions in the short term; unresolved problems may, however, contribute to depressive symptoms in the long term (López et al., 2020; Schäfer et al., 2017; Sheppes et al., 2015).

Since the majority of psychopathological changes begin in childhood and adolescence, young people appear as a prominent target for protection and preventive interventions. Given the substantial individual and societal costs of mental disorders and suicide in youth (Corso et al., 2007, Dölling, 2013; Trautmann et al., 2016), prevention programs may reduce the incidence of suicidal behaviours and prevent from progression into severe conditions. Almost all children and young people attend school, making it a suitable environment to promote positive behaviours and address potential risks during sensitive developmental phases (Robinson et al., 2018). Universal programs target all students. Although the underlying mechanisms for their efficacy are not fully clear, experts suggest that increasing knowledge, modifying unfavourable attitudes, increasing coping skills and agency, and promoting help-seeking strategies could be important favourable outcomes (Grosselli et al., 2021; for reviews, see Singer et al., 2019 and Stone & Crosby, 2014; Youth Awareness Mental Health program: Wasserman et al., 2015; SOS suicide prevention program: Aseltine & DeMartino, 2004; Schilling et al., 2014). By contrast, selective prevention programs identify and target specifically students at risk. Both approaches offer specific advantages. Proponents of selective programs highlight larger effect sizes and a more favourable cost–benefit ratio (McDaid et al., 2019). Conversely, universal programs may have favourable effects even before risk factors such as depression and suicidal ideation arise; furthermore, suicidal adolescents may be reached through the help of healthy peers, which would not be included in selective prevention programs (Shilubane et al., 2014). Although universal programs have shown promising effects in suicide prevention, it remains unclear whether these programs work for all students alike or whether specific groups should be reached with specific programs instead. In the literature, mixed results can be found with regard to differential effects, that is, by gender or the risk status of participants. Some programs show more favourable effects for female than for male participants (Hamilton & Kilmes-Doughan, 2015). With regard to suicidal ideas or attempts, Bockhoff et al. (2022) demonstrated that especially students with current suicidality benefit from a universal suicide prevention program (“SAVE”). However, contrasting findings were reported in older studies, where awareness programs had a negative impact on students with previous suicide attempts (Shaffer et al., 1990). Reference to previous studies is also limited, as some studies excluded students reporting ever making a suicide attempt before the baseline assessment or having severe suicidal ideation in the 2 weeks before baseline assessment (Wasserman et al., 2015).

Recently, the HEYLiFE universal school-based suicide prevention program was published; it demonstrated its efficacy and is currently disseminated in Saxony, a federal state in Eastern Germany (HEYLiFE et al., 2022). HEYLiFE aims to promote three putative protective factors, namely, knowledge about mental health, agency, and help-seeking intention in students aged 14 years and older. Its overall efficacy at post-intervention and at the 6-month follow-up was demonstrated in a cluster-randomized trial in terms of significant improvements in knowledge about mental health and suicide and increased levels of agency and help-seeking intentions (Grosselli et al., 2024a). However, its efficacy in adolescents with different risk profiles remains to be determined. We thus aimed to explore the differential efficacy of the HEYLiFE program with regard to three favourable outcomes of prevention programs (Grosselli et al., 2021), namely, knowledge about mental health, agency when supporting suicidal friends, and the intention to seek help for suicidal ideation in students at different risk for suicide. Based on previous findings and the theoretical reasoning behind our study, we expected favourable outcomes for each risk group after HEYLiFE program participation.

Method

A pre–post within-group comparison trial was conducted to evaluate the HEYLiFE suicide prevention program in students 14 – 18 years of age by suicide risk profile.

HEYLiFE Intervention

HEYLiFE was developed based on the findings of a three-stage Delphi survey (Grosselli et al., 2021; HEYLiFE, 2022). The main goals of the program are to reduce barriers to help-seeking, unfavourable attitudes toward suicidality, and stigma towards suicidal peers. Specifically, the program aims to promote mental health literacy (i.e., the ability to find, understand, and use health information to obtain or maintain positive health; Berkman et al., 2010; Kickbusch et al., 2013), to promote knowledge, to enhance coping skills, and to reduce mental states related to suicidality (feelings of hopelessness, isolation, burdensomeness, entrapment). A workshop with a duration of 180 min was developed. After an oral presentation on stress and mental health, students are instructed to work individually and in small groups on exercises and discussions about stressors and coping mechanisms. Reading case vignettes of teenagers in the same age group, the students are asked to detect signs of mental strain, depression, and suicidal behaviour while discussing potential means of offering assistance. The program also contains quizzes on myths and facts about suicidal behaviours

and mental health care, and provides information on local sources of help. Students finally engage in a role play in order to practise asking for and offering support. The program was administered in the classroom by two students with at least a bachelor's degree in social sciences (mostly psychology and social work), who were trained in a 1-day workshop. The HEYLiFE program did not produce unwanted negative effects in the mid-term (6 – 9 months of follow-up). More details on the program development, content, and safety are reported and discussed elsewhere (Grosselli et al., 2024a). Schools do not need to provide any technical support or personnel. HEYLiFE uses few materials, namely, a five-page booklet, and postcards on local health services for students, as well as an instruction manual and re-usable case vignettes for program trainers. The HEYLiFE suicide prevention program is available for all secondary schools in Saxony free of charge; the authors consistently promote the program to all schools in the region through E-mails, presence on prevention websites, and participation in local events. Schools register when they are interested in the program. The dissemination of HEYLiFE is tax-supported from the fiscal accounts of the Saxonian State Parliament. Schools, teachers, or students do not receive incentives for program participation or program evaluation. Study procedures were positively reviewed by the Ethics Committee of the Medical Faculty of the Technische Universität Dresden (EK-Nr. 26012019).

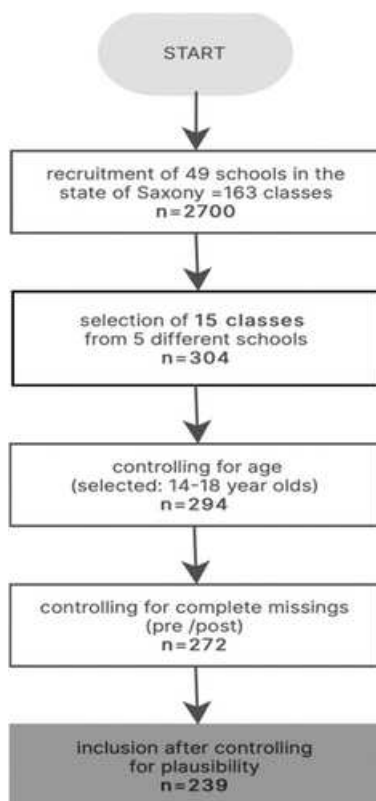
Study Sample

At the time of the study, 620 schools were eligible in Saxony (<https://www.statistik.sachsen.de/html/statistische-berichte.html>), of which 49 voluntarily registered for the HEYLiFE workshop via E-mail or telephone. Thereof, a convenience sample of adolescents was drawn from five public schools in Saxony, Germany, from June to July 2022. Inclusion criteria for student participation were (1) German speech comprehension, (2) students aged 14 – 18 years, (3) informed consent for anonymous data collection. The confidentiality of the data and the voluntary nature of participation were communicated before the data collection. For primary outcomes (knowledge, attitudes, stigma, risk factors for suicidality, and help-seeking intentions), small-to-medium effects through preventive interventions targeting diverse mental health outcomes (rather than suicidal behaviour in particular) were reported in previous studies (Gulliver et al., 2010; Wei et al., 2013). Using G*power 3.1 (Faul et al., 2007), a priori power analysis indicated a total of 204 students were needed in order to observe small-to-medium within-subject effects with partial $\eta^2 = 0.03$ ($f =$

.176) and a power of .7 at $\alpha = .05$. Similarly, for a significant main between-subjects and interaction effect with partial $\eta^2 = 0.035$ ($f = .19$) and identical power, 216 students were needed. Taking into account possible dropouts due to missing data or lack of criteria fulfilment for participation, data collection aimed to reach approximately 120% of the calculated sample size (244). A total of 218 students were eligible for data analyses after evaluating the age criteria and completeness of both pre-intervention and post-intervention measurements, as well as plausibility. Evaluation of plausibility was made on a case-by-case basis (i.e., implausible response patterns such as choosing the same option for each item regardless of the questionnaire or a high proportion of missing data suggesting low diligence; Figure 15).

Figure 15

Risk Cluster Study's Recruitment and Selection Process



Measures

Measurements were administered on the same day as the intervention, that is, “pre-intervention” refers to measurements before the immediate start of the intervention and “post-intervention” refers to measurements immediate after end of the intervention.

Risk Factors for Suicidal Behaviour.

Self-reported suicidality, depression, impulsivity/carelessness, and avoidance were measured at pre-intervention (before immediate start of the intervention) and were used to identify risk profiles for suicide, based on the literature on suicide risk (i.e., Carballo et al., 2020; Wasserman et al., 2021).

The Paykel Suicide Scale (PSS; Paykel et al., 1974) was used to examine past and current suicidal behaviour and ideation. The PSS consists of five questions about suicidal thoughts and attempts, including life weariness, death wishes, suicidal ideation, suicidal plans, and suicide attempts (Paykel et al., 1974). For this study, the German translation (Kaess et al., 2011) asked whether these suicidal behaviours occurred in the past 2 weeks, ever in one's lifetime, or never. The PSS was validated and found to be psychometrically sound in a sample with Spanish teenagers by Fonseca-Pedrero et al. (2018) showing an excellent goodness of fit with a gender invariance. The reliability of the PSS showed an ordinal α of .93 and a retest reliability of $r = .61$, making it a suitable instrument for the evaluation of suicide risk. Here, Cronbach's α was $\alpha = 0.87$.

The German version of the Patient Health Questionnaire is a self-administered 9-item diagnostic instrument for various disorders according to DSM-IV, including depression (Gräfe et al., 2004; Kroenke et al., 2001). The psychometric properties of the PHQ-9 have been demonstrated with an internal reliability of $\alpha = .88$ and test–retest reliability ranging from $r = .81$ to $r = .87$ (Löwe, Kroenke, et al., 2004; Löwe, Unützer, et al., 2004), and was $\alpha = 0.87$ in this study. Sensitivity for the diagnosis of a major depression is 95% and the specificity is 86% (Gräfe et al., 2004). The PHQ-9 has, moreover, been validated with a sample consisting of teenagers (Allgaier et al., 2012). The response scale ranges from 0 (*not at all*) to 3 (*almost every day*) with the maximum overall score being 27. Cut-off scores of the PHQ-9 have been established with a cut-off at ≥ 11 for major depression, and a range of 5 – 9 points reflecting mild depressive symptoms without clinical relevance (Kroenke et al., 2001; Löwe, Kroenke et al., 2004; Löwe, Unützer et al., 2004).

Social problem-solving was measured using the revised short form of the Social Problem-Solving inventory (SPSI-R) by D'Zurilla and Nezu (1990), a 25-item self-report questionnaire with five problem-solving dimensions: positive problem orientation, negative problem

orientation, rational problem-solving, impulsivity/carelessness style, and avoidance style. Each of the subscales can be scored independently, as well as for the complete inventory (Hawkins et al., 2009). D’Zurilla et al. (2002) found sufficient internal consistency for all subscales, with avoidance style being among the most internally consistent ($\alpha = .85$). Overall, strong evidence for the reliability of this measure is given, also in adolescents (Hawkins et al., 2009). Furthermore, the SPSI-R-SF was evaluated regarding its convergent validity, showing a significant correlation with depression, anxiety, hopelessness, and suicide ideation (Graf, 2003; D’Zurilla et al., 2002). The German version was validated by Graf (2003) and shows similar results in psychometric properties and factor structure. For this study, two subscales are of specific interest, namely, impulsivity/carelessness style (Cronbach’s $\alpha = 0.67$) as well as avoidance style ($\alpha = 0.79$), as these constructs are strongly associated with a higher risk for suicidal behaviour (Deisenhammer et al., 2009; McHugh et al., 2019). Higher subscores indicate higher levels of impulsive or avoidant behaviour.

Protective Factors Against Suicide Behaviour.

Protective factors against suicidal ideation and behaviour were assessed at pre-intervention and post-intervention using the Signs of Suicide (SOS) Questionnaire (Aseltine & DeMartino, 2004), which was designed for the evaluation of the SOS suicide prevention program to measure students’ knowledge about mental health (six out of seven true/false items) and their attitudes toward suicide and depression. Although the scale had sufficient internal consistency in the original study ($\alpha = .74$; Aseltine & DeMartino, 2004), it had a very low internal consistency in our study ($\alpha = .25$). We conducted an explorative factor analysis with a sample of German adolescents (Grosselli et al., 2024a). Results suggested forming two subscales: self-confidence when reacting to suicidality (“agency”; agreement ratings on a 5-point Likert scale ranging from *strongly disagree* to *strongly agree* with 4 items, $\alpha = .46$), and intention to seek help for suicidality (“help-seeking”; agreement ratings on a 5-point Likert scale, ranging from *strongly disagree* to *strongly agree*, five items, $\alpha = .67$). Although the internal consistency was higher than for the original scale, it still remained low in this study (agency: $\alpha = .26$; help-seeking: $\alpha = .21$). Of note, Item 7 on the knowledge about mental health scale was omitted (“alcohol consumption is unrelated to suicide”) because the relationship between alcohol and suicide was not the subject of the HEYLiFE prevention program.

Data Analysis

Data were analysed using IBM SPSS Statistics (Version 28). The descriptive analysis included characteristics of the total sample (age and gender distribution) and per risk group (risk profile). Systematic dropouts from pre- to post-intervention by gender, age, and suicidality were tested using a chi-square test. A two-step cluster analysis was carried out to identify naturally occurring subgroups in the sample population. The two-step cluster analysis was chosen because it includes both a distance measure and a probabilistic approach (Kent et al., 2014), and also allows for interval scale levels for the risk-conferring variables (i.e., suicidality, depression, impulsivity, and avoidance). Games–Howell tests were implemented to determine between which clusters such differences existed (Ruxton & Beauchamp, 2008). Three mixed ANOVAs were performed with time (pre- /post-intervention) as within- and cluster as between-subject factors for the dependent variables knowledge, agency, and help-seeking intention. In the case of interactions, Bonferroni-adjusted post hoc comparisons were used to examine differences. Age and gender were considered covariates because of the reported gender paradox of suicidality (i.e., higher rates of suicide attempts in females vs. males; Värnik & Wasserman, 2016) and higher help-seeking rates among females (Rickwood et al., 2005). Furthermore, an adjustment for baseline was implemented, as regression to the mean may occur, especially in groups with more extreme values a priori to the HEYLIFE prevention program. Welch tests were employed as a robust statistical method given significant Levene test results. Program efficacy was considered according to Backhaus et al. (2006), with Nagelkerke's $R^2 < .2$ (low efficacy, acceptable), $< .4$ (medium efficacy, good), and $< .5$ (large efficacy, very good).

Results

Sample Characteristics

The sample used for analysis was composed of 108 (45.2%) female and 126 (52.7%) male students, as well as five (2.1%) non-binary/other students from Grades 8 – 11. The mean age was 16.2 years ($SD = 1.2$, range = 14 – 18 years), and the majority of students ($n = 230/239$; 96.2 %) were German natives.

The 2-week and lifetime prevalence for suicidal behaviour at baseline ranged between 1.7% for suicide attempts to 13 % for life weariness, and between 8.4% (suicide attempts) and 37.2% (life weariness), respectively (Table 6).

Table 7*Prevalence (%) of Suicidal Behaviour in the Sample Population at Baseline*

Paykel Suicide Scale	In the past two weeks	Lifetime	Never	Total (n)
1. Have you felt that life is not worth living?	13.0	37.2	49.4	238
2. Have you wished you were dead? For example, going to sleep and wishing you would not get up.	11.7	24.7	63.6	239
3. Have you thought about taking your life, even if you weren't going to?	8.4	34.3	56.9	238
4. Have you reached the point where you considered actually taking your own life or made plans about how you would do it?	6.3	18.8	74.9	239
5. Have you tried to take your own life?	1.7	8.4	89.5	238

Note: Items 4 and 5 indicate acute suicidality.

The PHQ-9 scores for depression ranged from 0 to 26 points ($M = 7.58$, $SD = 5.72$) at pre-intervention, with a right-skewed distribution (0.95 , $SE = 0.16$). The total scores of the PHQ-9 were higher for female students ($M = 9.6$, $SD = 5.5$) than for male students ($M = 5.42$, $SD = 4.77$), $t(211.46) = 6.12$, $p < .001$). Rates for mild (i.e., subclinical), moderate, moderate–severe, and severe depression were 33.47%, 15.68%, 8.47% and 5.08%, respectively, in the total sample.

Regarding the two subscales of the SPSI-Short Form Revised, the mean scores for the impulsivity–carelessness subscale were $M = 8.10$ ($SD = 3.54$), while avoidance showed a slightly higher average with $M = 7.75$ ($SD = 3.98$). The skewness of the distribution of impulsivity–carelessness style was 0.14 ($SE = .16$) and kurtosis was -0.16 ($SE = .32$). A similar distribution of the variable avoidance can be seen according to skewness, 0.35 ($SE = .16$) and kurtosis, -0.028 ($SE = .32$). Female students demonstrated significantly higher impulsivity scores ($M = 8.77$, $SD = 3.42$) than their male counterparts ($M = 7.5$, $SD = 3.6$), $t(214) = 2.56$, $p = .011$. A similar pattern could be observed for avoidance, where female

students ($M = 8.54$, $SD = 4.1$) had significantly higher scores in avoidance than did male students ($M = 7.02$, $SD = 3.8$), $t(214) = 2.66$, $p = .008$.

Of note, the sample eligible for analysis ($n = 239$) did not differ from the sample prior to exclusion ($n = 294$) in terms of gender, $\chi^2(2, N = 531) = .754$, $p = .686$, age, $\chi^2(5, N = 531) = 1.569$, $p = .905$ and suicidality (lifetime and/or in the past 2 weeks), $\chi^2(5, N = 531) = 1.569$, $p = .51$.

Cluster Analysis and Risk Profiles

Two-step cluster analysis revealed a three-cluster solution using the Bayesian information criterion (Figure 16). Since cluster sizes varied, with the ratio of the largest cluster to the smallest cluster being 2.25, z-standardized values were calculated. Cluster quality was classified as fair (silhouette measure of cohesion = 0.4), indicating a satisfactory relation between cluster cohesion and separation. Table 7 shows the means, standard deviations, and z-standardized mean differences of the clusters in regard to the cluster-conferring variables suicidality, depression, impulsivity carelessness style, and avoidance.

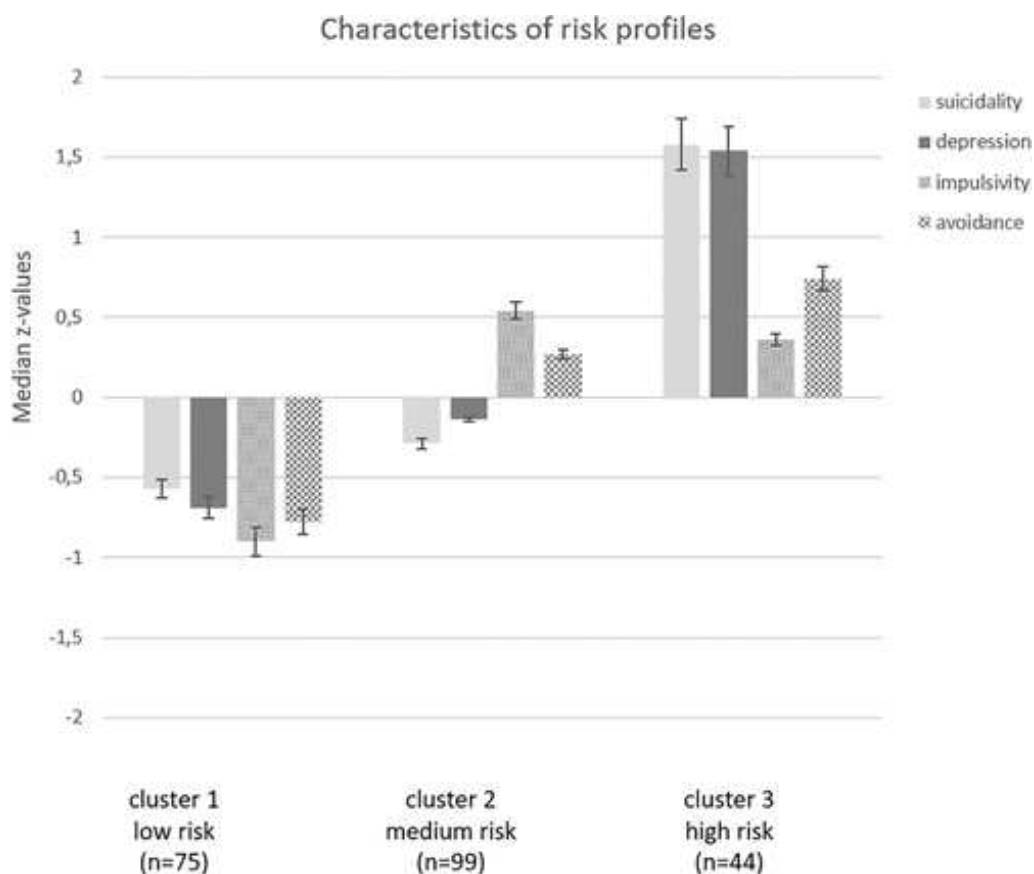
We identified three fairly distinct groups at $\alpha = .05$ according to post hoc tests except for impulsivity, which was the lowest in the Cluster 3 but similar in Clusters 1 and 2. Cluster 2 ($n = 99$) was the largest cluster, depicting a medium risk profile. The highest levels of suicidality, depression, and avoidance constituted Cluster 3 at high risk ($n = 44$). The lowest levels of cluster-conferring variables were consistently observed in Cluster 1 (low-risk profile, $n = 75$).

