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Promoting the self-regulation skills of children and adolescents in day care centres and schools



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**Promoting the self-regulation skills
of children and adolescents
in day care centres and schools**

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Preface

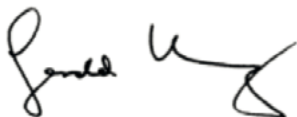
The well-being and development opportunities of children and adolescents are extremely important for the future development of our society. However, these are under threat in many ways, not least from the effects of crises and wars.

Recent psychological and neuroscientific research shows that the self-regulation skills of children and adolescents play a central role in their well-being and opportunities for development. These skills encompass cognitive, emotional, motivational and social skills that allow them to achieve personal goals and react flexibly to change. These include the ability to focus one's own attention and be fully aware of factors that can be distracting, such as the intensive use of social media. The ability to regulate emotions and social skills are also critical.

One of the main tasks of the German National Academy of Sciences Leopoldina is to provide evidence-based advice to policymakers and the public. For this reason, the Leopoldina is publishing with this statement. It has been prepared over the past two years by an interdisciplinary working group dedicated to addressing how to include the promotion of self-regulation skills in children and adolescents as an evidence-based guiding principle in the German school and education system.

The statement is based on the fundamental values of free personal development and responsible coexistence: self-regulation skills are not only worth encouraging in terms of achieving resilience with regard to health and providing an excellent education for children and adolescents, but are also indispensable skills for developing successful social relationships, worthwhile cultural participation and the broadest possible democratic involvement.

I would like to thank the spokespersons and all contributors in the working group, the reviewers and experts involved who have worked and commented on this statement over the past two years.



Prof (ETHZ) Dr Gerald Haug,
President of the German National Academy of Sciences Leopoldina

Summary and recommendations for action

Children and adolescents are the future of our society and, as the psychological and neuroscientific research of recent years has shown, self-regulation skills are highly important for their well-being and development, particularly their mental and physical health, education and social participation. They include cognitive, emotional, motivational and social skills that allow them to achieve personal goals and react flexibly to change. They also include the independent organisation of tasks, focussing attention, the conscious experience of emotions without acting impulsively, and the ability to manage social conflicts and actively participate in decision-making.

Numerous studies have now shown that there are now considerable threats to the well-being and development opportunities of young people: Many are suffering from significant mental health problems. Fundamental changes to the world they live in, such as wars and the climate crisis, lead to significant concerns and deep fears about the future. The physical health of many young people is also at risk, particularly due to an unhealthy diet and lack of exercise. In the area of education, low levels of competence in maths, reading and science are of concern. Significant risk factors for children and adolescents include mentally ill parents, low socio-economic status of the family, refugee and immigrant backgrounds as well as experiences of violence and bullying. Despite their advantages, digital media and technologies are also a considerable threat.

The state and society have a responsibility to respond quickly and appropriately to increasing threats to the well-being and development opportunities of children and adolescents. On the one hand, this follows from the UN Convention on the Rights of the Child, the preamble to the Constitution of the World Health Organisation, and German Basic Law. On the other hand, it is important to note the considerable negative consequences of a deterioration in the well-being and development opportunities of children and adolescents for German society and the economy, e.g. the considerable costs of mental illness and the waste of educational potential.

Due to the key importance of self-regulation skills for the well-being and development opportunities of young people, this statement recommends that promoting these skills should be made a further guiding principle of the German education system. Of course, it is still extremely important to improve the political, economic and social framework conditions. This includes, for example, appropriate socio-economic support for families and single parents and the sustainable improvement of often unsatisfactory conditions and structures in day care centres and schools. In addition, the strategies of some industries that specifically influence the preferences and behaviour of children and adolescents need to be counteracted. This applies to transnational social media providers as well as food, tobacco and alcohol companies. However, the local, personal skills of individuals in self-regulating their own behaviour and the successful global self-regulation of whole societies are two aspects of the same phenomenon. Due to the

aforementioned importance of self-regulation in all aspects of well-being and development opportunities, this statement and the recommendations for action relate to the first aspect, without in any way diminishing the importance of the second.