Table 8*Cluster Properties Regarding Suicidality, Depression, Impulsivity, and Avoidance*

	Cluster 1 = 75			Cluster 2 n = 99			Cluster 3 n = 44			Games-Howell						
	low risk			medium risk			high risk				Cluster 2 vs. 1		Cluster 3 vs. 2		Cluster 1 vs. 3	
	M	SD	z-score	M	SD	z-score	M	SD	z-score	Welch-Test F	mean diff.	95% CI	mean diff.	95% CI	mean diff.	95% CI
suicidality	5.63	1.16	-.57	6.32	1.48	-.29	11	1.79	1.58	F(2. 105.209) = 159.667**	5.37**	4.7; 6.1	4.68**	3.94; 5.41	.70*	.22; 1.17
depression	3.63	2.63	-.69	6.78	3.42	-.14	16.41	4.42	1.54	F(2. 103.517) = 153.639**	12.78**	11.02; 14.54	9.63**	7.83; 11.42	3.15**	2.06; 4.23
impulsivity	4.92	2.1	-.9	10.01	2.63	.54	9.39	3.54	.36	F(2. 103.042) = 107.086**	4.5**	3.06; 5.87	-.62	- 2.05; 0.8	5.09**	4.24; 5.94
avoidance	4.64	2.42	-.78	8.83	3.32	.27	10.68	4.32	0.74	F(2. 102.790) = 65.636**	6.04**	4.34; 7.75	1.85*	.10; 3.61	4.19**	3.16; 5.22

Figure 16

Clusters Reflecting Suicide Risk, Derived from a Two-step Cluster Analysis



We also explored cluster properties with regard to age and gender using a chi-square test of independence, yielding a significant relationship between gender and cluster membership, $\chi^2(4, N = 218) = 28.168, p < .001$. However, no association between age and cluster membership was found, $\chi^2(10, N = 218) = 10.707, p = .381$. Gender was therefore included as a covariate in the mixed ANOVA analysis.

Within-Cluster and Between-Cluster Effects

A mixed ANCOVA was performed to determine program efficacy per risk cluster (Table 8). Gender and pre-intervention scores were included as covariates. Across all clusters, an increase in knowledge, agency, and help-seeking was observed from pre- to post-intervention. No main effects per cluster were observed.

For knowledge (Figure 17a), analysis showed a significant effect of time on knowledge scores ($p < .001$), indicating an improvement in knowledge from pre- to post-intervention in the general sample population. There were, however, no main effects for cluster or for time*cluster interaction. For agency (Figure 17b), there was a time*cluster interaction, $F(2, 198) = 3.77, p = .03, \eta^2 = .04$. Bonferroni-adjusted comparisons indicated that the low-risk cluster (.52, $p = .02$, 95% confidence interval [CI] of the difference = .95 and .08) and medium-risk cluster (.58, $p = .002$, 95% CI of the difference = .94 and .22) showed significant improvements in their agency scores at post-intervention compared to pre-intervention. By contrast, agency scores in the high-risk cluster did not change per intervention across time.

For help-seeking (Figure 17c), the Bonferroni-adjusted pairwise comparisons indicated that the low-risk cluster (1.36, $p < .001$, 95% CI of the difference = .62 and 2.1) and medium-risk cluster (.81, $p = .01$, 95% CI of the difference = .19 and 1.43) showed significant improvements in their help-seeking intentions at post-intervention compared to pre-intervention. By contrast, help-seeking intention did not increase in the high-risk cluster ($p = .96$).

Effect sizes across time indicated a small effect for agency (Nagelkerke's $R^2 = .21$), and medium effects for knowledge (Nagelkerke's $R^2 = .36$) and help-seeking (Nagelkerke's $R^2 = .36$); effect sizes per cluster were low (Nagelkerke's R^2 from .00 to .21).

Figure 17

Profile Plots of Knowledge Effects by Time (a), Agency Effect by Time, and Help-seeking Effects by Time (c)

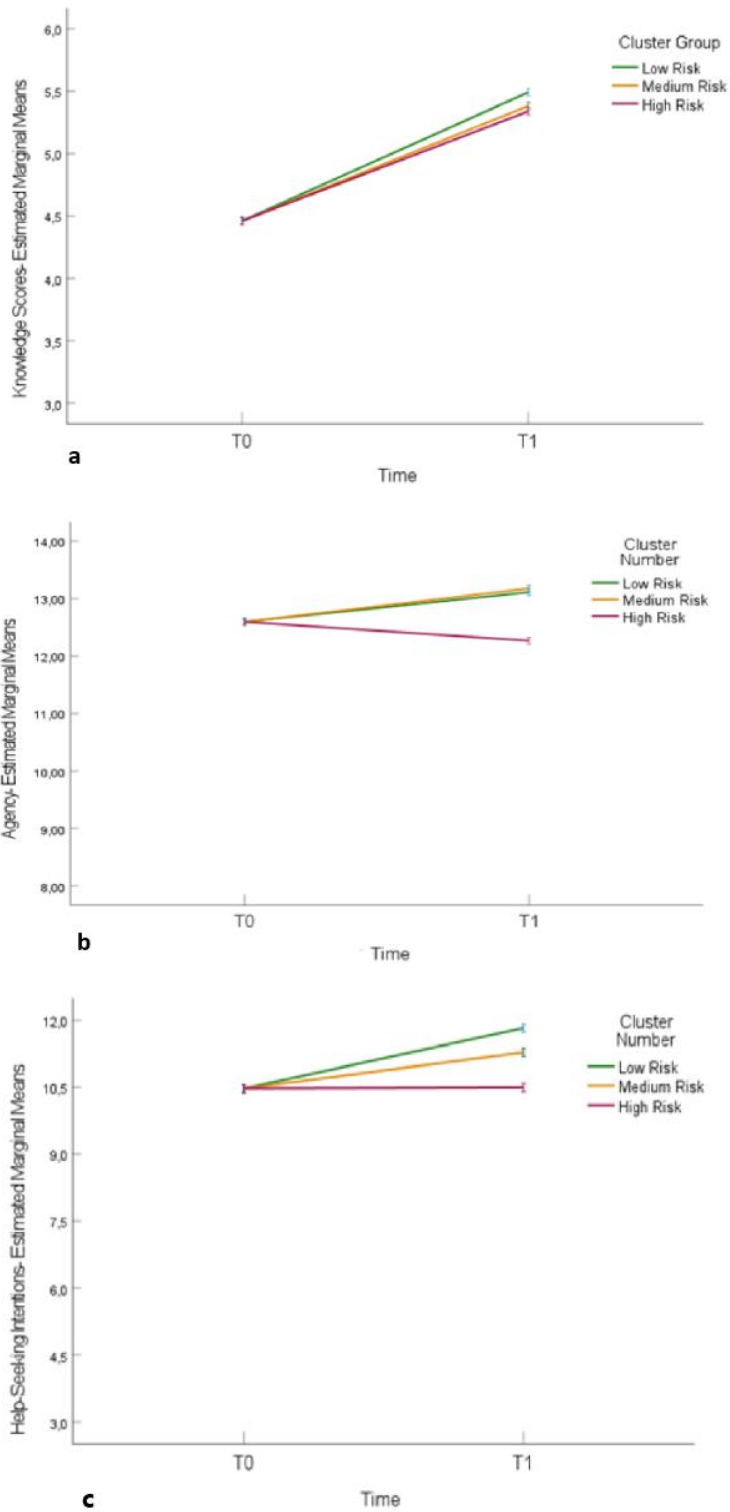


Table 9*Pre-post-effects of the HEYLiFE Suicide Prevention Program by Risk Cluster*

	Cluster 1 (low risk) = 75				Cluster 2 (medium risk) n = 99				Cluster 3 (high risk) n = 44				ANCOVA											
	pre-intervention		post-intervention		pre-intervention		post-intervention		pre-intervention		post-intervention		time		cluster		time*cluster							
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	F (df)	sum of squares	p	partial n ²	F (df)	sum of squares	p	partial n ²	F (df)	sum of squares	p	partial n ²
Knowledge	4.63	1.13	5.57	1.25	4.36	1.27	5.29	1.30	4.27	1.24	5.34	1.02	105.76 (1)	70.36	<.001	.36	.25 (2)	.33	.78	.00	.25 (2)	.33	.78	.00
agency	13.23	1.64	13.45	1.81	12.29	1.96	13.02	1.97	12.21	1.85	12.05	2.29	52.98 (1)	83.03	<.001	.21	11.83 (2)	11.83	.78	.00	5.91 (2)	11.83	.03	.04
help-seeking	11.90	4.20	12.49	3.65	10.57	4.21	11.35	3.64	7.72	4.61	9.15	4.23	103.86 (1)	427.74	<.001	.35	2.13 (2)	19.37	.12	.21	2.13 (2)	19.37	.12	.21

Discussion

In this study, we explored the efficacy of the universal HEYLiFE suicide prevention program for students aged 14 – 18 years at low, medium, and high risk for suicidality. Pre-intervention–post-intervention comparisons showed a significant increase in knowledge about mental health across all risk clusters. Agency and help-seeking intentions also improved significantly in the low-risk and medium-risk cluster, but not in the high-risk cluster. Efficacy across time ranged from small to medium effects. Findings broadly confirm prior data analyses (Grosselli et al., 2024a) in favour of the short-term efficacy of the universal HEYLiFE prevention program.

Using a two-step cluster analysis, we identified three risk clusters based on established risk factors for suicidal behaviours. While the high-risk cluster showed high levels of suicidality, depression, impulsivity, and avoidance, the medium risk cluster was characterized by medium (i.e., non-pathological) levels of depressive symptoms and suicidal behaviours, but also by elevated levels of avoidance and impulsivity compared to the general sample population. The low-risk cluster showed the lowest levels of depression and suicidality as well as of impulsivity and avoidance. Here, post hoc tests revealed fairly distinct clusters, but since this is the first study to examine the efficacy of a prevention program by risk profiles, replication of the cluster solution is warranted. Furthermore, given the multifactorial aetiopathogenesis of suicidal behaviour and its comorbidity with somatic and mental conditions such as poor sleep (Harris et al., 2020), low physical activity levels (e.g., Grasdalsmoen et al., 2020), and non-suicidal self-injury (e. g., Khazaie et al., 2021), the role and specificity of psychopathological load for adolescents' risk status warrant further research.

Similar to other prevention programs, education about youth suicidality is a core component of the HEYLiFE prevention program (Schilling et al., 2014; Strunk et al., 2014; Wasserman et al., 2015), and participants are encouraged to identify and adopt favourable coping skills for mental strain. In fact, Rhodes et al. (2013) and Bockhoff et al. (2022) emphasize that knowledge is a prerequisite to overcoming barriers toward help-seeking and to increasing self-efficacy. From this, knowledge can be considered a pivotal condition to promote agency and help-seeking intention. Findings revealed that the HEYLiFE

prevention program was successful in conveying knowledge to all students, regardless of suicide risk. However, agency and help-seeking did not increase similarly to knowledge, suggesting that the HEYLIFE prevention program has limited effects in the high-risk cluster. It remains to be determined which (additional) factors, beside knowledge, may contribute to agency and help-seeking in youth at high risk for suicidal behaviour.

While knowledge is likely required for becoming aware of suicidality (i.e., awareness) in oneself or in others, the concept of agency is more concerned with positive attitudes toward empowerment and enabling self-efficacious behaviour. Agency can be considered a precursor to intention formation (Ajzen, 1991). More specifically, without positive attitudes toward the behaviour and perceived behavioural control, intention formation is unlikely. From that, it may be assumed that students who do not believe in their ability to seek help are unlikely to engage in help-seeking, even when they are aware of suicide risk. Of note, students in the low-risk and medium-risk cluster benefited most from the HEYLIFE prevention program, while agency levels in the high-risk cluster did not change per intervention. Hence, students in the low-risk and medium-risk cluster may have felt more able and keener to organize help than those in the high-risk cluster. The high-risk group may have been limited in their resources to reach for or to provide help due to high levels of depression and suicidality. Also, in line with higher psychopathological load, the high-risk cluster may have been less confident that their actions would lead to positive outcomes.

Within the HEYLIFE workshops, the necessity and putative benefits of help-seeking are stressed at multiple times; contacts for regional health-care providers as well as anonymous resources for mental health care are showcased to students, and students observe and engage in role plays about how to provide help for peers and to facilitate access to health-care providers. Again, an increase in help-seeking intentions was observed for the low-risk and medium-risk cluster, but not for the high-risk cluster. Although students reported higher intentions to seek help after the intervention across all clusters, the rate of improvement was attenuated to non-significance for the high-risk cluster when controlling for baseline scores and gender. Lower intentions for help-seeking in the high-risk cluster of this study may also reflect higher levels of an avoidant social problem-solving style. Of note, the high-risk cluster was also characterized by the highest levels of depressive symptoms, arguing for an unfavourable cumulation of depression and lack of agency to substantially limit help-seeking intentions. This is in line with findings on the help-negation effect, which postulates that

people with more severe manifestations of depression or other symptoms of psychological distress are less likely to seek help (Wilson & Deane, 2010), arguing for differential approaches to promote agency and help-seeking in this cluster.

During the HEYLiFE workshop, students learn that the suicidal person may be unable to ask for help themselves and that help should be actively offered. For high-risk students, however, the (own) inability to seek help in a suicidal crisis may be perceived as rejection of help or lack of motivation to change, and along with lower (i.e., stable) levels of agency and higher levels of depressive symptoms, help-seeking is additionally limited. Since earlier studies either excluded suicidal students from data analysis (Wasserman et al., 2015) or reported mixed results for students with high risk of suicide (Bockhoff et al., 2022; Shaffer et al., 1990), it seems important to monitor possible iatrogenic effects of the HEYLiFE program on high-risk students in terms of the primary outcomes (Foulkes & Stringaris, 2023). Of note, the HEYLiFE prevention program did not decrease levels of agency or help-seeking in the high-risk cluster, suggesting that the intervention did not reach efficacy in this cluster, but also it did not produce unwanted effects or even negative outcomes (Kuiper et al., 2019). Efficacy with regard to help-seeking may be broadly promoted by informing about health-care services, but also specifically promoted in the high-risk cluster by sharing mental strain with others experiencing mental strain or suicidal behaviour themselves (Hasking et al., 2015; Sheehan et al., 2019). However, the high-risk cluster may at the same time experience higher levels of stigmatization, which would counter opening up about themselves to others. Although seeking and providing help were actively trained during the intervention in groups of two or three close classmates, the constricted space of the classroom may attenuate the experience of disclosing personal problems, especially among those with higher levels of mental strain. Modifications to the HEYLiFE prevention program could therefore allocate more time and more space beyond the classroom for roleplays and to promote disclosure of mental strain toward trusted peers. Also, given the observed increase in knowledge, agency, and help-seeking intentions in the low-risk and medium-risk cluster, these young people may also serve as gatekeepers for the high-risk cluster. For example, Yakunina et al. (2010) propose that perceived social support can alleviate the help-negation effect when seeking help from nonprofessional sources. The positive impact of the intervention on the low- and medium-risk clusters might stimulate more supportive behaviours, potentially enhancing perceived social support for the high-risk group. Along with the reported efficacy of the

HEYLIFE program at the 6-month-follow-up (Grosselli et al., 2024a), an added booster session that promotes social problem-solving or provides examples of people who successfully reached out for help may specifically address the needs of the high-risk cluster.

Limitations and Strengths

Although this is one of the first studies to examine the differential efficacy of a universal prevention program in youth by risk profile, the strengths and weaknesses of the study design and procedures should be acknowledged. Given already existing evidence for the efficacy of the HEYLIFE prevention program compared to a waitlist control condition, this study was designed as a non-randomized natural / quasi-experimental study. However, both studies were conducted within the same work group, and efficacy is usually attenuated with increasing program dissemination (McHugh & Barlow, 2010). Hence, evaluation of the program in other regions and by other groups is warranted, preferably also covering long-term effects and to explore whether program participation would contribute to alterations in the students' risk profile. Comparison of our findings with other studies is limited, as others excluded suicidal students at study entry (i.e., Wasserman et al., 2015) or definitions of "high risk" and outcome variables differed. A strength of our study is that we used several indicators to determine suicide risk rather than only suicidal thoughts or attempts (as in Bockhoff et al., 2022; Shaffer et al., 1990). In this study sample, 18.8% of adolescents reported lifetime suicide ideation or plans at baseline, which is similar to the work of Nock et al. (2008), who found up to 24% of youths aged 12 – 17 reported suicidal ideation. A notable prevalence of 8.4% ($n = 21$) of lifetime suicide attempts and 1.7% ($n = 4$) attempts within the past 2 weeks highlight the importance of addressing suicidality within adolescent populations. Of note, there was no increase in suicide rates from pre- to post-intervention, $t(236) = 0.42$, $p = .674$, in the sample, supporting previous findings on program safety (Grosselli et al., 2024a); however, potential iatrogenic harm from preventive mental health interventions needs to be monitored continuously (Foulkes & Stringaris, 2023). Furthermore, outcome measures alternative to the SOS scale could be used. The subscales agency and help-seeking had a low internal consistency in our study. Although mental health literacy and help-seeking represent multifaceted constructs and their assessment is associated with limited internal consistency, knowledge on mental health, agency, and intentions related to help-seeking are likely primary targets for preventive interventions in this field. Also, replication of the cluster solution is needed. The convenience sample may underestimate the proportion of individuals at risk who

were unavailable to participate due to sick leave from school, or who may have refused to participate because of self-perceived stigma. The rates of suicidality at baseline, however, are concordant with rates from a regional epidemiological community sample (Voss et al., 2020). Also, analyses were based on complete datasets. Risk clusters in this study differed significantly in their intentions to seek help at baseline, with the high-risk cluster exhibiting a significantly lower willingness to seek help compared to the other two clusters. Hence, analyses were adjusted for baseline levels. The HEYLiFE prevention program, however, did not promote help-seeking in the cluster with presumably the highest need for support.

Conclusion

Findings confirm the administration of the HEYLiFE prevention program as a universal prevention strategy, with the potential to also yield positive effects for youth at different levels of risk. Benefits for youth at the highest risk are, however, limited to an increase in knowledge. Thus, findings on the differential efficacy of the HEYLiFE prevention program indicate the need to enhance agency and, either as a correlate or consequence, thereby increase help-seeking in those at high risk for suicidal behaviour.

Chapter 7 Discussion

While suicide prevention among adolescents has been a major challenge for public health professionals for the past two decades (WHO, 2014), an increase in self-harm and suicidal ideation made it especially urgent to address this issue in the last couple of years (Benton et al., 2024; Grzejszczak et al., 2024; Lu & Keyes, 2023; McGorry et al., 2024; Lass-Hennemann et al., 2023; Sorter et al., 2024). Educational suicide prevention programs in schools are a promising tool for suicide prevention (Wasserman et al., 2015; Platt & Niederkrotenthaler, 2020). However, research on educational suicide prevention is confronted with several methodological and ethical challenges. This thesis aimed to address some of the central research gaps in this field regarding the i) theoretical framework, ii) program development and evaluation, and iii) differential effects.

7.1 Theoretical Framework

Two studies contributed to examine the i) theoretical framework of educational suicide prevention. A three-rounds Delphi-survey with experts in the field of suicide prevention was used to generate recommendations for researchers, practitioners and users about effective and safe educational suicide prevention programs (Grosselli et al., 2021). A systematic review on the correlation of mental health knowledge with stigma (personal, public, self-stigma) and help-seeking (attitudes, intentions, behaviour; Grosselli et al., 2024b) adds important insights to clarify the connection of knowledge to these variables, laying a foundation for understanding the role of knowledge in education mental health prevention. The meaning of these results for suicide prevention research will be discussed in the following sections.

7.1.1 Expert Opinions? It's a Start

Suicide prevention research comes with substantial ethical and methodological challenges. When conducting human research, informed consent is essential for correct ethical conduct (Hom et al., 2016). In the case of minors, consent should be given by the caregivers and by the minor themselves. This can represent a major difficulty since suicide is a taboo topic. Even if it was falsified in several studies (Gould et al., 2005; Reynolds et al., 2006), it is still a

common misconception that it is dangerous to ask adolescents whether they ever had suicidal thoughts (in line with the saying “Let sleeping dogs lie”). These fears may cause individuals not to give their consent for the participation in suicide prevention studies. This could create a substantial bias for research, since parents of students with higher suicide risk and low MHL may be particularly prone to withhold their consent (Shaw et al., 2015; Anderman et al., 1995). Moreover, it is evident that it is not ethical to compare different study conditions if one of them may risk increasing suicidality or if one group is denied a probably helpful intervention. Due to lack of data, it may be difficult to decide a priori how helpful (or hurtful) an intervention may be, causing difficulties in obtaining approval from ethics committees (Andriessen et al., 2019).

On the hierarchy of evidence, “expert opinions without explicit critical appraisal” are considered the lowest level of evidence (while systematic reviews and meta-analyses of randomized-controlled trials are at the highest) (Howick et al., 2011). Nevertheless, when the level of evidence on a research field is low, and it is difficult to generate knowledge through experimental designs, expert opinions are a valuable source of information (Jorm, 2015). The quality of evidence elicited through expert interviews can be substantially enhanced through appropriate research methods (Jorm, 2015). When experts are provided with the results of systematic reviews, experiments or qualitative studies, their group decisions can substantially improve in quality compared to their professional experience only (Jorm, 2015). Systematic assessment methods can yield more reliable results than unsystematic methods (Jorm, 2015). One of these methodologies is the Delphi-survey, which has been extensively employed in the field of mental health (Jorm, 2015) and suicide prevention research (among many, see Cai et al., 2023; Colucci et al., 2010; Cox et al., 2016; Kelly et al., 2008; Johnson, 2011). The Delphi-method aims to ensure that information is collected independently and aggregated systematically preventing biases in the collective decision-making process (Jorm, 2015; Surowiecki, 2004).

As the NeSuD project started in 2017, the evidence base for school-based suicide prevention was very scarce (see Robinson et al., 2015). By then, we had only knowledge of two educational prevention programs that had been successfully evaluated within randomized-controlled trials (SOS, Aseltine & DeMartino, 2004; YAM, Wasserman et al., 2015). Both evaluated programs were inaccessible to our research group due to language or

financial restraints. The discussion on effective mechanisms for educational suicide prevention was still at its beginnings. Thus, we decided to conduct a Delphi-survey to guide the process of developing an economic suicide prevention program in German language. To increase the quality of the outcome, we decided to generate research items not only from expert opinions, but also from randomized-controlled trials. We invited experts from all over the world and representing different lines of thoughts to broaden the reliability of expert decisions (see Jorm, 2015; Surowiecki, 2004). We used standardized methods to arrive to unbiased group decisions and recommendations. Even if the findings are mostly based on experts' personal and professional opinions and should be thus interpreted cautiously, our Delphi-study (Grosselli et al., 2021) offered a foundation for subsequent research and provided valuable practical guidance for professionals in the field. Since its publication, however, much happened in the field of suicide prevention so that the findings of the Delphi-survey should be integrated with recent research.

7.1.2 School-based Prevention: A Worthwhile Commitment

Interestingly, experts recommended the use of educational prevention programs but at the same time, expected only small measurable effects on suicide attempts and suicidal ideation in evaluation studies (Grosselli et al., 2021). This is probably due to the multifactorial aetiopathogenesis and relative rarity of these phenomena in general populations. The cost-effectiveness of educational suicide prevention programs has been doubted before since massive cost may be necessary to produce small effects (Ahern et al., 2018). Thus, one question arises: is it really recommended spending valuable financial and time resources on suicide prevention in schools? Recent empiric research suggests that the answer is yes. A meta-analysis evaluated the effects of school-based prevention programs that targeted suicidal ideations or suicide attempts either as a primary or as a secondary outcome (Walsh et al., 2023). They included both universal and selected approaches (i.e. screening programs). They showed that the odds of the pooled intervention group to suffer from suicidal ideation was 13% lower than in the pooled control group; for suicide attempts, it was 34% lower (Walsh et al., 2023). The number to treat to prevent one case of suicide attempt was 55 (Walsh et al., 2023). Although these numbers may be subjected to a publication bias and aggregate the effects of universal and selective programs, these figures suggest that school-based prevention is worth its costs and that educational programs are indeed a promising prevention tool. It must be noted that longitudinal evaluation studies had follow-ups between 2/3 weeks and 2.5

years (Walsh et al., 2023). It is possible that this times are not ideal to reflect the real magnitude of effects.

7.1.3 Heading to Shared Theoretical Frameworks for Suicide Prevention

What should an effective and safe educational suicide prevention program look like? The expert recommendations from our Delphi survey (Grosselli et al., 2021) provide insight into which goals and mechanisms may be most effective for suicide prevention efforts, helping to clarify which theories might serve as the best foundation for these efforts.

To reduce suicidal ideation and suicide attempts, it is crucial to target psychological risk factors for suicidality (e.g. hopelessness, feelings of isolation and entrapment; see Qiu et al., 2017; Joiner, 2005; O'Connor & Kirtley, 2018). Theories that explain the psychological precursors of suicidal ideation (e.g. "Hopelessness theory of suicide", see Qui et al., 2017) or the transition from ideation to action (e.g. "Integrated motivational-volitional model of suicidal behaviour"; O'Connor & Kirtley, 2018) may be especially well-suited as a theoretical foundation for a more direct reduction of suicidal ideation and suicide attempts.

In our survey (Grosselli et al., 2021), two further strategies found the highest expert consensus: improving help-seeking for suicidal ideation and increasing support among peers. Individuals experiencing suicidal ideation are less prone to reach out for help compared to individuals with other symptoms ("help negation effect"; Wilson & Deane, 2010). For this reason, universal suicide prevention strategies seem central to enhancing professional help seeking for young people suffering from mental distress before they develop suicide thoughts. Rickwood and Deane (2005) proposed a conceptual framework to understand help seeking processes among adolescents, which could be used as a basis for suicide prevention. When young people are already experiencing suicidal ideation, on the other hand, the support of friends and peers could be crucial to facilitate proper treatment or interventions from adults, as well as reducing to reduce risk factors such as sense of isolation and burdensomeness (e.g. Hart et al., 2020; Kia et al., 2021; Thomas & Brausch, 2020). The Teen Mental Health First Aid program, for example, is based on this principle and developed a model to provide adolescents with the tools to successfully support distressed peers (Hart et al., 2020).

7.1.4 From Specific to Upstream Prevention

The experts in the Delphi-survey (Grosselli et al., 2021) suggested integrating suicide prevention into programs with the wider focus of enhancing mental health and improving life-skills (i.e. coping, emotional regulation, social skills). This approach is consistent with the concept of upstream suicide prevention (Wyman, 2014), which suggests that the most effective way to reduce suicide attempts and suicidal ideation is to foster protective and reduce risk factors both during childhood (e.g. self-regulation, social emotional learning; Posamentier et al., 2023; Wyman, 2014) and during adolescence (e.g. dysfunctional emotional regulation, social skills; Wyman, 2014). These risk-factors are not specific for or limited to suicidality. Improving these outcomes would generally increase mental health and well-being and reduce a range of common mental disorders (Wyman, 2014). This approach would have a further advantage: When prevention programs do not target suicide as a main theme, their acceptance by school-personnel and parents may be increased (Kutcher et al., 2017). Furthermore, doing so may reduce the adverse effects of emotional discomfort that young people may experience when exposed to emotional information about suicide (Kuiper et al., 2019; Grosselli et al., 2021). Theoretical models that explain how to promote social and emotional learning and resilience (e.g. Cavioni et al., 2020) could provide theoretical guidance for upstream prevention programs that reduce suicidality through a general mental health promotion. All in all, the results of the Delphi-survey highlight the potentials of a broader vision of prevention programs, away from mere awareness programs aiming at educating about suicidality to more comprehensive strategies of mental health promotion.

7.1.5 Enhancing Safety

Our Delphi study (Grosselli et al., 2021) adds to the small body of studies that formulated guidelines for safety in suicide prevention research (Hom et al., 2016; Kuiper et al., 2019; Singer et al., 2019; Surgenor et al., 2016). Since these studies based their recommendations on unsystematic literature synthesis, the systematic aggregation of expert opinions represents a valuable addition.

Some safety recommendations regard methodological aspects. Singer et al. (2019) highlighted contextual factors and suggested that interventions should be led by mental health professionals. This suggestion is backed up by our findings, which see school psychologists and psychologists as the most favourable facilitators (Grosselli et al., 2021). External

facilitators, also, may be both more acceptable for students than school staff and encourage students to open up in case of suicidal ideation (Surgenor et al., 2016). Both Singer et al. (2019) and Surgenor et al. (2016) propose engaging all important stakeholders (school-direction, staff, parents) before delivering the program, which may facilitate the recognition and helpful reactions to suicidal ideation.

As for contents, Surgenor et al. (2016) recommended that outcomes should be clearly defined beforehand and that risk factors which cannot be influenced should not be addressed in wider discussions. Interestingly, Surgenor et al. (2016) suggested that content delivery should be flexible since reactions to suicide contents may be very emotional and unpredictable. This, however, highlights further difficulties in the evaluation of educational programs, since program fidelity may be at stake. Continuous program evaluation with sound study designs and longitudinal measurements over long time periods is essential independently of the chosen contents (Surgenor et al., 2016; Grosselli et al., 2021).

Further recommendations regard safety plans. Kuiper et al. (2019) strongly recommended to explicitly monitor and report unexpected negative effects, with a particular focus on students at risk. Hom et al. (2016) focused on ethical issues in prevention research and on strategies to prevent negative effects. They strongly recommended assessing suicide risk, especially when study participants are supposed to be a risk population. When participants are found at higher risk of suicide, they should be referred to a professional helper (Hom et al. 2016). This procedure should be planned beforehand with study protocols and emergency procedures (Hom et al., 2016).

Educational prevention programs are universally administered and not limited to at risk-populations only. However, adding a suicide screening to the intervention may increase the safety of the intervention and reduce ethical concerns. Some prominent prevention programs (as the SOS program; Aseltine & DeMartino, 2005) combine educational elements with a screening to improve effectiveness and safety. Our Delphi-survey (Grosselli et al., 2021) supports this recommendation, suggesting that a screening may also facilitate treatment access for participants. As also stated by Surgenor et al. (2016), for effective and safe prevention, the referral of students at risk should not only happen punctually during the study but also in the long term (Grosselli et al., 2021). Furthermore, schools should develop long-term plans to prevent and to react to suicidality even after the participation in a punctual prevention

program as a part of a multistage, comprehensive strategy of suicide prevention (Grosselli et al., 2021).

7.1.6 Mental Health Knowledge: The Core of Mental Health Literacy

Improving mental health literacy (MHL) has been advocated as a pivotal early intervention to prevent mental disorders (Kelly et al., 2007). The definition of MHL as “knowledge and beliefs about mental disorders which aid their recognition, management and prevention” (Jorm et al., 1997, p. 182) frames it as a construct reflecting the type of knowledge required to undertake effective health actions. Since this original definition, however, MHL has been re-defined and assessed in very different ways (Spiker & Hammer, 2019; Wei et al., 2015), encompassing further variables beyond knowledge that seem central for maintaining a positive mental health (e.g. low stigma, high self-efficacy for seeking help; see Kutcher et al., 2016; Spiker & Hammer, 2019).

The findings of our systematic review suggest that while knowledge, stigma, and help-seeking are related, they are clearly distinct constructs (Grosselli et al., 2024b). Trying to merge these constructs up into a single, unidimensional construct as suggested in the past (Kutcher et al., 2016) could be thus detrimental for a deeper understanding of mechanisms in mental health prevention (see Spiker & Hammer, 2019). Our research highlights the importance of examining separate facets of MHL rather than using broad, all-encompassing definitions.

Our systematic review (Grosselli et al., 2024b) contributes to understanding the core construct of MHL: mental health knowledge. Experts suggested that enhancing knowledge of symptoms of depression, warning signs, causes, and risk factors of suicide, helpful reactions to suicidal peers, and providing information about professional help are effective and feasible outcomes of educational programs (Grosselli et al., 2021). This expert’s recommendation stresses the importance of improving knowledge for prevention. However, what is the significance of knowledge and what impact does it have in preventing mental disorders, suicidal ideation and suicide attempts?

7.1.7 Quantifying Correlations: How Strong is the Link between Knowledge, Stigma and Help-Seeking?

As expected, in our systematic review (Grosselli et al., 2024b) mental health knowledge correlated negatively to mental health related stigma (personal stigma, self-stigma) and negatively to help seeking attitudes, intentions, and behaviour. However, it is important to note that these correlations were of small to moderate magnitude. Mental health knowledge was not related to public stigma of mental health. Our findings on mental health knowledge have several consequences for prevention research. While the correlations between these variables may seem intuitive, previous overview studies have not sufficiently delineated the interrelations between the different facets of mental health knowledge, stigma, and help-seeking. By comparing the results of our systematic review with those of earlier studies, we contribute to a more profound understanding of these interconnections.

Lien et al. (2024) found a small positive correlation between recognition (as a specific form of knowledge) with mental health stigma and a moderate correlation to attitudes towards help seeking in their meta-analysis. The authors did not differentiate between different types of mental health related stigma. However, personal stigma (stigmatizing attitudes and behaviours towards others), self-stigma (stigmatizing attitudes towards the self) and public stigma (perception of stigma among others) are correlated but distinct phenomena (Correll et al., 2010). Our study adds to the aforementioned since it was the first to systematically examine the direction and magnitude of the correlation of mental health knowledge (including knowledge of mental disorders, recognition of disorders, knowledge of risk factors and causes, knowledge of self-treatment, knowledge of professional help available, knowledge of how to seek information, knowledge of prevention; Grosselli et al., 2024b) with distinct facets of both stigma (personal, public, self-stigma) and help-seeking (attitudes, intention, behaviour) in the general population. Our study suggests that not only recognition of mental disorders but also knowledge about symptoms, causes and treatment is negatively related to both personal (moderate effect) and self-stigma (small effect). Also, our review is the first to show that knowledge about mental health is not consistently related to public stigma, i.e. it does not change the perception about stigma held by others (Grosselli et al., 2024b).

In their systematic review and meta-analysis, Özparlak et al. (2023) reported a very large positive correlation of the broad construct of MHL with help-seeking attitudes and a moderate correlation to help seeking intentions among young people. Compared to Özparlak et al.'s review (2023), in our review with no age limits for inclusion we found smaller correlations between knowledge and help-seeking attitudes and intentions (Grosselli et al., 2024b). Schomerus & Angermeyer (2008) suggested that young people show the largest effects after taking part in educational programs targeting help-seeking attitudes. We also observed that younger students gained more knowledge from HEYLiFE (Grosselli et al., 2024a). This suggests that improving knowledge is especially relevant in younger populations (or for younger generations), while other individual barriers (such as higher perceived public stigma; Conner et al., 2010) may be more central forming the decision to seek help in older populations. An alternative explanation to the difference in effect sizes is that Özparlak et al. (2023) included studies measuring MHL, while our review focused on mental health knowledge. It is possible that instruments measuring MHL also use items related to attitudes towards help seeking, due to a too broad definition of the construct. The correlations, thus, may be tautological. To clarify which explanation is more accurate, further research should use validated instruments that measure mental health knowledge and help-seeking attitudes across different age groups.

In sum, the small to moderate correlations suggest that knowledge is relevant but by far not the only important factor related to stigma and help-seeking (Grosselli et al., 2024b). Thus, improving knowledge should not be the only central target outcome of educational programs (see also Grosselli et al., 2021). To reduce stigma, other prevention strategies might be more effective than improving knowledge, such as personal interactions with individuals experiencing mental health disorders (Collins et al., 2013; Rüsç & Xu, 2016). Given the multiple obstacles to help-seeking (e.g., Gulliver et al., 2010; Heinig et al., 2021), other factors, such as self-efficacy (the belief in one's ability to seek and receive appropriate help), play a much more crucial role in the process of seeking professional help than mental health knowledge alone (Kauer et al., 2016; Zhang et al., 2019; Grosselli et al., 2024b).

7.1.8 Unravelling the Correlations: How does Knowledge Contribute to Prevention?

The direction and magnitude of the correlations between mental health knowledge, mental health related stigma and help-seeking should not be understood to imply causality, but rather serve as a basis for further research on the mechanisms underlying these relationships. Examining theories that explain help seeking processes (e.g. Sounder & Bowersox, 2019; Rickwood et al., 2005, Schnyder et al., 2017; Schomerus & Angermeyer, 2008) is a starting point for empirical research aiming to understand the role of knowledge for educational suicide prevention.

Several influential theories of behavioural change highlight variables for which knowledge plays an important role (Davidson & Scholz, 2020; Davis et al., 2014). In Bandura's Social Cognitive theory (1986), outcome expectations are pivotal for shaping behaviour. In the case of help-seeking for mental health problems, outcome expectations could be whether they believe professional help to be effective and whether they fear negative consequences of seeking help. Improving knowledge about the effectiveness of counselling, psychotherapy and medication as provided by educational programs could help to improve outcome expectations for seeking professional help (Morrison et al., 2020). The Theory of Planned Behaviour (Ajzen, 1991) stresses the role of attitudes towards a specific behaviour as a behavioural predecessor. Knowledge about treatment effectiveness has a positive impact on attitudes towards help seeking (see Rüscher et al., 2013). The Transtheoretical Stages of Change Model (Prochaska et al., 1998) describes several motivational and volitional states that precede every behaviour. Saunders and Bowersox (2007; Figure 4) developed a stages-of-change-model for the specific steps necessary to initiate a help-seeking action. In the pre-motivational phase, knowledge about symptoms of mental disorders is central for the process of self-identification as a "person with a mental health problem" (McLaren et al., 2023). Knowledge about the effectiveness of professional help and about how to find help facilitates decision-making and action in the motivational and volitional phases. Due to age-specific and developmental aspects, pathways to help are slightly different for adolescents; these will probably need to open up to an adult gate-keeper (i.e. parents, teachers, etc.) to obtain access to help sources (Rickwood et al., 2005). Knowledge on mental health symptoms and treatment, still, seems to

be strongly related to help-seeking intentions in this age group (Grosselli et al., 2024b). Overall, knowledge seems to be a necessary and important predecessor for help-seeking.

Stigmatizing views of mental illness and of the action of help-seeking (e.g. “It is weak to reach out for help”) are also connected to knowledge (Grosselli et al., 2024b) and are a principal barrier to help-seeking behaviours (Aguirre Velasco et al., 2020; Coleman et al., 2017; Clement et al. 2014; Gulliver et al., 2010; Schnyder et al., 2017). Clement et al. (2014) suggested in their systematic review and meta-analysis that negative media representation, as well as discriminating policies against people who seek help for mental health problems (e.g. difficulties in gaining jobs positions or insurances) contributed to personal negative beliefs about mental illness and treatment. Fear of discrimination by others and a feeling of shame due to internalized self-stigma play a role in this process (Schnyder et al., 2017; Schomerus & Angermeyer, 2008). Actual personal experiences of social rejection further deter people from reaching out for help (Clement et al., 2014). Referring to the theories of behaviour mentioned before, fear of discrimination represents a negative outcome expectation and can predict negative attitudes towards help-seeking behaviour (see Bandura, 1986; Ajzen, 1991; Surapaneni et al., 2019; Topkaya; 2014). While several researchers suggest that perceived stigma in society may discourage help-seeking (Clement et al., 2014), Schnyder et al. (2017) found no evidence to support this assertion. It is possible that, instead, perceived stigma in intimate relationships (family, friends) has a stronger negative influence on help-seeking (Ajzen, 1991; Saunders & Bowersox, 2007).