The development of self-regulation skills in children and adolescents is characterised by their genetic disposition as well as their environment and living conditions. In early childhood, the family context plays a critical role. As children grow up, self-regulation skills then need to be developed further in day care centres and schools. Research has shown that there are demonstrably effective approaches to achieve this. It is extremely important to create a conducive environment for development and learning which includes cognitive activation and constructive support. It is also fundamental to promote appropriate mental health literacy – i. e. the understanding that self-regulation skills can be learnt – and to develop the ability to apply these in an appropriate manner. Other important evidence-based ways of encouraging self-regulation skills include behavioural and/or cognitive-behavioural approaches, mindfulness and compassion-based methods. These approaches are already being used in many programmes nationally and internationally. Digital apps and other digital technologies have the potential to effectively support such programmes. In addition, promoting the self-regulation skills of children and adolescents in day care centres and schools requires qualified teaching staff and appropriate resources in the education system. An efficient and trustworthy network of stakeholders in the education and healthcare systems is essential.

In this context, the German National Academy of Sciences Leopoldina recommends the following:

1. Promoting the self-regulation skills of children and adolescents should become a further guiding principle of the German education system.
 - a. This guiding principle should be integrated into
 - i. the standards and recommendations of the Standing Conference of the Ministers of Education and Cultural Affairs of the Länder (KMK) for education in Germany and
 - ii. the educational plans and school curricula of the German federal states,
 - iii. the curricula for the initial, continuing and further training of educational and teaching staff, also in teacher training courses,
 - iv. the concepts of providers of day care centres and schools.
 - b. The relevant bodies of educational institutions such as parents' or school councils should be involved in a discussion on the promotion of self-regulation skills and integrated into teaching concepts accordingly.
 - c. Associations and trade unions in the German education system should also be involved in a discussion on the importance of promoting self-regulation skills. They should be involved so as to make this a further guiding principle of the German education system.

2. Indicators¹ for the self-regulation skills of children and adolescents should be developed and/or developed further and included as part of the nationwide monitoring of education as well as the data-based school and curriculum development of the German federal states.

- a. The KMK should commission the Institute for Quality Development in Education (IQB) or another educational research institute to develop indicators for the reliable measurement of self-regulation skills or further develop existing indicators.
- b. Using these indicators, the self-regulation skills of children and adolescents should become part of the nationwide monitoring of education, for example in the IQB's education trends and the National Education Report.
- c. The Ministries of Education and Cultural Affairs and other responsible state ministries should include the self-regulation skills of children and adolescents in data-supported school and curriculum development and also use the corresponding indicators.
- d. In addition, the data foundation on mental health and other aspects of children's and adolescents' well-being and opportunities for development should be improved and integrated into the routine health screening of all health and counselling professions. Innovative and real-life survey methods (e.g. real-time surveys via smartphones) should be used in an appropriate manner. In the future, preschool children should also be included in these surveys.

3. Effective strategies for promoting self-regulation skills in German day care centres and schools should be developed, introduced nationwide and on a long-term basis, and be continuously evaluated and improved.

- a. On the basis of tried-and-tested educational and teaching models, such as the three basic dimensions (effective classroom management, cognitive activation, constructive support), the promotion of self-regulation skills should be integrated into everyday educational and teaching practice as well as into the training, study and initial, further and advanced training of education professionals.
- b. To achieve this, day care centres and schools should develop joint ideas and concepts based on the available scientific findings, which are shared by all education professionals in the respective institution. All of those involved in the day care centres and schools should be included, and the individual needs and strategies of day care centres and schools should be taken into account.
- c. In addition, it should be included as part of existing school subjects, on project days, as part of class teacher lessons, full day school programmes, childcare programmes, etc. There should also be programmes for all children and adolescents as well as for specific groups, such as particularly vulnerable children and adolescents that enable them to learn suitable ways of strengthening their self-regulation skills.

¹ Indicators are defined as metrics for evaluating certain characteristics.

- d. These programmes should be developed, continuously evaluated and improved, in cooperation with university and non-university research institutions, relevant state institutes, day care centres and schools. Scalability² and sustainability should be taken into account from the outset. This research could be included in the German Federal Ministry of Education and Research (BMBF) programme “Empirical Educational Research” or a separate funding line.

² Scalability refers to the efficacy in every day conditions with many participants.

1 Introduction

Children and adolescents are the future of our society and, as the psychological and neuroscientific research of recent years has shown, self-regulation skills are of critical importance to their well-being and development opportunities, particularly to their mental and physical health, education and social participation. They include cognitive, emotional, motivational and social skills that allow them to achieve personal goals and react flexibly to change. They also include the independent organisation of tasks, attention control, the conscious experience of emotions without acting impulsively, and the ability to manage social conflicts and actively participate in decision-making.