The indirect role of knowledge in the prediction of help-seeking behaviours through attitudes and stigma has been examined in various studies. In their study with 172 school students, Pearson & Hide (2021) showed that mental health knowledge was a direct predictor of both attitudes towards help seeking and help seeking intention in a regression analysis, while there was no indirect effect of knowledge on intentions with attitudes as a mediator. However, both knowledge and attitudes accounted only for a small portion of variance for help-seeking intentions (Pearson & Hide, 2021). Two studies with a sample of Korean college students ($N = 200$, Kim et al., 2020; $N = 305$, Kim, 2021) supported the assumption that stigma mediates the influence of MHL on help-seeking. Structural equation models suggest that MHL has a direct effect on self-stigma and personal stigma of receiving treatment, and that this effect fully mediates the positive effect of MHL on attitudes towards help-seeking and help-seeking intentions. While the model with MHL, self-stigma, public stigma, social support and perceived barriers to care had a substantial predictive effect on attitudes (52.6%),

it only explained a small amount of variance for help-seeking intentions (14.5%; Kim et al., 2020).

7.1.9 The Limits of Knowledge for Suicide Prevention

The mechanisms underlying help-seeking behaviours are complex. Several studies highlighted that only a combination of predisposing factors, actual need and facilitating factors can explain a sufficient variance of help-seeking behaviours (Li et al., 2018; McLaren et al., 2023). Knowledge seems to play a significant but marginal role (Pearson & Hide, 2021; Kim et al., 2020). O'Connor et al. (2014) reported that perceived benefits, perceived barriers, extraversion and social support were more central predictors of help-seeking intentions than mental health knowledge among young people ($N = 180$). Aldalaykeh et al. (2019) showed that depression knowledge was not a significant predictor of help-seeking intentions among university students ($N = 134$) when attitudes, subjective norms and perceived behavioural controls were added as predictors to a hierarchical regression analysis. The presented studies examined help-seeking for mental health problems in general. Since there may be peculiarities for suicidal ideation (e.g. help-negation effect; Wilson & Deane, 2010), it is important to test these models on help-seeking intentions for suicidal ideation. A narrative review suggests that knowledge and stigma may play a role, but also that fear of hospitalization may be a substantial barrier more specific to suicidal ideation (Hom et al., 2015).

Furthermore, not all forms of knowledge may be beneficial for prevention (Goodfellow et al., 2023). Biopsychosocial models of mental illness assume that biological factors, personality, and stress all have an impact on health (Lehman et al., 2017). In a pathway analysis with a representative community sample ($N = 1375$), Schnyder et al. (2017) showed that the assumption that mental illness is caused by biological and personality factors led to higher stigma and less help-seeking behaviours. Goodfellow et al. (2023) reported a similar finding for adolescents. While knowledge about the effectivity of help sources was positively related to help-seeking intention, the correct recognition of mental disorders was linked to less help-seeking intentions. The missing factor in this equation may be stigma. The assumption that genetics and personality cause mental illness has been shown to be connected to higher personal stigma (assumption that the person is dangerous or unpredictable; Goodfellow et al., 2023). High perceived stigma regarding specific mental disorders may lead to expected

discrimination (Gulliver et al., 2012; Goodfellow et al., 2023; Kvaale, Haslam, & Gottdiener, 2013). These findings have relevant implications for educational suicide prevention. Experts have repeatedly recommended depicting suicidal ideation, and suicide attempts not as a result of stress, but, instead, as a symptom of mental illness (e.g. Bründel, 2015). The concern was that identifying stress as a cause might increase acceptance of suicide as an “escape strategy” from challenging situations. On the contrary, identifying suicide as a symptom of mental illness could increase the cognitive dissonance of people suffering from suicidal ideation and increase their propensity to reach out for help (Ciffone, 2007). Doing this, however, may have the unwanted effect of increasing stigma towards people with suicidal ideation and reducing social support. It may be more helpful to describe suicidal ideation as resulting from a feeling of hopelessness and isolation that results from multiple, complex causes, and that reaching out for help is essential and helpful to overcome this feeling.

7.2 Program Development and Evaluation

One of the main achievements of the NeSuD project was to address this challenge and develop and evaluate an educational suicide prevention program for secondary schools: HEYLIFE (Grosselli et al., 2024a). The program was developed based on the two programs with the highest level of evidence at that time (SOS, Aseltine & DeMartino, 2004; YAM, Wasserman et al., 2015) and on the results of our Delphi-survey on educational suicide prevention (Grosselli et al., 2021). We integrated techniques from cognitive-behavioural therapy for children and adolescents. We placed great emphasis on conceiving an engaging but feasible program in German language that could be delivered with limited costs for personnel and materials. The contents of the program were designed to improve mental health literacy and, in particular, knowledge about depression and suicidality; improve adaptive coping for stress; encourage help-seeking for mental disorders; reduce stigma and improve adaptive attitudes regarding suicidality; improve peer-support; reduce psychological risk-factors for suicidality (hopelessness, isolation, burdensomeness, entrapment). Our second research question, hence, focused on ii) program development and evaluation.

We evaluated the program with a randomized-controlled design with a waiting-control-group and a 6-month-follow-up. For practicability reasons, short-term effects were measured comparing pre-post results in the experimental group only, while mid-term effects were measured comparing the pre-to-follow-up-changes of the experimental group with the control

group. Due to the limited sample and interval between baseline and follow-up, we did not expect to measure significant effects on suicide attempts or suicidal ideation. Based on the suggestions of the experts of the Delphi-survey (Grosselli et al., 2021), we included following outcome variables in the evaluation: knowledge of suicidality, attitudes towards suicidality, personal stigma towards suicidal peers, help-seeking intentions and behaviour for mental health problems, risk-factors for suicidality. We also reported acceptability and unwanted negative effects. Overall, 745 students of 54 school classes from 19 schools of the city of Dresden took part in our study (Grosselli et al., 2024a).

7.2.1 Short-lived Effects for Knowledge and Attitudes

Immediately after the program, participants demonstrated higher levels of knowledge about suicide and more adaptive attitudes towards it. In particular, students reported that after the program they would not keep it a secret if a friend was suicidal and that they would know how to react helpfully. Knowledge is an important predecessor of help-seeking (see Chapter 6.1.3). Adolescents tend to confide suicidal thoughts only to friends (Wilson & Deane, 2010). These friends, however, may feel overwhelmed and may react with rejection or avoidance (Davies et al., 2024). This may contribute to social distancing and a sense of being burdened by the suicidal person, both of which are central risk factors for suicidality (Frey et al., 2016; Joiner et al., 2005). Improving social support among peers is considered one of the most important outcomes of prevention programs (Grosselli et al., 2021). Informing adolescents that suicide is preventable and encouraging them to refer their friends to a trusted adult could be a key strategy in ensuring appropriate social support and promoting help-seeking (Aseltine & DeMartino, 2004), even preventing suicide attempts in the long run. This strategy was applied in the HEYLiFE program.

The effectiveness of the HEYLiFE program for these outcomes, however, was short-lived. At the 6-months-follow-up, both groups seemed to have better knowledge than at baseline, and there were no significant differences between the groups. With growing age, adolescents acquire more knowledge about mental health themes (Özbıçakçı et al., 2024). It is possible, moreover, that participating in our baseline assessment alone motivates students to research about common myths and facts about suicidality, accelerating this natural development. A

different research design introducing a control group without the baseline measurement would be helpful to examine this hypothesis.

To assess suicide knowledge, we used a German translation of the questionnaire administered in the evaluation of SOS-prevention program (Aseltine & DeMartino, 2004). In their evaluation study of the SOS-programs, the authors reported an increase in knowledge within the intervention group compared to the control group after 3 months (Aseltine et al., 2007; Shilling et al., 2014; Shilling et al., 2016), a rather short period of time. In their systematic review, Patafio et al. (2021) noted that it is rare for evaluation studies of prevention programs aimed at improving mental health outcomes in youth to report mid- to long-term follow-up results. Only few studies found durable results on knowledge on the mid-term (Schwarz et al., 2017, 4-months-follow-up; Lai et al., 2016, 5 to 6 months follow-up; Bella-Awusah et al., 2014, Campos et al., 2018, Perry et al., 2014, 6-months-follow-up). Others, on the contrary, reported only short-lived effects, similar to our study (Pinfold et al., 2003, 6-months follow-up; LaFromboise & Howard-Pitney, 1995, 9-months-follow-up; Andersen, 2013, 12-months-follow-up). The interval between baseline and follow-up in the intervention group was longer for HEYLiFE than for most of the programs with significant results mentioned before (6 to 9 months) so that it is possible that effects after this period are more difficult to obtain. Nevertheless, techniques apt to solidify knowledge as quizzes, posters hanging at school, booster sessions may be beneficial to achieve long-lasting results. Future improvements to enhance the durability of knowledge and attitude gains through HEYLiFE, as for example through booster sessions, may be considered.

As for attitudes, Aseltine et al. (2007) and Shilling et al. (2016) reported a moderate effect on attitudes at their 3-months-follow-up using the same questionnaire. To our knowledge, no further studies reported favourable effects of interventions on attitudes towards suicidality for longer follow-up intervals. Systematic reviews observed that the quality of evidence for effects on attitudes was very low and that in most of the examined studies only reported short-time, small effects on attitudes (Holmes et al. 2019; Pistone et al. 2019). Thus, more studies assessing a change in attitudes on the mid-term are needed to understand long-term effects of interventions on attitudes towards suicide. It is possible that only long-term programs that intervene at multiple levels in a community are apt to improve attitudes towards suicide over time (Fountoulakis et al., 2011).

7.2.2 Protective Effects on the Mid-term

Hom et al. (2015) described research gaps on educational suicide prevention programs aimed at increasing help-seeking. First of all, they noted the scarcity of RCTs with mid- to long-term follow-ups. Furthermore, that most intervention studies did not measure behavioural outcomes. Our study addressed both these research gaps (Grosselli et al., 2024a). The effects of the 6-to-9-months follow-up suggest that HEYLiFE is a valuable intervention for mental health promotion and suicide prevention. The program showed mid-term effects on two central outcomes of suicide prevention programs (Grosselli et al., 2021): help-seeking-intentions and risk-factors for suicidality (hopelessness, isolation, burdensomeness, entrapment; Grosselli et al., 2024a). HEYLiFE, however, did not have any effects on help-seeking behaviours in our sample.

A significantly larger number of classes in the intervention group completed the follow-up during the COVID-19 pandemic compared to the control group. This represents a notable limitation of the HEYLiFE evaluation study (Grosselli et al., 2024a). Upon further consideration, this unbalanced distribution may actually enhance the impact of the observed effects on risk factors for suicidality. Covid-19-pandemic caused a significant increase in mental health strain; among others, adolescents reported higher values in depression, loneliness, suicidal ideation and suicide attempts (Oliveira, 2021; Hossain et al., 2022; Ravens-Sieberer et al., 2022). In our sample, too, we noted significantly higher values in depression and suicidality in students filling out the follow-up questionnaire after Covid-19-pandemic onset compared to students filling it out before (independently of the group). However, students in the intervention group showed a significantly less strong increase than the control group in psychological risk-factors for suicidality at follow-up despite. This suggests that the intervention had a protective effect on the mental health of young people during the ongoing pandemic. HEYLiFE seems to have helped young people's psychological strategies of coping with stress and crisis, hindering them from losing hope or feeling isolated. This prevention strategy has been strongly supported by experts (Grosselli et al., 2021) and may have protective effects for a large range of mental health conditions (see Walsh et al., 2024).

A second, very meaningful result is that the intervention group showed higher help-seeking intentions than the control group at follow-up. In this case, however, it is unclear whether and how the Covid-19 pandemic confounded these results. Help-seeking intention can arise in times of crisis when people feel high levels of anxiety and do not feel resilient to face change (Maba et al., 2020; Marchini et al., 2020). It is possible that the intervention group had higher help-seeking intentions partly due to greater mental health strain, leading them to perceive a higher need for professional help. However, the HEYLiFE program seems to have enhanced psychological coping, as evidenced by reduced psychological risk factors for suicidality. This suggests that the higher help-seeking intentions in the intervention group may not solely be a result of increased mental health distress. A replication of the study with more similar conditions between the control and the experimental group may be necessary to replicate the results.

No behavioural changes in help-seeking were found for the intervention group compared to the control group. Again, the circumstances of the pandemic, along with contact limits and closures (unavailability) of local health care facilities may have contributed to this result. HEYLiFE is a universal program targeting a general population of young people. Our results are in line with previous studies showing that interventions were only able to increase professional help-seeking behaviour in high-risk populations but not in general populations and schools (Xu et al., 2018). To measure a significant change in general populations, very large sample sizes and long-term follow-ups would be needed. The sample size and the measurement intervals in our study may be too small to detect these effects. Thus, it seems very promising that the intervention could significantly improve help-seeking intentions, one of the central predecessors of help-seeking behaviours (Gulliver et al., 2010). It is possible that young people that receive interventions like HEYLiFE when they are not experiencing any distress will be more likely to look for professional help when they may develop mental health problems in the future. The long-term effects of HEYLiFE, especially among those students at higher risk of developing mental disorders, should be investigated to confirm this hypothesis.

7.2.3 Heterogeneous Findings for Stigma

The HEYLiFE program had mixed effects on stigmatizing reactions to a suicidal peer in a vignette (Grosselli et al., 2024a). When interpreting these results, it should be considered that mental health stigma is a complex construct. Different types of stigmata have been defined

regarding the subject and object of the stigma (personal, public, self-stigma) as well as the type of reaction (cognitive, emotional or behavioural; stereotypes, emotional reactions, discrimination; see Sheehan et al., 2017). Furthermore, the specific disorder and demographic characteristics of the stigmatized person (e.g. age, gender) may have an influence on the intensity of stigmatization (Calear et al., 2017). In our evaluation study (Grosselli et al., 2024a), we measured personal stigma towards people with depression and suicidal ideation at a similar age as the responder with a randomly assigned gender (50% male, 50% female). We measured both stigmatizing emotional reactions (anger, fear, low prosocial reactions) and the wish for social distance (an indicator for discrimination).

On the short-term, HEYLiFE led to a decrease in fear of a suicidal peer. However, it also led to a decrease in pro-social reaction and an increase in social distance. This effect was stronger for males (vs. females) and younger (vs. older) adolescents (Grosselli et al., 2024a). In their meta-analysis and systematic review on stigma reduction programs in schools, Song et al. (2023) report that more than 50% of the included studies (14 out of 22) reported mixed (significant and non-significant) or no effects on stigma. However, no single intervention led to a significant increase in stigma. Funnel plots did not suggest a publication bias. HEYLiFE's negative effects, thus, are not reflected by effects of similar interventions. It is possible that the more negative, stigmatizing emotional reactions and attitudes stems from HEYLiFE's focus on suicidal ideation, which is a particularly lethal and thus dangerous condition. In HEYLiFE, we stress the gravity of suicidal ideation to promote the realization of need for help, i.e. to encourage peers to reach out to an adult for help. Ciffone et al. (2007) speculates that talking about suicidality will undoubtedly elicit negative emotions. These emotions, however, could be considered a positive sign since they may motivate young people to take action and to react appropriately to suicidal thoughts. On the other hand, it is possible that this call to action causes a feeling of being overwhelmed – and thus elicit the wish to not be involved in this process. It may be necessary to modify HEYLiFE to reduce this effect. The program could adopt some strategies from stigma-reduction programs, as focusing on the strengths and resources of people with suicidal thoughts in the examples, focusing on stories that show a positive development, fostering contact with peers with lived experience (Song et al., 2023).

The negative effects on stigma were only found in the short-term. At follow-up, the control group showed a higher wish for social distance than the intervention group. Heary et al. (2017) described that stigmatizing attitudes show a complex development during teen years. Desire for social distance and the perception that people with mental disorders are “weak (instead of sick)” seems to decrease for several mental disorders (like social anxiety and ADHD) during adolescence (Jorm et al., 2008; Swords et al., 2011). The reduction of stigma with age, however, does seem to differ regarding several mental disorders. Several studies confirmed the observation that young people become increasingly less accepting of peers with depression with increasing age (Kaushik et al., 2016; Swords et al., 2011). Since the HEYLiFE evaluation study measured stigma against a peer with depression and suicidal ideation (Grosselli et al., 2024a), an increasing stigmatization in form of a main, negative effect of time for fear, prosocial reactions and social distance does not seem surprising (Grosselli et al., 2024a). Young people reported being less afraid, but also less willing to empathize and have contact with a depressed peer after six to nine months. A possible reason is that older adolescents are more likely to have had contact with media depicting mental illness in a negative way or experienced more emotionally negative situations linked with depression. This increased rejection occurs especially among boys (Grosselli et al., 2024a; O’Driscoll et al., 2012) and may cause older boys to experience less social support from their peers when depressed (O’Driscoll et al., 2012). In this light, it is remarkable that HEYLiFE showed a protective effect for social distance, as the desire for social distance in the intervention group was unchanged between baseline and follow-up while it increased for the control group, more so since most preventive programs that aim at stigma reduction only show short-time effects (Song et al., 2023). This could be an important predecessor or more social support, one of the most important protective factors of educational programs (Grosselli et al., 2021).

7.2.4 Program Safety

The first results on awareness-based suicide prevention programs were rather controversial and worrying for the scientific community due to several unwanted negative effects (Kuiper et al., 2019; see Chapter 2.4.2). Together with criticism concerning research methods, this caused a general scepticism against school-based educational suicide prevention programs (Bründel, 2015; Kuiper et al., 2019; Kutcher et al., 2017). However, negative effects were rare and resulted from very unsystematic, descriptive study designs. A growing body of research

summarized in recent meta-analyses shows how educational programs can effectively reduce suicidal ideation and suicide attempts in adolescents (Walsh et al., 2023; Gijzen et al., 2023). A more systematic assessment of unwanted negative results and acceptability to the public would improve the impact of these results (Kuiper et al., 2019).

In the HEYLIFE evaluation study (Grosselli et al., 2024a), we assessed and reported both unwanted negative effects and serious adverse events. All students reporting recent serious suicidal ideation or attempts were interviewed after each assessment. We did not find any causal connection between program participation and suicidal ideation or attempts in these interviews. One student mentioned that the program triggered suicide thoughts. However, they had got green light from the treating psychotherapist to participate in the program. The therapist also confirmed that the suicidal thoughts were chronic and not caused by the program. One student from the intervention group attempted suicide between the intervention and follow-up but dropped out before an interview to assess the reasons for the attempt could be conducted. The class teacher, however, confirmed the attempt occurred months later and was probably unrelated to the program. No further serious adverse events were registered. Among the unwanted negative effects, we observed mostly negative emotional reactions (e.g. crying and leaving the room). As already described, an emotional engagement with the program may rather indicate active involvement (Ciffone et al., 2007). Furthermore, it may lead to a positive help seeking experience, since the adolescents can receive help and comfort through the study personnel and the group. Thus, it could even contribute to positive outcomes on the long term (Ciffone et al., 2007).

Earlier research suggests that prevention programs do not lead to a higher incidence of suicidal ideation or attempts, but rather that participants with previous suicidal thoughts are likely to reflect on this theme due to the focus of the program (DeCou & Schumann, 2017). For individuals not currently receiving treatment, such programs provide a valuable opportunity to gain information on treatment options, as well as on accessible, low-threshold counselling options, such as online or chat-based support. Thus, when a prevention program conveys information and attitudes that may enhance help-seeking, a participation may be beneficial also for this group, even if emotionally challenging. Overall, our data support the safety of the HEYLIFE prevention program. Nevertheless, it seems important to react adequately to any signs of emotional distress among participants. Our Delphi survey

(Grosselli et al., 2021) provides valuable recommendations to increase the safety of program participants (see Chapter 6.1.2).

7.2.5 Program Acceptability

We assessed acceptability with a self-developed questionnaire based on theoretical framework for acceptability of healthcare interventions by Sekhon et al. (2017). The authors identified seven components of acceptability: affective attitude (feelings about intervention), burden (amount of effort required), ethicality (congruence with participant's values), coherence (understanding of the intervention and how it works), perceived effectiveness, opportunity costs (what participants must miss to participate to intervention), self-efficacy (participant's perception that they can perform the action required by the intervention). We developed one item for each facet of acceptability. The results showed that the intervention was rather acceptable for adolescents ($M = 3.97$ on a scale of 1 – not at all to 5 – very acceptable). This indicates that adolescents appreciate the participations to HEYLiFE and thought that it was a useful and important intervention.

However, another indicator of acceptability should be discussed critically. Only 11.6% of the schools we contacted decided to offer HEYLiFE to their students. We can assume that practical barriers (such as difficulties with scheduling or the use of alternative prevention programs) were among the main reasons. In other cases, however, school directors or staff reported that they did not find the program focus on suicide prevention acceptable or feared negative reactions from the parents. Of the classes that participated in our study, only 42.2% of potential participants took part in the first assessment. A total of 40.1% did not receive consent to participate from their parents (or did not consent themselves in case of adults). We did not assess reasons for declining the participation. According to observations of study staff and according to the literature (Surgenor et al., 2016), the following reasons for the low participation rates seem plausible: a. Negative emotional reactions from school personnel to the theme of suicide (e.g. fear that this may be inappropriate, dangerous or unacceptable to students or parents, fear of being held liable if a suicidal crisis emerges during the intervention); b. The feeling of school personnel that suicidality would be a too specific or irrelevant theme for adolescents; c. An uninteresting, unappealing (but also non-commercial) study information; d. A too complicated procedure for collecting informed consent from both legal guardians and students using paper-pencil materials; e. An emotional negative reaction of parents (e.g. fear that talking about suicide may be dangerous for their children). It is

possible that the rather high acceptability rating results from a biased sample of students that show interest in mental health related themes. In future, school principals and staff should be asked for barriers to implement the program. The reasons for parents or adolescents to refuse consent should be asked explicitly in the consent form. Focus groups with adolescents could be conducted to discuss their interest in the theme and their acceptance and evaluation of the intervention.

7.3 Differential Effects

With our third research question, we examined if the HEYLiFE prevention program worked equally for all participating students. Previous studies showed that prevention programs may have differential effects for specific sub-groups, but that there is a scarcity of studies investigating moderating variables (Musci et al., 2018). This dissertation aims to contribute to address the research gap on iii) differential effects regarding gender, age and risk for suicidality.

7.3.1 Gender: Masculinity Norms as a Challenge for Prevention

The HEYLiFE program had more positive effects for females than for males (Grosselli et al., 2024a). Immediately after the intervention, males showed a negative emotional reaction (more rejection/anger, less prosocial emotions such as compassion) towards a suicidal peer in a vignette. This suggests that emphasizing the commonality of mental health problems and the importance of seeking help for suicidal ideation may have inadvertently caused irritation and a reactant reaction in boys. On the mid-term, females (but not males) in the intervention group showed more favourable results in social distance, prosocial emotions, and help-seeking behaviour. Several previous studies have reported similar observations with more positive effects of suicide prevention programs for females than for males on knowledge, attitudes, stigma and help-seeking (Aseltine & DeMartino, 2004; Hamilton & Klimes-Dougan, 2015; Musci et al., 2018).

The influence of gender on suicidality is a widely explored phenomenon, with higher suicide rates for males in most countries (Pirkis et al., 2023). A higher propensity for violence, risk-taking behaviours, emotional avoidance and self-reliance for males compared to

females have been considered possible explanations for this disparity (Pirkis et al., 2023). The “hegemonic” ideal of masculinity in Western cultures entails being “strong”, “emotionally tough” and “self-reliant” (King et al., 2020). Thus, while females are presumably socialized to vent out negative emotions with friends and family and express mutual emotional support, males are encouraged to project an image of stoicism and tend, therefore, to be more isolated in case of distress (Hamilton & Klimes-Dougan, 2015). Embracing masculinity values has proven to be a risk factor for suicidality (Mackenzie et al., 2019). The self-stigma for depression, suicidal thoughts and help-seeking is much higher among men (Mackenzie et al., 2019). Self-stigma leads to more negative emotional experiences for males (shame, scepticism, sense of inadequacy), when accessing the help-system when professional helpers fail to address social norms and self-stigma adequately (Pirkis et al., 2023). Negative emotional responses and cognitive dissonance caused by the concept that mental health problems are not a sign of weakness, and that external help may be necessary may be a barrier to the effectiveness of prevention programs among males. HEYLiFE encourages being empathetic and supportive and to seek help for mental health problems. Acknowledging vulnerability and soliciting help-seeking during times of emotional distress may be perceived as a threat to a "masculine identity", particularly in young ages, when young people are in the process of identity construction and their self-worth is highly susceptible to negative comments by peers (Mackenzie et al., 2019).

Following the argumentation above, the effectiveness of prevention programs for males may be enhanced by considering masculinity norms. While normalizing help-seeking for mental health problems (e.g. comparing it to visiting a doctor for physical problems) may be a start, it may be insufficient to reduce profoundly anchored feelings of shame. Programs could shift their focus to fostering a sense of hope and mastery and conveying more self-help strategies and skills, such as problem solving and emotional regulation skills (Struszyk et al., 2019). When the aim is to increase help-seeking, prevention programs could aim to reduce the internal dissonance between help-seeking and a “masculine identity” reducing social isolation and self-stigma. A promising approach could be to provide role models, e.g. inviting suicide survivors with characteristics that make them acceptable as role models to share their positive experience with help-seeking. Prevention programs could address and validate self-stigma (“It is valid to feel shame since males are socially expected to show strength”), while normalizing mental distress (“Many man/boys feel the same way but they do not share their feelings for fear of appearing weak”). They may challenge current norms, re-framing help-seeking as a

courageous, strong act (“Seeking for help shows a high grade of courage, since it means you defied social conventions, took responsibility for your own mental health and became active to solve your problem”). Stressing the consequences of suicide on family and friends also seems to appeal to a sense of responsibility and protection of loved ones compatible with masculinity norms (Struszyk et al., 2019). Furthermore, providing help in more informal settings seems to enhance acceptability for men (Struszyk et al., 2019). Several programs tailored especially for men arose in the last decade; a thorough examination of their effectiveness is a very important goal for future research on suicide prevention (Pirkis et al., 2023; Struszyk et al., 2019).

Simple adjustments to the HEYLiFE program to improve the effectiveness for males could include ensuring that at least one of the two trainers is male, providing a relatable role model for the participants. Additionally, case vignettes could feature young male characters who embody "manly" traits and successfully overcome suicidal ideation and mental distress, fostering a stronger sense of identification. Greater emphasis could be placed on demonstrating how seeking help can align with masculine values. Assessing the impact of these modifications in future trials would represent a valuable addition to our understanding of educational suicide-prevention.

7.3.2 Age: Tailoring Prevention to Development

Studies on school-based suicide prevention programs mostly included young people in the age range 11-18 years (Walsh et al., 2022). Due to peculiarity of the German school-system, the HEYLiFE evaluation study sample encompassed an even larger age range. While this sample has the strength of being a naturalistic selection of German school-students, it encompasses very different age groups. Thus, we compared different groups to examine potential differential effects for age. Since we did not find any study that used age or age-group as a moderating variable, our analysis was explorative in nature. In particular, we compared three age groups: 12-13 years old, 14-16 years old and ≤ 17 years old.

Our results were mixed. Immediately after the intervention, only the oldest age group (≤ 17) had a significant increase in pro-social reactions. On the contrary, the 12-13 years old showed an increase in the wish for social distance and a decrease in help-seeking intentions (Grosselli et al., 2024a). These results suggest that HEYLiFE may have caused negative

emotional reactions in the youngest participants. HEYLiFE stressed out the gravity and potential lethality of suicidal ideation and invites adolescents to take suicidal thoughts of their peers seriously. It is possible that younger participants did not feel emotionally prepared to talk about suicidal ideation with peers and wished to avoid this situation. Furthermore, the possibility of hospitalization for severe suicidal ideation was discussed openly. Younger participants may have less contact to peers who stayed in a psychiatric hospital. Their only source of information, in this case, might be biased, negative images from the media (see Burgić Radmanović & Burgić, 2017), inadvertently causing fear. Following the Health Belief Model (Rosenstock, 1974), the costs of seeking help may be perceived as too high compared to the benefits in this age group after hearing that severe suicidal thoughts could lead to hospitalization.

In the mid-term, the youngest age group was the only one with a significant increase in knowledge, suggesting that HEYLiFE was a valuable source of information for the youngest (Grosselli et al., 2024a). As suggested by oral and written feedback of some participants, older adolescents may have already known most of the information conveyed by the program so that there was small room for an increase in knowledge. Although the interaction between age group*time*group was not significant, the youngest age group was the only one to show an increase in pro-social emotional reactions when participating to HEYLiFE compared to the control group. This suggests that eventual stigmatizing emotional reactions immediately after the intervention dissipate with time and may lead to more informed, less stigmatizing attitudes for this age group.

Only the older age groups (14-16, 17+) showed a significant reduction of risk factors for suicidality when participating in the intervention compared to the control group. Older adolescents have higher probability to develop some of the risk factors we assessed (thwarted belongingness, perceived burdensomeness) compared to younger adolescents (Hill et al., 2018; Vélez-Grau et al., 2023). It is possible that the protective effects of the intervention in the youngest age group were not significant because these risk factors are too rare in this age group. But it is also possible that HEYLiFE offered solutions to common problems that seemed too difficult or inappropriate to the youngest age group due to a different cognitive and emotional maturity. In this case, the intervention might not have conveyed a higher sense of hope or connectedness among the youngest.

Qualitative research methods (i.e. interviews) could be used in the future to better understand which emotional impact HEYLiFE had on pre-adolescents. HEYLiFE was conceived to target a large age range. However, our results suggest that different, age-adapted version of the program adapted to the developmental characteristics of each group may be beneficial. An example for this approach is Signs of Suicide program, where a version for middle school was created using more age conform language, examples and materials (Schilling et al., 2014).

7.3.3 Suicide Risk: When Educational Prevention is not Enough

A central research question was whether HEYLiFE is effective and safe also for students that suffer from suicidal ideation and had previous suicide attempts. In the largest and most influential study on school-based suicide prevention, the SEYLE study (Wasserman et al., 2015), students with suicidal ideation or previous attempts were excluded from the evaluation. The rationale behind it is that prevention targets conditions not yet present. Although this may be valid for suicidal ideation, it limits evaluating whether programs were helpful to prevent new suicide attempts. Moreover, excluding these students makes it impossible to assess program safety for them. In practice, universal programs are delivered in school classes, including students with suicidal ideation. Ignoring this group seems negligent, as it is crucial to determine whether they benefit from the program or require more intensive support.

For this reason, our research group conducted a separate evaluation study (Knappe et al., 2024) with $N = 218$ adolescents aged 14 – 18 years to assess the efficacy of HEYLiFE for different risk groups. We conducted a cluster analysis to identify risk groups for suicide attempt based on emotional regulation styles (e.g., impulsivity, avoidance) and mental health conditions (e.g., depression, suicidal ideation, prior attempts; Ati et al., 2021; Carballo et al., 2020). Three clusters emerged: a low-risk group with few emotional or mental health issues, a medium-risk group with maladaptive emotional regulation but low depression or suicidality, and a high-risk group with both. ANOVA showed all groups gained knowledge, but only the low- and medium-risk groups showed improvements in agency and help-seeking attitudes.

Learned helplessness, hopelessness and a low sense of agency (i.e. an external locus of control) are cognitive and emotional phenomena strongly linked to depression (Henkel et al., 2002; Pryce et al., 2011). The Integrated Motivational-Volitional Model of Suicide

(O'Connor et al., 2018) describes how suicidal ideation and attempts can be result from a sense of hopelessness and entrapment in a negative situation. The phenomenon of “help-negation” (e.g. people with increased levels of depression and suicidality show a lower intention to seek help) has been described extensively in the literature (Wilson & Deane, 2010). Depressive adolescents with avoidant problem solving and emotional regulation skills, thus, may feel very helpless to solve the problems influencing their condition. Also, they may have less hope that external help will contribute to the solution of their problem (Deane et al., 2001). Possibly, they already had negative experiences with the help system or experience substantial practical or internal barriers to reaching out for help (Gulliver et al., 2010). Thus, a brief intervention like HEYLiFE may not seem sufficient to change help seeking intentions in this group.

Nevertheless, high-risk students did not seem to take harm from the intervention, either. Grosselli et al. (2024a) did not observe any increase in suicidal ideation or suicide attempts through HEYLiFE. Knappe et al. (2024) showed that the high-risk group did not show any change in agency to deal with suicidal ideation or help-seeking intention for suicidal ideation after the intervention. Thus, it does not seem necessary to exclude high-risk students from a participation in HEYLiFE.

A possibility to make the program more effective also for this group would be combining it with a previous screening for depression and suicidality. Aseltine and DeMartino (2004) describe this approach for the Signs of Suicide program. There, students complete a screening instrument for depression on their own. They also receive a scoring instruction and are encouraged to reach out for help in case the screening suggests the presence of depression. This method may bridge two possible barriers for help-seeking: lacking knowledge of mental disorders and help-sources and minimizing symptoms (“My problem is not severe enough”). Nevertheless, it does not resolve the help negation effects. An alternative solution could be to couple a positive screening for depression or suicidal ideation with an interview with a school counsellor or mental health professional. The goal of the conversation should be to motivate and organize appropriate treatment for high-risk students. A cooperation between program providers, schools and mental health professionals would be ideal to provide fast access to help. Overall, high-risk students would profit more from selective prevention strategies (e.g. screening) and, eventually, professional treatment.

7.4 Limitations

The results of this thesis come with several limitations. Most of them are discussed in the Chapters 3 to 6. This paragraph contains some further considerations.

The expert recommendations in the Delphi-survey based mostly on personal and professional experience (Grosselli et al., 2021). Due to the high specificity of the theme (school-based educational suicide prevention), we could only recruit a limited number of experts ($N = 19$). While expert numbers > 7 have been suggested to produce reliable results (Häder, 2014), the participation of additional experts could have generated slightly different suggestions. Overall, the suggestions generated through the Delphi survey is a valuable an inspiration to inform future research but should be verified empirically.

The systematic review on mental health knowledge (Grosselli et al., 2024b) contributed to understanding how mental health knowledge is related to further constructs relevant for prevention like mental health stigma and help-seeking for mental health problems. Mapping out the correlations between a mental health knowledge and other similar constructs is extremely important to understand its validity (Spiker & Hammer, 2019). To examine correlation size, we decided to include only first level correlation coefficients in our review (since coefficients from multiple regressions may vary in amplitude depending on the different predictors). Due to the high variability of measurements and construct definitions, we also restrained from computing a meta-analysis and reported median correlations. The discussed effect sizes, thus, should be interpreted carefully. Our review cannot prove causality in any direction. Future systematic reviews and meta-analyses could analyse if awareness programs (focused only on improving awareness and knowledge) lead to less stigmatization and more help-seeking among recipients and the amplitude of this effect. To our knowledge, only narrative reviews have been conducted on this theme, supporting the weak connection between knowledge and stigma but not providing systematic evidence on effect sizes (Walsh & Foster, 2021; Yamaguchi et al., 2011). Furthermore, different types of knowledge may have a different relevance for maintaining mental health, so that more fine-graded distinctions may be examined in further empirical studies and reviews.

The HEYLiFE main evaluation study is a very relevant contribution to suicide prevention research since it is one of the few randomized-controlled studies examining mid-term effects

(Grosselli et al., 2024a). However, this study had several limitations that compromise the interpretation of results. First of all, the Covid-19 pandemic may have confounded the results. Future evaluation studies should be repeated under more stable circumstances. Furthermore, the participation rate to our study was rather low (42.2 % of students in participating school classes: Grosselli et al., 2024a). Alternative methods of gaining consent (e.g. passive consent forms) could solve this problem in the future. The results should be interpreted accordingly and could suffer from a participation bias. Although our program had effects on relevant risk-factors for suicide, our sample size was not large enough to measure direct effects on suicidal ideation and attempts. To ensure the safety of the program, we used screenings and interviews to check on participants who reported suicidal ideation and attempts on the past two weeks. This procedure is not considered a substantial part of the program. Although we suggest developing own safety measures, it is possible that the program will be used without this precaution in the future. We do not expect that this measure had a decisive impact on help-seeking intentions, risk-factors for suicidality or other relevant outcomes. This assumption is supported by the fact that HEYLIFE had promising results on our second evaluation study that did not have this supplementary screening element (Knappe et al., 2024). However, future studies could compare the effects of HEYLIFE with and without additional screening, to make sure that the screening can, in fact, be omitted or if, on the contrary, is a valuable addition to the program.

A limitation concerns the differential effects for gender. In our studies (Grosselli et al., 2024a; Knappe et al., 2024), we assessed gender/sex with one item and three possible answers (“Geschlecht”, “weiblich/männlich/divers”). We only included participants that declared their gender as “female” or “male” in the moderation analysis. 1.3% (N = 10) of participants identified as “diverse”. This group was too small to include it as a separate group in our analyses. Transgender and non-binary youth, however, have a higher risk to develop suicidal ideation or suicide attempts (Toma et al., 2019). Furthermore, the risk also differs within this group, with the highest risk for suicide attempts for female to male transgender youth (Toomey et al., 2018). The different role of biological sex, gender assigned at birth and gender identity should be assessed more in detail (see Hyde et al., 2019). In German language, “Geschlecht” can be understood both as sex and as gender. With this kind of assessment, it is not possible to understand the complex effects of sex and gender in depth. For further research on differential effects of gender or sex we strongly suggest a more differentiated assessment and analysis, assessing gender assigned at birth and gender identity

and including multiple categories as well as fluid, complex or neutral gender identities (see Hyde et al., 2019). A practical barrier for this kind of research consists in recruiting samples large enough to analyse differences for the effectiveness of prevention for such a rare phenomenon as suicidal ideation for smaller demographic groups.

A further limitation concerns differential effects for different age groups. The separation in three age groups (12-13; 14-16; 17+) followed developmental consideration (pre-puberty, adolescents, young adulthood). We chose to define the oldest age group at 17+ because students of the vocational branch mostly make their high school degree with ca. 16 years and start a professional school after that. In addition, students in the academic branch access a final level of education meant to prepare them for the final exam (“Gymnasiale Oberstufe”). In both cases, students reach a higher level of maturity and responsibility at this age. Nevertheless, this separation is arbitrary. Also, we did not exclude older adults (>25) to have an ecologically valid sample of German secondary school students and to improve the power of our analyses. Even if the number of older adults was very limited (2.8%; Grosselli et al., 2024a), it may have influenced the results. Our results inserting age group and its interaction with time as independent variables had exploratory nature.

In our second evaluation study, we used selected personality (avoidant emotional regulation, impulsivity) and mental health characteristics (depression, suicidal ideation and past suicide attempts) to build clusters with moderate and high risk for suicide attempts (Knappe et al., 2024). These variables have shown consistently a correlation with suicide attempts in the past (Ati et al., 2021; Carballo et al., 2020). However, other variables could be considered for cluster building as they determine a higher suicide risk, such as instruments assessing mental health strain in general, alcohol and drugs consumption or further personality factors, like neuroticism, aggressivity, perfectionism, low self-esteem (see Ati et al., 2021; Carballo et al., 2020).

7.5 Implications for Research and Practice

Overall, several implications originate from this work. Our research provides useful insight to assist researchers in the process of creating and evaluating suicide prevention programs. Furthermore, it points out several research gaps.

7.5.1 Specific vs. Upstream Prevention

In the past decade, two different approaches to suicide prevention emerged: specific suicide prevention programs that address suicidality as a main topic and aim to reduce it, and broader mental health promotion initiatives that indirectly contribute to suicide prevention through an "upstream" approach (Walsh et al., 2023). HEYLiFE is an example of a specific suicide prevention program. While specific prevention programs could maximize the reduction of suicidal ideation and suicide attempts in the short term, upstream prevention programs may have effects on a broader number of outcomes and be more acceptable for the general public. To my knowledge, no empirical study compared which of these approaches is more effective or acceptable.