Numerous studies have now shown that there are considerable threats to the well-being and development opportunities of young people³: Many are suffering from mental health problems such as anxiety disorders, depression, attention-deficit hyperactivity disorder and social behaviour disorders.⁴ Fundamental changes to the world they live in, such as wars and the climate crisis, lead to significant concerns and deep fears about the future.⁵ The physical health of many young people is also at risk, especially due to unhealthy diets and a lack of exercise.⁶ In the area of education, low levels of competence in maths, reading and science are of concern.⁷ Many do not achieve the minimum standards considered necessary for full participation in society.⁸ Significant risk factors for children and adolescents include parents with mental illnesses⁹, low socio-economic status of the family¹⁰, refugee and immigrant backgrounds¹¹ and experiences of violence and bullying¹². Despite their benefits, digital media and technologies are also a considerable risk¹³.

Aim of this statement

The state and society need to take urgent action and react quickly and appropriately to these threats and promote the well-being and development opportunities of young people in a sustainable and effective manner.

3 Detailed explanations and further evidence for the following can be found in Section 2 “Vulnerability and resilience”.

4 We cite an older study, which provides a good overview: Ravens-Sieberer et al. 2007. We discuss more recent results and the connection with the pandemic in Section 2.

5 Ravens-Sieberer et al. 2023.

6 Robert Koch Institute 2021, Schmidt et al. 2024.

7 OECD 2023.

8 Stanat et al. 2023, p. 67.

9 Beardslee et al. 2011.

10 Klasen et al. 2017.

11 OECD 2023.

12 Schmid et al. 2022, Baldwin et al. 2023.

13 Committee on the Impact of Social Media on Adolescent Health 2023, The U. S. Surgeon General 2023.

Due to the key importance of self-regulation skills for the well-being and development opportunities of children and adolescents, this statement recommends that they should be made a further guiding principle of the German education system and provides specific recommendations for action based on current scientific findings. Of course, it is still extremely important to improve the political, economic and social framework conditions. However, the local, personal skills of individuals in self-regulating their own behaviour and the successful global self-regulation of whole societies are two aspects of the same phenomenon. Due to the aforementioned importance of self-regulation in all aspects of well-being and development opportunities, this statement and the recommendations for action relate to the first aspect, without in any way diminishing the importance of the second.

In the following, we explain the line of argument of the statement in detail.

Well-being and development opportunities

There are many different aspects to the well-being and development opportunities of young people: As mentioned above, mental and physical health as well as the opportunity to develop their own talents and abilities are key factors. Opportunities for social participation in the sense of successful interactions with peers, active participation in shaping their own living environment, e. g. in the family and school, and access to educational and leisure activities are also important. Another key aspect is the development of self-esteem and an understanding of the value and autonomy of oneself and all people, combined with a sense of responsibility for one's own development and the common good. Here, the Western philosophical tradition refers to the concept of *eudaimonia*, which essentially goes back to Aristotle: a successful way of life according to the requirements and principles of an ethically sensitive attitude towards one's own life as a whole.¹⁴

The responsibility of the state and society

The responsibility of the state and society for the well-being and development opportunities of children and adolescents in this broad sense and the promotion of self-regulation skills is set out in numerous fundamental documents. At the level of international agreements, the UN Convention on the Rights of the Child stresses in Article 29:

“States Parties agree that the education of the child shall be directed to the development of the child's personality, talents and mental and physical abilities to their fullest potential;”¹⁵ The preamble to the Constitution of the World Health Organisation (WHO) also stresses: “The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition.”¹⁶ This includes mental health in particular.

¹⁴ In this context, Thomas Metzinger proposes the development of a “culture of awareness” (Metzinger 2023). This means asking not only, “What is a good action?”, but also, “What would be a desirable mental state, what is actually a good state of consciousness?” In such a culture of awareness, children and adolescents would learn to adopt an ethical perspective towards their own mental state. In the medium term, this should lead to the cultural embedding of states of consciousness that are recognised as valuable.

¹⁵ United Nations 1989.

¹⁶ World Health Organization 1946.

According to the WHO definition,¹⁷ mental health is a state of mental well-being that enables an individual to realise their own potential, cope with the normal stresses of life, work and learn productively, and be able to contribute to their community. In Germany, these principles are derived from Article 2 of the Basic Law: the right to free development of the personality. The appropriate support of the well-being and development opportunities of children and adolescents are a prerequisite to this right. Book 8 of the Federal Republic of Germany's Social Code specifies the statement of the Basic Law in Section 1, which states: "Every young person has a right to support of their development and to education to become a self-reliant, independent person capable of participating in the community."