A possibility to examine this research gap in the future would be a randomized-controlled trial with multiple study arms comparing a specific suicide prevention program with a focus on risk-factors for suicidal ideation and attempts (like HEYLiFE) with a general mental health promotion program targeting skills like emotional regulation and problem solving. A third group may be an active waiting control group that receives one of the interventions after follow-up or, alternatively, receive a minimal intervention (such as exposure to posters with information on mental health at school). The study should optimally measure outcomes over a longer period (e.g. 2 to 3 years). It would be interesting to compare the effects of both these approaches on suicidal ideation and suicide attempts as well as further indicators of mental health (depression, anxiety, stress level, life satisfaction, functioning) and quality of life. A plausible hypothesis considering recent literature reviews (Walsh et al., 2022; Walsh et al., 2023) is that upstream prevention programs show similar effects on suicidal ideation and attempts and higher effects on further mental health outcomes. In this case, it may be more economical, practicable and acceptable to improve the implementation of those programs compared to programs focusing on suicidality.

7.5.2 Central Mechanisms and Outcomes in Specific Educational Suicide Prevention

When focusing on suicide prevention, several key outcomes should be considered for education programs. One of the main aims of educational programs is to provide reliable information on mental health promotion, stress, mental disorders and treatment available that

enable young people to maintain and restore a positive mental health (MHL; see Jorm et al., 1997). Knowing when and where to find help for mental health strain and having knowledge of the effectivity of treatment are important predecessors of action in the help-seeking process (see Saunders & Bowersox, 2007). While our systematic review confirmed the relevance of knowledge for prevention (Grosselli et al., 2024b), research also suggested that we should investigate more in detail which kind of knowledge is really of value for prevention. For example, focusing on labelling and biological explanation models may inadvertently cause higher stigmatization (Grosselli et al., 2024a; Grosselli et al., 2024b; Schnyder et al., 2017).

Conveying knowledge is necessary but not sufficient to achieve meaningful effects on mental health (Grosselli et al., 2024b). Our expert survey provided valuable insights on possible relevant mechanisms and outcomes of suicide prevention programs (Grosselli et al., 2021). Educational programs should focus on promoting help seeking intentions, providing adequate support to peers with suicidal ideation, reducing risk-factors for suicidality like hopelessness, isolation, a sense of burdensomeness and entrapment, improving skills like emotional regulation and problem solving (Grosselli et al., 2021). When developing a prevention program, thus, it is crucial to carefully consider the theoretical framework that will guide the program and identify the mechanisms intended to influence suicidal ideation and attempts (Grosselli et al., 2021; e.g. Hopelessness Theory of Suicide, Abramson et al., 1978, Beck et al., 1985; Interpersonal theory of suicide, Joiner, 2005; Integrated Motivational-Volitional Model of Suicide, O'Connor et al., 2015). Alternatively, prevention programs could focus on improving help-seeking for mental health problems related to suicide (e.g. Saunders & Bowersox, 2019). In this case, researchers should target outcomes that have proven pivotal for help-seeking behaviours, such as risk perception and self-efficacy regarding reaching out for help and recovering (Zhang et al., 2019).

Our Delphi-survey contains recommendations on relevant outcomes and mechanisms based on expert opinions (Grosselli et al., 2021). It is essential to empirically test whether these mechanisms work as hypothesized. When the sample size permits it, future evaluation studies could use mediation analysis to identify processes that eventually lead to a reduction of suicidal ideation or suicide attempts. Due to the rarity of suicidal ideation, large, multi-centric trials are more apt for this aim (see Wasserman et al., 2015).

7.5.3 Extension, Replicability and Generalizability of the Results

HEYLiFE proved to be an effective and safe program for pupils in German secondary schools. In particular, the program improved help-seeking intentions and reduced psychological risk-factors for suicidality (hopelessness, thwarted belongingness, perceived burdensomeness and sense of entrapment) in the mid-term (6-9 months; Grosselli et al., 2024a). Further trials are necessary to replicate these results. This seems crucial particularly because the Covid-19-pandemic limited the comparability of the groups in our first trial (Grosselli et al., 2024a). Since the effects of the intervention on knowledge and attitudes were only short-lived, it would be interesting to see if booster sessions could obviate this problem. A future development of HEYLiFE could be its translation into other languages and test if the results with German students are generalizable to students in other countries and social and cultural realities.

Due to economical and practical limitations, the sample size of our evaluation was not sufficient to measure effects on suicidal ideation and suicide attempts. Future studies with a wider sample size should do this in future. It seems realistic to realize such a study involving multiple research centres in various German-speaking cities or regions. Moreover, potential mediators could be analysed. It would be interesting to examine if a reduction of risk-factors of suicidality and an increase in formal (professional) or informal help-seeking (family and friends) mediates a reduction of suicidal ideation or suicide attempts in the long term (1 to 3 years).

7.5.4 Further Understanding Differential Effects

Moreover, it seems important to analyse moderators that influence the success of a program and if the program has differential effects for different groups. For example, the effects of the HEYLiFE prevention program varied by gender, age and suicide-risk-level (Grosselli et al., 2024a; Knappe et al., 2024). HEYLiFE was particularly effective for females and for students who were not experiencing depression or suicidal ideation (Grosselli et al., 2024a; Knappe et al. 2024). Further research is needed to identify what contents and methods are more engaging and acceptable for young men, considering cultural values connected to masculinity (see Struszyk et al., 2019). The same as well as further moderators should be considered in future studies to see if these differences occur also for other prevention programs. In particular, while many studies reproduced similar gender effects (Hamilton &

Klimes-Dougan, 2015), studies analysing effects depending on other characteristics of the participants or of the program are lacking (see Walsh et al., 2022). Examining differential effects on age group could further help to tailor age appropriate, effective contents for several age groups. If future studies confirm that adolescents with high risk for suicide attempts do not suffer negative effects from educational programs, this would provide a stronger empirical foundation for their safety and build more trust for potential stakeholders (policymakers, school personnel, parents).

Other possible mediators on an individual level include socio-economic status, cultural background, previous experience with mental health problems or help-seeking, current mental distress, personal stigma against mental disorders prior to the intervention. Walsh et al. (2022) suggested in their review that contextual factors such as region, policies, funding, community partnerships, qualification of the trainers could also play a role in determining the effectiveness of educational programs. These mediators may be considered in future research.

7.5.5 Towards Multi-Level Suicide Prevention in Schools

HEYLIFE showed its efficacy as a primary prevention program in our randomized-controlled trial (preventing outcomes connected to suicidality before suicidal ideation arises; Grosselli et al., 2024a). However, the program was not as beneficial for adolescents already experiencing suicidal ideation compared to students with low suicide risk (Knappe et al., 2024). A possible explanation are help-negation effects, since depression and suicidality are connected to hopelessness, an external locus of control and the conviction that professional help will be ineffective (Yakunina et al., 2010). An alternative approach could be to combine educational programs like HEYLIFE with screening programs (see Joe & Bryant, 2007; Aseltine & DeMartino, 2004). After screening for suicidality, adolescents with acute suicidal ideation could receive per default the possibility to talk with a mental health professional to assess suicide risk and encourage help-seeking. It would be ideal to establish cooperation between study team, schools and mental-health providers prior to the prevention programs to guarantee a fast access to help. Practical barriers such as a shortage of therapy places, difficulties in funding and unclear responsibilities could be an obstacle in practice.

Punctual interventions like HEYLIFE are promising suicide prevention interventions. However, suicide prevention on multiple levels is far more effective on the long-term (Hofstra

et al., 2020). In schools, it seems recommendable to involve multiple stakeholders and approaches into prevention efforts (Erbacher et al., 2023). One of the main aims of educational prevention programs like HEYLiFE is to motivate adolescents to reach out for help when needed (Grosselli et al., 2024a). It is crucial that parents, teachers and other people working with youth in schools feel equipped to react appropriately when adolescents disclose suicidal ideation to them. Gate-keeper programs educating teachers on how to identify and react to suicidality, thus, seem a central add-on to school-based educational programs for adolescents (Yonemoto et al., 2019).

A further, more comprehensive step into systemic, multi-level suicide prevention among adolescents would be to establish long-term suicide prevention guidelines for schools (Erbacher et al., 2023; Kreuze et al., 2018). Regional and national regulations that make such guidelines mandatory have already been established in other regions (e.g. in many states in the USA; Keuze et al., 2018). While until now the effectiveness of such regulations did not receive enough empirical support (Keuze et al., 2018), this may change in the fashion that more effective interventions (like HEYLiFE) are developed and synergetic effects (e.g. with gatekeeper programs) are targeted.

7.5.6 Lessons Learned During the NeSuD Project

Suicide prevention in schools poses substantial challenges to researchers (see Nordentoft et al., 2011; Surgenor et al., 2016). Unsurprisingly, several challenges arose also during the implementation of the NeSuD project. This research experience may bear valuable insights for researchers in the field of suicide prevention.

7.5.6.1 Enhancing Participation Rates

One of the main difficulties our team encountered during the trials was recruiting enough schools and participants (see Section 7.2.4.2). Some changes in the study design could improve participation rates in similar studies. First of all, the term “suicide” triggers deep feelings of sadness, fear and anger (Hu et al., 2019). Our study title was “Network for Suicide Prevention in Dresden” (NeSuD). The word “suicide” was prominent, both in the title and in the logo of the recruiting materials. It may be advisable, instead to use both materials and a language that evoke positive feeling and are appealing to both parents and adolescents.

HEYLIFE was initially developed on the base of an expert survey and literature research (Grosselli et al., 2021; Grosselli et al., 2024b). Young people were involved in the development process through initial pilot interventions with subsequent written feedback. Focus groups with adolescents (including adolescents with lived experience), parents and school staff could have been an alternative to improve the acceptability of the study materials.

A substantial barrier to the participation to our trial may have been the complexity of the study procedures. We used an active consent procedure asking for a signature from both parents and adolescents for participation. To do so, we sent the forms to teachers or school social workers and instructed them to hand them out to the students. We normally collected the forms on the day of the base-line assessments. Students who failed to collect a signature from their parents or forgot the form at home were excluded from participations. Retrospectively, the study information and the form to elicit parental consent seemed rather long and used bureaucratic and scientific language. Both migrant families and families with a low level of education may have found our participation forms difficult to understand and those failed to give their consent. It seems recommendable to use easy language and short consent forms in future trials as well as translations for regions with a high rate of migrant families. Alternatively, passive consent forms (asking to hand in a signed form only if the parents or students did not agree with study participation) could be considered. Totura et al. (2017) reported that passive consent produced the highest participation rates (up to 100%) compared to other forms of consent. This option may be ethically less acceptable for new programs with less empirical support. In cases where active consent is preferred, Totura et al. (2017) suggested that giving consent forms directly to parents at school events increased participation rates compared to giving them to students or sending them per e-mail or mail.

7.5.6.2 Adequate Safety Protocols

When delivering suicide prevention interventions (especially with minors) ethical considerations and safety precautions are essential. Several considerations arise from the reflection of the safety protocols applied for the evaluation of HEYLIFE (Grosselli et al., 2024a).

To make sure that the program would not elicit suicidal ideation, HEYLIFE's safety protocol foresaw personal interviews with adolescents that indicated acute suicidal ideation or

suicide attempts in the last two weeks at each assessment. Among the advantages of this procedure was that adolescents suffering from suicidal ideation could be reached immediately and could be motivated to seek professional help. However, this approach was also challenging and may be adapted in the future. Since it was not possible to know in advance the number and duration of such interviews, students and study personnel had to stay longer at school as planned, which punctually caused stress. Furthermore, this approach felt very confrontational, since adolescents did not have time to prepare emotionally for the interview. Study personnel did not know the pupils in advance and did not have time to develop a professional relationship of mutual trust as they would with patients in therapy. So, it sometimes felt burdensome for them to conduct a suicide assessment under these conditions. All in all, a less intrusive approach may be more viable for future studies. An approach described elsewhere, for example, was to contact pupils with current suicidal ideation via phone after the study (Wasserman et al., 2015). A disadvantage of this approach was that some students did not attend the phone or gave a wrong telephone number. Maybe, this should be accepted as a valid way the students had of not giving their consent for successive interviews. Other studies relied on self-assessment (e.g. Aseltine & DeMarino, 2004). They did not score the assessments for depression and suicidality immediately; instead, they asked every adolescent to score them themselves. They also invited the adolescents that had more points than a specific cut-off to reach out for help and described possible help sources. This way, the study personnel did not actively intervene with suicidal students at all. This may be the easiest and more practical way and a realistic balance between safety and practicability for the use of prevention programs in the future. Since the first evaluation study suggests that the program is safe, it also seems a sufficient precaution.

A difficulty that originated during the study also concerned students identified needing professional help after the intervention. When schools were staffed with a school social worker, regular conversations and monitoring through the social worker could be organised. However, this does not substitute a proper psychotherapy or medication. Students in need of psychotherapy were instructed on how to get help, but waiting lists of psychotherapists or psychiatric wards may be very long. Before conducting a study on suicide prevention, thus, it may be helpful to create a connection to local mental health professionals (where possible) to ensure rapid access to care.

7.5.7 Outlook: Recent Developments of the NeSuD Project

The NeSuD Project was only the first of multiple suicide prevention research projects located in Dresden (Saxony, Germany). After the end of the project, the evaluation of the HEYLiFE prevention program was continued at the Werner Felber Institute for Suicide Prevention and Interdisciplinary Research (WFI; <https://www.felberinstitut.de/>) also thanks to a funding by the Saxonian Ministry for Ministry of State for Social Affairs and Social Cohesion (*Staatsministerium für Soziales und Gesellschaftlichen Zusammenhalt*). The WFI is a private research institute founded to pursue suicide prevention research as well as the regional and national implementation of suicide prevention interventions. In the years 2021 to 2024, the “Network for Suicide Prevention in Dresden” was extended to a “Network for Suicide Prevention in Saxony” (Grosselli et al., 2023). Prevention activities such as HEYLiFE, networking events with mental health professionals and an educational website (<https://www.suizidpraevention-sachsen.de/>) were extended to wide regions of the State of Saxony, Germany (Grosselli et al., 2023). To offer a more comprehensive suicide prevention to schools, the research group at WFI developed a gate-keeper program for teachers and school-social workers. The program generated promising results in first a pilot study (Loewe, 2024). This program also contained an additional, optional module to advise stakeholders at schools on how to organize a structural, multi-level suicide prevention at schools. Furthermore, through a collaboration with policy makers the WFI team collaborated to the modernization of school-internal guidelines on how to react to suicidal ideation and attempts at school (AManSys, see Unger, 2015). The NeSuD project has successfully laid the foundation for multi-level suicide prevention initiatives in Dresden and Saxony, thus becoming a model for suicide prevention in other German federal states (Grosselli et al., 2023).

7.6 Conclusion

This dissertation targeted substantial research gaps regarding school-based, educational suicide prevention: i) the lack of a theoretical framework, ii) a scarcity of accessible prevention programs with a methodologically sound empirical evaluation, and iii) the examination of differential effects on different demographic groups (depending on gender, age, risk-status). The introduction (Chapter 2) offers a thorough overview of epidemiology

and risk factors of suicidality among adolescents. It describes some of the most influential theories that describe the origination of suicidal ideation and suicide attempts. It provides a narrative review on educational suicide prevention. This part of the dissertation may be very useful for researchers that wish to grasp the state of the art in educational suicide prevention and to identify existing research gaps. The research regarding the theoretical framework (i) (Chapter 3 and 4; Grosselli et al., 2021; Grosselli et al., 2024b) provides guidance for the development of theoretically grounded prevention programs and for designing sound evaluation studies. The studies on program evaluation and differential effects (ii, iii) (Chapter 5 and 6; Grosselli et al., 2024a; Knappe et al., 2024) showed that HEYLiFE is a promising prevention program that should be further be implemented in German-speaking regions. This dissertation can serve as a basis to further develop and evaluate HEYLiFE and similar prevention programs. The lessons learned during this research project may be helpful for other researchers engaging in suicide prevention research.

This dissertation highlighted several research gaps that are still open for investigation. Central future developments include research on how to engage males or individuals with higher risk and comparing the effectiveness of specific suicide prevention with wider upstream prevention programs. Wider, multi-centered studies could enable to investigate the effects of educational programs on suicidal ideation and attempts and to consider several moderating or mediating factors.

Overall, this thesis offers a very valuable contribution to research on school-based educational suicide prevention. The results of this thesis suggest that HEYLiFE is a promising educational program for suicide prevention in secondary schools.

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Appendix A: Additional Materials Grosselli et al., 2021

Appendix A, Additional Table 1

Contents of an Educational Program Rated on Their Effectiveness for Suicide Prevention^a

Content	<i>Median</i>	<i>IQR</i>
1. Information on where to find help (in the community, at school)	5	1
2. Awareness and definition of mental health	4	1
3. Strategies to maintain a good mental health	4	1
4. Risk taking behaviors and possible consequences	4	1
5. Awareness and definition of (non-pathological) emotional distress	4	1
6. Information on typical stressors and stress reaction	4	1
7. Strategies to cope with stress	4	1
8. Strategies to influence feelings	4	1
9. Information on anxiety	4	1
10. Information on self-injury	4	1
11. Information on mental disorders in general	4	1
12. Information on substance use	4	1
13. Myths and false beliefs about suicidality (e.g. asking someone about suicidality will cause him to kill himself)	4	1

14. Description of warning signs of suicidality	4	1
15. Experiences of real people around suicide	4	1
16. Communicate that suicidality requires professional treatment	4	1
17. Characterization of suicidality as a symptom of psychopathology (and not as a possible reaction to stress)	4	1
18. Communicate that suicide can be prevented	4	1
19. Create cognitive dissonance about suicide as an option for coping with extreme stress (i.e. “suicide is not an option/a solution”)	4	1
20. Information on treatment for mental health problems	4	1
21. Instructions on how to react helpfully to suicidal peers	4	1
22. Instruction on how to act if oneself is feeling suicidal	4	1
23. Elucidation of possible outcomes of help-seeking efforts	4	1
24. Communication training (e.g. how to talk about problems, how to ask for help)	4	1
25. Problem-solving training	4	1
26. Information and coping strategies for bullying	4	1
27. Awareness of stigmatization of mental disorders and help-seeking and its consequences	4	1
28. Awareness of suicidality as a problem of concern	4	1
29. Information on depression	4	2
30. Information on characteristics of suicidality as prevalence, causes, risk factors, protective factors	4	2

Note. ^a Items were considered as consensually rated if $IQR \leq 1$; items that reached consensus are highlighted in bold; ^b Items were rated on a 5-point Likert scale from 1 (*very detrimental*), 2 (*somewhat detrimental*), 3 (*neutral / mixed*), 4 (*somewhat effective*) to 5 (*very effective*).

Appendix A, Additional Table 2*Importance, Effectiveness and Feasibility of Outcomes of Educational Programs*

Outcome	Importance ^a		Effectiveness ^b		Feasibility ^b	
	<i>n</i>	%	<i>Median</i>	<i>IQR</i>	<i>Median</i>	<i>IQR</i>
1. Improvement of help-seeking behavior	10	83.3	3	1	3	2
2. Improvement of willingness to seek help for oneself if needed	10	83.3	3	1	3	1
3. Reduction of number of suicide attempts ^c	8	66.7	-	-	2	1
4. Improvement of helping behaviors towards peers	6	50.0	3	2	3	1
5. Improvement of readiness to communicate distress to others	4	33.3	3	1	3	1
6. Increase of knowledge of warning signs for suicidality	3	25.0	3	1	3	1
7. Reduction of feelings of hopelessness	3	25.0	3	1	2	1

8. Improvement of knowledge of available professional help	3	25.0	3	1	3	1
9. Reduction of (severe) suicide ideation ^c	2	16.7	-	-	2	1
10. Reduction of number of completed suicides ^c	2	16.7	-	-	2	1
11. Improved confidence that help is possible/reduce feeling of entrapment	2	16.7	3	1	2.5	2
12. More trusting attitude about helpers (e.g. school counselor)	2	16.7	3	1	3	1
13. Reduction of feelings of social isolation	1	8.3	3	2	2.5	1
14. Improvement of willingness to seek help for peers if needed	1	8.3	3	1	3	1
15. Decrease of stigmatization of suicidality	1	8.3	2.5	2	2.5	1
16. Decrease of stigmatization of help-seeking	1	8.3	3	2	3	1
17. Improvement of skills to deal with emotional distress	1	8.3	3	1	2	1

18. Improvement of quality of reaction to disclosure of suicidality by peers	1	8.3	3	1	3	1
19. Reduction of mental health problems	0	0	3	1	3	1
20. Increase of knowledge of symptoms of depression	0	0	3	1	3	1
21. Increase of knowledge of causes and risk-factors of suicide	0	0	3	1	3	1

Note. ^a Number of experts who chose the item as one of the five the most important, $N=13$, ^b Items were rated on following Likert-scale: 1 (*not at all*), 2 (*to a small extent*), 3 (*to a moderate extent*), 4 (*to a great extent*). ^c Outcome directly related to suicidality, question on the relevance for the reduction of suicides is not applicable. **Outcomes in bold** reached consensus both on their efficacy and feasibility.

Appendix A, Additional Table 3

Items Regarding the Safety or Applicability of Educational Programs. ^a

Item	Median	IQR
1. When delivering universal suicide prevention programs, one must pay attention to potential unanticipated effects	4	1
2. Prevention programs should be tailored on specific characteristics of the audience:		
a) Age	4	1
b) Gender	3	1
c) Mental illness status	3	1
d) Culture	3	0
	2.5	1

e) Suicidal vs. non-suicidal youth

3. The benefits of suicide prevention programs outweigh the unanticipated consequences	3	1
4. <u>Suicide prevention programs should target only high-risk groups</u>	2	1
5. <u>Suicide prevention is not a theme for groups and should be treated individually</u>	2	1
6. <u>Suicide prevention programs should be delivered only to interested students</u>	2	1
7. <u>Suicide prevention programs do not have any adverse effects</u>	2	1
8. <u>Other types of suicide prevention in schools (e.g. gate-keeper trainings) are preferable to universal programs for suicide prevention</u>	2	1
9. <u>Suicide prevention programs should not be disseminated in schools or areas already affected by suicide</u>	1	1
10. Suicide prevention programs should be delivered universally	3	3
11. Talking about suicidality with young people lowers the threshold for suicidal behavior	2	2
12. Talking about suicidality leads to an increased cognitive availability of suicidal behavior	2	2

Note. ^a Items were rated on the 4-point Likert scale: 1 – *strongly disagree*, 2 - *disagree*, 3 - *agree*, 4 – *strongly agree*; items that reached consensus and have a median above the middle value of the scale (**supported by the experts**) are highlighted in **bold**, items that reached consensus and have a median below the middle value of the scale (rejected by the experts) are underlined.^f

Appendix A, Additional Table 4*Precautions to Prevent Unanticipated Negative Effects^a*

Item	<i>Mdn</i>	<i>IQR</i>
1. ...embed suicide prevention in more general mental health fostering programs	4	1
2. ...pilot the program with the target audience before delivering it more broadly	4	0
3. ...measure long-term effects when piloting the program (e.g. after one year)	4	1
4. ...not dramatize suicide	4	1
5. ...not mention details about suicidal behavior (e.g. methods)	4	1
6. ...redact a study protocol on how to react to individual risk prior to starting the program	4	1
7. ...address concerns of people about help-seeking in a credible and reassuring manner	4	1
8. ...inform about ways to help yourself and others	4	1
9. ...create the possibility to rapidly access appropriate treatment when needed as follow up to program	4	0
10. ...provide teachers with methods to observe and follow up on the well-being of participants	4	1
11. ...train teachers and other school professionals to better assess suicidality and react to it	4	1
12. ...train gatekeepers at school to discuss suicidality and motivate help-seeking	4	1
13. ...communicate openly with parents and teachers of students at risk of suicide	4	1
14. ...establish durable public relations between school and mental health providers	4	1
15. ...train parents to better assess suicidality and react to it	4	1
16. ...only use evidence-based interventions	3.5	1
17. ...only use videos produced by / in cooperation with mental health professionals	3	1
18. ...let two educators conduct the program together	3	1
19. ...conduct a program with more than one session over a longer period (i.e. no punctual intervention)	3	1
20. ...convey more adaptive attitudes towards suicide (e.g. "suicide is not an option")	3	1
21. ...inform participants about symptoms of depression	3	1

22. ...include testimonies of young people who considered suicide but ruled it out as an option	3	1
23. ...indicate safe places where students can discuss suicidality	3	1
24. ...involve adolescents in expert rounds when deciding the contents of the program	3	1
25. ...train gatekeepers to approach and inform parents of suicidal students	3	1
26. ...let participating schools adopt policies about dealing with suicidality	3	1
27. ...write a standardized script for the prevention program	3	1

Note. ^a Items were rated on the 4-point Likert scale: 1 - *I do not recommend doing this*, 2 - *not very important*, 3 - *moderately important*, 4 - *very important*. This table lists items that were consensually endorsed as “very important” or “moderately important”.

Appendix A, Additional Table 5

Useful Formats

Item	Median	IQR
1. A mix of intervention techniques	5	1
2. Signalize the presence of gate-keepers with whom to talk openly about suicidality	5	1
3. Brief and clear message about what to do in case of suicidality	5	1
4. Skills training for dealing with emotional distress	5	1
5. Peer-to-peer information	5	1
6. (Short) videos with discussion	4	1
7. Web-based self-management components (e.g. apps)	4	1
8. Group discussions	4	1
9. Information materials to take away	4	1
10. Posters	3	1
11. Short lecture	3.5	1
12. Screening for depression	3	1
13. Role plays	4	2
14. Tools that support help-seeking (e.g. addresses, internet pages)	5	2
15. Follow-up questionnaire	5	2
16. Communication training	4	2
17. Screening for suicidality	4	2

Note. Items for which there was consensus and have a median above the middle value of the scale (**supported by the experts**) are highlighted in **bold**. Items were rated on the 5-point

Likert scale: 1 - *not necessary*, 2 - *not very useful*, 3 - *somewhat useful*, 4 - *moderately useful*, 5 - *very useful*.

Appendix A, Additional Table 6

Important Characteristics of Educators

Item	Median	IQR
1. Experience in working with youth	5	1
2. Experience in working with mentally ill or suicidal youth	5	1
3. Appropriate training in delivering the prevention program	5	1
4. Founded knowledge on suicidality	5	1
5. Trusted by youth	5	0
6. Believe in the program	5	1
7. Calm, balanced	5	1
8. Open, can relate to youth	5	1
9. Is sensitive to the wellbeing of the participants	5	1
10. Good knowledge of own professional limits	5	1
11. Pedagogical training/knowledge	5	1
12. Lived experience in mental illness	5	2

Note. Items for which there was consensus and have a median above the middle value of the scale (**supported by the experts**) are highlighted in **bold**. Items were rated on the 5-point Likert scale: 1 - *detrimental*, 2 - *not very important*, 3 - *somewhat important*, 4 - *moderately important*, 5 - *very important*.

Appendix A, Additional Table 7

Most Indicated Profession of Educators

Item	Mean Rank
1. School psychologist	1.93
2. Psychologist	2.93
3. Trained teacher	4.00
4. Psychotherapist	4.20
5. Social worker	4.20
6. Doctor	4.53
12. Other health professional	6.20

Appendix B: Additional Materials Grosselli et al., 2024b

Appendix B, Additional Table 1

Changes between Pre-Registration and Final Study

Criteria	Pre-Registration	Publication	Reason for change
Research Questions	Direction of the interrelation between mental health knowledge and stigma? Between mental health knowledge and help-seeking? Which covariates influence these interrelations? Which specific forms/facets of mental health knowledge, stigma and help-seeking are interrelated?	Direction of the interrelation between mental health knowledge and stigma? Between mental health knowledge and help-seeking? Which specific forms/facets of mental health knowledge, stigma and help-seeking are interrelated?	Clearer focus, saving of time resources in the analysis
Inclusion criteria	Quantitative and qualitative articles	Only quantitative articles	Clearer focus, saving of time resources in the analysis

Inclusion criteria	<p>Definition of mental health knowledge: mental health knowledge (including recognition, knowledge of prevention, of causes, of professional help, of self-help, of how to find information, of mental first-aid skills)</p>	<p>Definition of mental health knowledge: mental health knowledge (including recognition, knowledge of prevention, of causes, of professional help, of self-help, of how to find information)</p>	<p>Older and most widely used definition of MHL used</p>
Outcomes	<p>Correlation, regression coefficient or comparable analysis</p>	<p>First level correlation (or coefficient that can be transformed in first level correlation)</p>	<p>First order correlation selected to increase comparability of outcomes between studies</p>
Outcomes	<p>Covariates for this interrelationships and further constructs interrelated with mental health knowledge as additional outcome</p>	<p>No additional outcome</p>	<p>Clearer focus, saving of time resources in the analysis</p>
Outcomes	<p>1. Number of studies that report significant interrelations between different forms of constructs. 2. Names of covariates and direction of their effect. 3. Name of further constructs inter-</p>	<p>1. Number of studies that report significant correlation between MHL and stigma or help-seeking 2. Effect size (r; Mdn, Min, Max, number of articles with a very small, small, medium, large, very large effect size; if studies reported more</p>	<p>Clearer focus, saving of time resources in the analysis</p>

	related (through correlation, regression or comparable analysis) with mental health knowledge.	than one r for the same two variables, pooled correlation was computed)	
Methods	One of the authors (HB) will extract the data using the data extraction protocol. The second authors (LG) will check if the data extracted are correct.	Data were extracted by only one author	Saving of time resources in the analysis
Methods	The study design will be taken into account according to the Oxford Centre for Evidence-based Medicine Grading system. Furthermore, the Study Quality Assessment Tools will be used to evaluate the quality of individual studies.	The Study Quality Assessment Tools will be used to evaluate the quality of individual studies.	Simplification, since most studies were cross-sectional

Appendix C, Additional Table 2

Number, Direction and Effect Size (r) of the Associations of Mental Health Knowledge with Mental Health Related Stigma and Help Seeking without Studies with Poor Quality Rating

<i>Effect size</i>	Negative r^a (sample size)					Positive r^a (sample size)					Non-significant r^a (sample size)	<i>Mdn r</i> (Min r; Max r)
	<i>Very small</i>	<i>Small</i>	<i>Medium</i>	<i>Large</i>	<i>Very large</i>	<i>Very small</i>	<i>Small</i>	<i>Medium</i>	<i>Large</i>	<i>Very large</i>		
Stigma												
Personal stigma	1 (242)	5 (4429)	8 (6710)	8 (24725)	5 (3360)	/	/	/	/	/	4 (1118)	-.27 (-.54; -.06)
Perceived stigma	/	1 (361)	1 (99)	/	/	1 (1767)	1 (552)	/	/	/	7 (2760)	-.01 (-.29; .16)
Self-Stigma	/	1 (230)	3 (2722)	3 (454)	/	/	/	/	/	/	5 (842)	-.19 (-.39; -.02)
Help-Seeking												
Attitudes	/	/	/	/	/	/	4 (4488)	1 (168)	2 (333)	3 (394)	1 (285)	.29 (.04; .58)

Inten- tion	/	1 (369)	/	/	/	/	11 (8923)	3 (704)	2 (431)	/	7 (4089)	.15 (-.16; .33)
Behav- iour	/	/	/	/	/	/	1 (2709)	/		/	3 (1655)	.11 (-.04; .15)

Note: Effect size (Person's r) was interpreted as follows: $\geq .1$ small, $\geq .2$ medium, $\geq .3$ large; $\geq .4$ very large (see Funder & Ozer, 2019) ^a Number of studies reporting a correlation with this effect size

Appendix C: Additional Materials Grosselli et al., 2024a

Appendix C, Additional Table 1

Items of the Risk Factor Scale (RFS)

Item number	Item text
-------------	-----------

In the last two weeks, have you...

- | | |
|---|---|
| 1 | ...felt like a burden to others? |
| 2 | ...felt disconnected or isolated from other people? |
| 3 | ...felt hopeless? |
| 4 | ...felt trapped in a desperate situation? |
-

Note. This is a translation of the original German questions. The answer was given on a 4-point-scale: 0 Not at all, 1 On some days, 2 On more than half of the days, 3 Nearly every day. A sum score was calculated.

Appendix C, Additional Table 2*Unwanted Side-Effects and Serious Adverse Events*

Category	Events
USE	Somatic or mental symptoms stronger than expected, overt aggression against others or objects, intended self-harm (no medical support necessary)
SAE	Somatic illness with risk of permanent harm (required medical support), stationary admission to general hospital for at least one night (SAE causes or prolonged admission time), stationary admission to psychiatric hospital for at least one night (SAE causes or prolonged admission time) with or without psychiatric emergency care, intoxication by psychotropic substances (including alcohol, required medical support), delinquent behaviours (required police or justice), overt aggression (offence), intended self-harm (required medical support) or suicide attempt

Appendix C, Additional Table 3*Short- (T1) and Mid-term Effects (T2) of the Intervention on SOSa items*

Items and Variables	Post-intervention (T1)				Follow-up (T2)			
	Estimate	<i>F</i>	<i>p</i>	<i>CI (95%)</i>	Estimate	<i>F</i>	<i>p</i>	<i>CI (95%)</i>
Attitudes Towards Suicide								
1. Suicide only solution (r)								
Time ^a	-.12	3.19	.08	-.25, .01	-.09	1.95	.16	-.28, .09
School type ^b	.08	.48	.49	-.15, .31	.04	.16	.70	-.15, .22
Group ^c	/	/	/	/	-.04	.23	.63	-.30, .22
Time*Group	/	/	/	/	.01	.01	.94	-.28, .29
2. Nothing I can do (r)								
Time ^a	.10	2.49	.12	-.02, .22	-.13	.18	.67	-.27, .01
School type ^b	.16	3.59	.07	-.01, .34	.09	1.19	.28	-.07, .25
Group ^c	/	/	/	/	-.04	.73	.40	-.25, .17
Time*Group	/	/	/	/	.22	4.19*	.04	.01, .43
3. Not my business (r)								
Time ^a	-.04	.89	.35	-.13, .05	-.12	4.93*	.03	-.22, -.01
School type ^b	-.04	.35	.56	-.18, .10	-.09	1.71	.20	-.22, .05
Group ^c	/	/	/	/	.05	1.48	.23	-.12, .22
Time*Group	/	/	/	/	-.05	.37	.54	-.21, .11
4. Talk to an adult if suicidal								

Time ^a	-.01	.02	.90	-.16, .14	-.18	2.94	.08	-.38, .02
School type ^b	.08	.40	.53	-.18, .35	.07	.50	.48	-.14, .29
Group ^c	/	/	/	/	-.002	.22	.65	-.29, .29
Time*Group	/	/	/	/	-.10	.47	.50	-.40, .19
Attitudes Towards Suicidal Friend								
5. Not know what to do (r)								
Time ^a	.30	19.00** *	<.001	.16, .43	-.04	.18	.67	-.20, .13
School type ^b	.16	3.37	.07	-.01, .33	.18	4.44*	.04	.01, .34
Group ^c	/	/	/	/	.12	2.29	.13	-.12, .35
Time*Group	/	/	/	/	-.02	.03	.87	-.27, .23
6. Don't tell anybody (r)								
Time ^a	.15	3.84	.05	-.001, .29	.09	5.21*	.02	-.13, .28
School type ^b	.21	3.79	.06	-.01, .43	.12	1.27	.27	-.10, .34
Group ^c	/	/	/	/	-.12	.11	.74	-.40, .17
Time*Group	/	/	/	/	-.16	1.16	.28	-.45, .13
7. Hope he/she would not tell (r)								
Time ^a	.03	.19	.66	-.11, .18	-.08	.27	.61	-.09, .24
School type ^b	-.06	.32	.58	-.28, .16	-.07	.48	.49	-.27, .13
Group ^c	/	/	/	/	.12	.01	.94	-.38, .14
Time*Group	/	/	/	/	.22	2.89	.09	-.03, .47
8. Keep it secret (r)								

Time ^a	.35	18.83** *	<.001	.19, .52	.17	7.62	.01	-.03, .37
School type ^b	.23	4.33*	.04	.01, .45	.19	2.51	.12	-.05, .42
Group ^c	/	/	/	/	.12	1.91	.17	-.19, .43
Time*Group	/	/	/	/	-.09	.33	.60	-.39, .22
9. Tell an adult at school								
Time ^a	-.02	.06	.82	-.18, .14	.10	.45	.50	-.09, .29
School type ^b	.25	4.43*	.04	.01, .49	.31	9.43**	.004	.11, .52
Group ^c	/	/	/	/	.06	.01	.93	-.22, .34
Time*Group	/	/	/	/	.10	.44	.51	-.19, .39
10. Tell other adult								
Time ^a	-.08	.93	.34	-.23, .08	-.03	.18	.68	-.23, .18
School type ^b	-.15	1.30	.26	-.41, .11	-.14	1.38	.25	-.37, -.10
Group ^c	/	/	/	/	-.04	.02	.89	-.35, .27
Time*Group	/	/	/	/	-.12	.59	.44	-.43, .19

Note. Results of LMM; **bold prints indicate significant effects of the intervention at p <.05** (main effect of time for postintervention, interaction time*group for follow-up); reference categories for the estimates: a T1 or T2 b Professional school branch c Intervention group; r = reversed item.

*p<.05, **p<.01, ***p<.001.

Appendix C, Additional Table 4

Fixed Effects of Group and Time on Lifetime Suicidality

Variables and Group	Estimate	z value	p	T1		T2		
				CI (95%)	Estimate	z value	p	CI (95%)
Suicidal Ideation (PSS Item 4)								
Time ^a	-1.63	-2.70**	.007	-2.82, -.45	-.25	-.88	.38	-0.80, 0.30
School type ^b	-.48	-.62	.54	-1.99, 1.04	-.76	-1.09	.28	-2.13, 0.61
Group ^c	/	/	/	/	.78	.82	.41	1.08, -2.64
Time*Group	/	/	/	/	-.64	-1.58	.11	-1.42, 0.15
Suicide Attempts (PSS 5)								
Time ^a	.68	1.23	.22	-.28, 1.78	-.06	-.14	.89	-0.89, 0.77
School type ^b	-1.67	-2.61**	.009	-5.83, -.71	-.87	-.69	.49	-3.31, 1.58
Group ^c	/	/	/	/	-1.16	-.81	.42	-3.98, 1.66
Time*Group	/	/	/	/	.60	.83	.41	-0.82, 2.01

Note. Results of LMM; **bold prints indicate significant effects of the intervention at $p < .05$** (main effect of time for postintervention, interaction time*group for follow-up); * $p < .05$, ** $p < .01$, *** $p < .001$; reference categories for the estimates: ^a Postintervention or Follow-up ^b Professional school branch ^c Intervention group.

Appendix C, Additional Table 5

Short- (T1) and Mid-term Effects (T2) of the Intervention with Gender as a Main and Interaction Term

Variables and Group	T1 (Pre-post)				T2 (Follow-up)			
	Estimate	F	p	95% CI	Estimate	F	p	95% CI
Mental Health Knowledge								
Knowledge (SOS-k)								
Time ^a	.89	118.34***	<.001***	.66, 1.13	.23	15.93***	<.001	-.03, .50
School type ^b	-.54	4.13	.06	-1.09, .02	-.27	3.79	.06	-.54, .01
Group ^c	/	/	/	/	-.15	.02	.89	-.58, .28
Time*Group ^d	/	/	/	/	.12	1.80	.18	-.30, .54
Gender ^e	-.01	.23	.63	-.28, .26	-.24	.002	.97	-.55, .07
Time*Gender ^f	-.13	.67	.41	-.43, .18	/	/	/	/
Time*Group*Gender	/	/	/	/	s. e.	1.78	.15	s. e.
Attitudes and Stigma								
Attitudes Towards Suicide (SOS-a)								
Time ^a	.12	5.99*	.02*	.02, .22	.02	.41	.52	-.08, .13
School type ^b	.12	1.78	.20	-.07, .32	.08	2.14	.15	-.03, .20
Group ^c	/	/	/	/	-.12	.81	.37	-.30, .06
Time*Group ^d	/	/	/	/	.04	.65	.42	-.13, .21
Gender ^e	.02	1.12	.29	-.11, .15	-.11	.01	.91	-.25, .04
Time*Gender ^f	-.08	1.39	.24	-.21, .05	/	/	/	/
Time*Group*Gender	/	/	/	/	s. e.	2.06	.10	s. e.
Stigma Rejection (ERMIS)								
Time ^a	.09	1.86	.17	.03, .16	.02	.32	.57	-.04, .07

School type ^b	.05	4.22*	.05	.001, .10	.07	10.67**	.001	.03, .11
Group ^c	/	/	/	/	.04	.17	.68	-.05, .12
Time*Group ^d	/	/	/	/	.03	.57	.42	-.06, .12
Gender ^e	-.19	27.31***	<.001	-.26, -.11	-.09	21.16***	.001	-.16, -.01
Time*Gender ^f	-.13	8.36***	.004	-.21, -.04	/	/	/	/
Time*Group*Gender	/	/	/	/	s. e.	1.69	.17	s. e.

Stigma Fear (ERMIS)

Time ^a	-.34	44.36***	<.001	-.50, -.20	-.15	13.49***	<.001	-.32, .02
School type ^b	-.13	2.06	<.16	-.31, .05	-.10	1.17	.29	-.27, .08
Group ^c	/	/	/	/	-.24	2.48	.12	-.53, .04
Time*Group ^d	/	/	/	/	-.04	.59	.44	
Gender ^e	.29	15.01***	<.001	.10, .48	.18	15.87***	<.001	-.31, .22
Time*Gender ^f	.05	.22	.64	-.14, .23	/	/	/	/
Time*Group*Gender	/	/	/	/	s. e.	.78	.50	s. e.

Stigma Prosocial Reactions (ERMIS)

Time ^a	-.32	26.92***	<.001	-.44, -.21	-.21	24.61***	<.001	-.34, -.09
School type ^b	-.09	1.91	.17	-.04, .22	-.09	2.36	.13	-.21, .03
Group ^c	/	/	/	/	-.26	4.36*	.04	-.46, -.06
Time*Group ^d	/	/	/	/	-.01	.87	.35	
Gender ^e	.60	85.87***	<.001	.46, .75	.29	78.02***	<.001	-.20, .18
Time*Gender ^f	.27	13.00***	<.001	.12, .41	/	/	/	/

Time*Group*Gen-der	/	/	/	/	s. e.	3.62*	.01	s. e.
Stigma Social Distance (SDS)								
Time ^a	-.79	6.65*	.01*	-1.40, -.18		12.01***	<.001	
School type ^b	-.43	.34	.57	-2.01, 1.14		.04	.85	
Group ^c	/	/	/	/		.40	.53	
Time*Group ^d	/	/	/	/		2.25	.13	
Gender ^e	.07	.27	.60	-.81, .95		.90	.34	
Time*Gender ^f	.55	1.92	.17	-.23, 1.33		/	/	/
Time*Group*Gen-der	/	/	/	/	s. e.	2.74*	.04	s. e.
Help-Seeking								
Intention to Seek Professional Help (GHSQ)								
Time ^a	-.36	4.57*	.03*	-.71, -.01	-.14	.25	.62	-.53, .24
School type ^b	-.12	.19	.67	-.73, .48	.13	.74	.40	-.18, .43
Group ^c	/	/	/	/	.07	.62	.44	-.50, .64
Time*Group ^d	/	/	/	/	.22	3.65	.06	-.38, .82
Gender ^e	.11	.01	.94	-.32, .53	.04	.25	.62	-.43, .51
Time*Gender ^f	.24	1.08	.30	-.21, .69	/	/	/	/
Time*Group*Gen-der	/	/	/	/	s. e.	.47	.70	s. e.
Help-Seeking Behavior (Professional Help; AHSQ)								
Time ^a	/	/	/	/	.35	15.32***	<.001***	-.57, 1.27
School type ^b	/	/	/	/	-1.71	6.05*	.01*	-3.08, -.35
Group ^c	/	/	/	/	.20	.12	.73	-1.71, 2.11
Time*Group ^d	/	/	/	/	1.46	.46	.50	.26, 2.66

Gender ^e	/	/	/	/	-5.83	<.001	.99	-295169.59, 295157.91	/
Time*Gender ^f	/	/	/	/	/	/	/	/	/
Time*Group*Gen- der	/	/	/	/	s. e.	5.97***	<.001***		s. e.
Risk factors									
Time ^a	/	/	/	/	3.34	413.75	<.001	2.86, 3.83	
School type ^b	/	/	/	/	-.10	.14	.71	-.65, .45	
Group ^c	/	/	/	/	-1.42,	4.56*	.04*	-2.19, -.66	
Time*Group ^d	/	/	/	/	1.53	25.58***	<.001***	.78, 2.27	
Gender ^e	/	/	/	/	-.03	1.13	.29	-.53, .47	
Time*Gender ^f	/	/	/	/	/	/	/	/	/
Time*Group*Gen- der	/	/	/	/	s. e.	.37	.77		s. e.

Note. Results of LMM (continuous dependent variables) and GLMM (dichotomous variables); **bold prints indicate significant main or interaction effects of gender at $p < .05$** ; s. e. = several estimates exist comparing several levels of this interaction; reference categories for the estimates: ^a T1 or T2; ^b Professional school branch; ^c IG; ^d IG, T1 or T2; ^e female; ^f female, T1 or T2.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Appendix C, Additional Table 6

Short- (T1) and Mid-term Effects (T2) of the Intervention with Age Group (12-13 y., 14-16 y., 17+ y.) as a Main and Interaction Term

Variables and Group	Estimate	T1 (Pre-post)			T2 (Follow-up)			95% CI
		F	p	95% CI	Estimate	F	p	
Mental Health Knowledge								
Knowledge (SOS-k)								
Time ^a	.88***	332.20***	<.001	.53, 1.22	.60**	13.41***	<.001	.15, -1.06
School type ^b	-.40**	8.22**	.01	-.68, -.11	-.41**	10.96**	.002	-.66, -.16
Group ^c	/	/	/	/	-.77*	.002	.96	1-46, -.08
Time*Group ^d	/	/	/	/	-.80*	.05	.82	-1.47, .12
Age group 1 ^e	-.69**	6.57**	.002	-1.15, -.22	-1.14***	5.27**	.01	-1.71, -.57
Age group 2 ^e	-.40			-.84, .04	-.86**			-1.38, -.34
Time*Age group ^f	s. e.	.35	.71	s. e.	/	/	/	/
	/	/	/		s. e.	2.85*	.01	s. e.
Time*Group*Age group								
Attitudes and Stigma								
Attitudes Towards Suicide (SOS-a)								
Time ^a	.14	7.87**	.01	.001, .29	-.02	.03	.86	-.21, .17
School type ^b	-.02	.11	.75	-.17, .12	-.03	.26	.62	-.14, .08
Group ^c	/	/	/	/	.01	.26	.61	-.29, .31
Time*Group ^d	/	/	/	/	-.03	1.18	.28	-.31, .26
Age group 1 ^e	-.32**	8.37***	<.001	-.54, -.11	-.34	8.15***	<.001	-.59, -.08
Age group 2 ^e	-.40***			-.60, -.19	-.22			-.45, .01

Time*Age group ^f	s. e.	.80	.45	s. e.	/	/	/	/
	/	/	/	/	s. e.	.91	.48	s. e.
Time*Group*Age group								
Stigma Rejection (ERMIS)								
Time ^a	-.87	4.37*	.04	-.25, .07	-.03	.92	.34	-.14, .08
School type ^b	.13	2.39	.14	-.05, .24	-.15	23.42***	<.001	-.21, '- .09
Group ^c	/	/	/	/	.07	.01	.95	-.04, .18
Time*Group ^d	/	/	/	/	-.13	2.73	.10	-.29, .02
Age group 1 ^e	.05	.30	.74	-.15, .24	.15	1.73	.18	-.03, .32
Age group 2 ^e	.08			-.10, .27	.14			-.15, .43
Time*Age group ^f	s. e.	.18	.83	s. e.	/	/	/	/
	/	/	/	/	s. e.	.60	.73	s. e.
Time*Group*Age group								
Stigma Fear (ERMIS)								
Time ^a	-.07	.001	.97	-.38, .24	.31*	2.06	.15	.02, .61
School type ^b	-.20	1.03	.32	-.60, .21	.24	3.67	.06	.004, .48
Group ^c	/	/	/	/	-.05	.35	.55	-.42, .33
Time*Group ^d	/	/	/	/	.32	2.21	.14	-.10, .74
Age group 1 ^e	-.60*	3.97*	.03	-1.08, - .12	-.54	2.77	.07	-1.07, - 0.01
Age group 2 ^e	-.44			-.90, .02	-.06			-1.49, 0.30
Time*Age group ^f	s. e.	.83	.44	s. e.	/	/	/	/
	/	/	/	/	s. e.	1.36	.23	s. e.
Time*Group*Age group								
Stigma Prosocial Reactions (ERMIS)								

Time ^a	.41	12.26***	<.001	.18, .66	.04	.82	.37	-.31, .39
School type ^b	-.31	5.04*	.04	-.02, -.60	-.17	4.04	.05	-.35, .001
Group ^c	/	/	/	/	-.004	.27	.61	-.56, .55
Time*Group ^d	/	/	/	/	.26	3.68	.06	-.25, .76
Age group 1 ^e	-.44*	3.84*	.03	-.80, -.08	-.48*	4.57*	.01	-.95, -.02
Age group 2 ^e	-.59***			-.94, -.25	-.40			-.83, .02
Time*Age group ^f	s. e.	3.27*	.04	s. e.	/	/	/	/
	/	/	/	/	s. e.	.96	.45	s. e.
Time*Group*Age group								

Stigma Social Distance (SDS)

Time ^a	.19	3.24	.07	-.73, 1.10	.51	8.90**	.002	-.37, 1.39
School type ^b	-.58	2.75	.11	1.30, .13	-.68	3.75	.06	-1.32, .03
Group ^c	/	/	/	/	-.57	3.42	.07	-1.64, 0.54
Time*Group ^d	/	/	/	/	.88	1.94	.16	-.36, 2.11
Age group 1 ^e	-2.57***	9.61***	<.001	-3.84, -1.30	-2.23	4.52*	.01	-.56, -5.76
Age group 2 ^e	-2.06***			-3.27, -.85	-.92			-3.53, 1.68
Time*Age group ^f	s. e.	1.81	.17	s. e.				
	/	/	/	/	s. e.	1.28	.26	s. e.
Time*Group*Age group								

Help-Seeking

Intention to Seek Professional Help (GHSQ)

Time ^a	.03	2.70	.10	-.48, .53	-.15	.16	.69	-.50, .80
School type ^b	-.16	1.01	.32	-.48, .16	-.06	.19	.69	-.36, .23

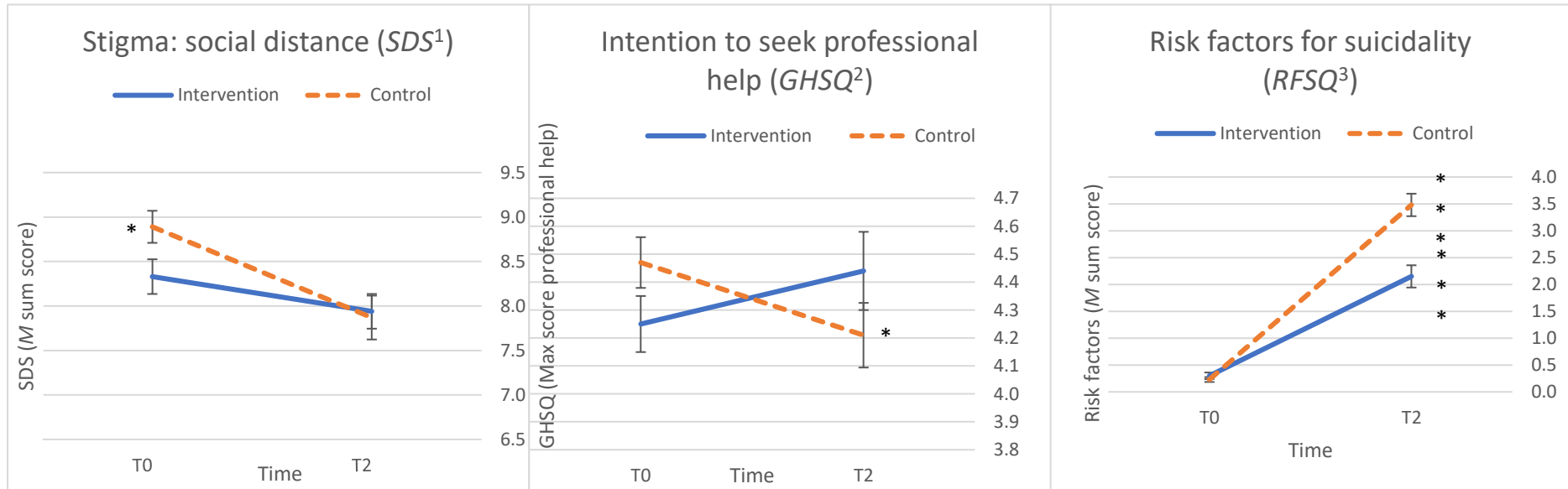
Age group 2 ^e	/	/	/	/	-47				-1.66,
									.71
Time*Age group ^f	/	/	/	/	/	/	/	/	/
	/	/	/	/	s. e.	4.17***	<.001		s. e.
Time*Group*Age group									

Note. Results of LMM (continuous dependent variables) and GLMM (dichotomous variables); **bold prints indicate significant main or interaction effects of age at $p < .05$** ; s. e. = several estimates exist comparing several levels of this interaction; n. c. = model did not converge; reference categories for the estimates: ^a T1 or T2; ^b Professional school branch; ^c IG; ^d IG, T1 or T2; ^e 17+; ^f 17+, T1 or T2

* $p < .05$, ** $p < .01$, *** $p < .001$.

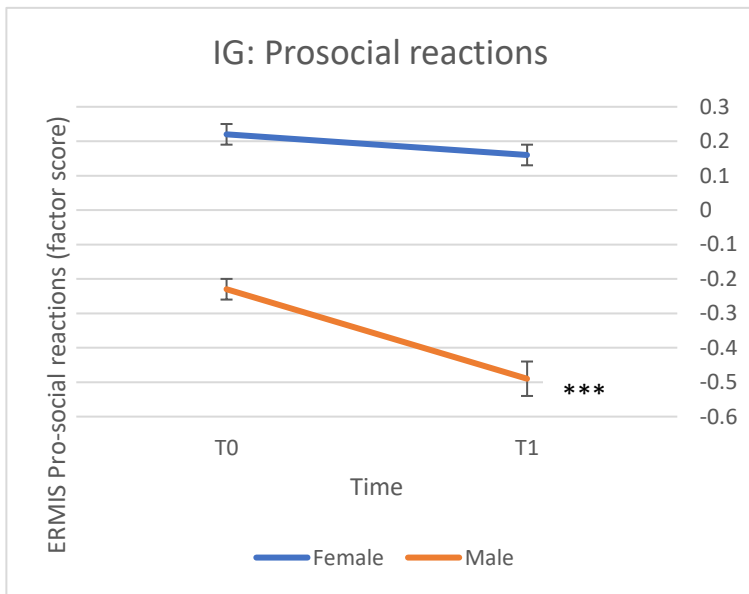
Appendix C, Additional Figure 1

*Mean Difference between T0 and T2 for Both Groups for Outcomes with a Significant Time*Group Interaction*



Appendix C, Additional Figure 2

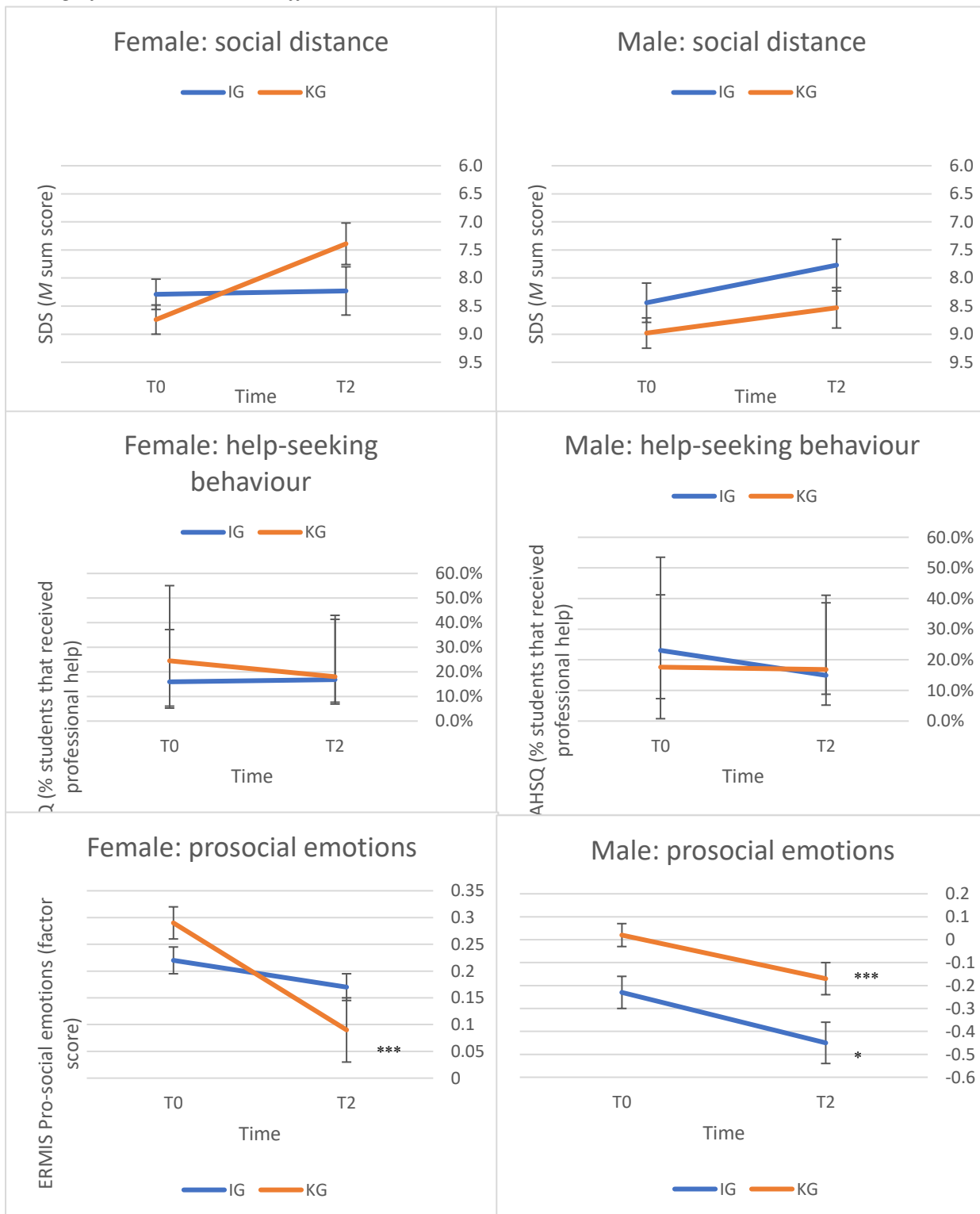
Significant Interaction Effects of Gender on the Short-Term



Note. Error bars = SE. Significance level: * < .05, ** < .01, *** < .00156

Appendix C, Additional Figure 3

Significant Interaction Effects on Gender on Mid-Term



Erklärung gemäß § 5 der Promotionsordnung

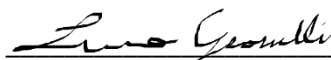
Versicherung

Hiermit versichere ich, dass ich die vorliegende Arbeit ohne unzulässige Hilfe Dritter und ohne Benutzung anderer als der angegebenen Hilfsmittel angefertigt habe; Hilfe dritter wurde nur in wissenschaftlich vertretbarem und prüfungsrechtlich zulässigem Ausmaß in Anspruch genommen, die aus fremden Quellen direkt oder indirekt übernommenen Gedanken sind als solche kenntlich gemacht. Es sind keine unzulässigen geldwerten Leistungen, weder unmittelbar noch mittelbar, im Zusammenhang mit dem Inhalt der vorliegenden Dissertation an Dritte erfolgt. Die Arbeit wurde bisher weder im Inland noch im Ausland in gleicher oder ähnlicher Form einer anderen Prüfungsbehörde vorgelegt.

Die vorgelegte Dissertation wurde unter wissenschaftlicher Betreuung von Prof. Dr. Jürgen Hoyer (Erstbetreuer) und Frau Prof. Susanne Knappe (Zweitbetreuerin) am Institut für Klinische Psychologie und Psychotherapie der Technischen Universität Dresden erstellt.

Es haben keine früheren erfolglosen Promotionsverfahren stattgefunden.

Die Promotionsordnung des Bereichs Mathematik und Naturwissenschaften der Technischen Universität Dresden, in der Fassung vom 23.02.2011, letzte Änderung 23.05.2018, wird anerkannt.

 12.12.2024

Unterschrift, Datum