Nevertheless, as outlined above, the well-being and development opportunities of children and adolescents are at risk and this has far-reaching consequences for their lifelong development. The need for the state and society to take urgent action arises on the one hand from the individual responsibility of leading a successful life and from the social and economic consequences of this risk for society as a whole on the other. For example, the costs of mental illness in the population as a whole amounted to 4.8% of Germany's gross domestic product in 2015, which corresponds to around 147 billion euros.¹⁸ These costs include, for example, therapies, absence from work and early retirement. Half of these illnesses begin before the age of 15.¹⁹ In addition, for example, the insufficient participation of young people in education and training has a negative impact on the labour market and Germany's economic performance. The situation is made even more dramatic since Germany has a population with a very high average age (2023: 44.6 years)²⁰.

Political decision-makers, relevant social institutions such as day care centres, schools, social associations, sports clubs and churches, as well as those directly responsible for the education of children and adolescents, including parents, educators and teachers, are therefore called upon to quickly create conditions and take measures to counteract such negative developments. The well-being and development opportunities of young people should be optimally promoted to enable them to lead a successful life with autonomy, dignity and self-determination.

For such promotion to be successful, favourable social and economic conditions need to be in place. This includes providing appropriate socio-economic support for families and single parents on the one hand and changing often unsatisfactory conditions and structures in day care centres and schools on the other. For example, due to the shortage of skilled labour and the increasing demands made on them, many nursery school teachers and school teachers are currently reaching their limits. Optimal support for children and adolescents also depends to a large extent on the educational skills of parents, whose support is of considerable importance.

¹⁷ <https://www.who.int/news-room/fact-sheets/detail/mental-health-strengthening-our-response>

¹⁸ DGPPN e. V. 2024.

¹⁹ Kessler et al. 2007.

²⁰ <https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bevoelkerung/Bevoelkerungsstand/Tabellen/bevoelkerungsstand-gebietsstand-werte.html>

The necessary systemic changes also relate to the aforementioned changes to the living environment of children and adolescents. These include the strategies of some industries, such as transnational social media and food, tobacco and alcohol companies, to deliberately influence the preferences and behaviour of children, adolescents and adults. Epidemiologists and public health researchers see such strategies as an important reason “for escalating levels of preventable disease, environmental damage and social and health inequalities”²¹ with negative consequences for the well-being and development opportunities of children and adolescents. This problematic dynamic and the tendency to blame individuals for its consequences needs to be counteracted politically. In Germany, for example, medical associations as well as children’s rights and consumer organisations have long called for restrictions on advertising foods with a high sugar, fat or salt content in all media relevant to children. The need to regulate social networks was outlined in the Leopoldina statement “Digitalisation and Democracy”²².

Effectively promoting the self-regulation skills of children and adolescents

As mentioned at the beginning of this statement, in recent years psychological and neuroscientific research has shown that the self-regulation skills of children and adolescents are key to their well-being and development opportunities. These include, as mentioned above, cognitive, emotional, motivational and social skills that allow them to achieve personal goals and react flexibly to change. Cognition-related self-regulation is, for example, focussing one’s attention with the aim of working on a task in a concentrated manner. This also includes clearly recognising the factors that can interfere with this ability, e.g. compulsive or excessive use of social media. An example of emotion regulation is the conscious but non-judgemental perception of anger, rage, and other unpleasant feelings without acting upon them. Motivational aspects relate to formulating, achieving or, if necessary, changing goals. Self-regulation skills are also important in a social and political context, as they can help you resolve conflicts with others and participate in decision-making processes. The purpose of promoting self-regulation skills is therefore not – as is sometimes assumed – to make individuals fit into problematic structures, but rather to strengthen the autonomy of individuals and their participation in society. It also does not mean that individuals are solely responsible for dealing with such structures and that the state and society can escape their obligation to make the systemic changes mentioned above.

This statement presents scientific evidence that self-regulation skills are of crucial importance for the well-being and development opportunities of children and adolescents: They have a preventive effect in relation to the aforementioned risks and are critical to enabling young people to fulfil their potential and participate socially, which has great benefits for our entire society. For this reason, the authors of this statement believe that there is an urgent need to promote these skills for all young people in day care centres and schools. With this statement, they wish to contribute to this extremely important goal by exploring the possibilities of such promotion on the basis of the latest scientific findings and at the same time provide practical recommendations for action within the German education system.

²¹ Gilmore et al. 2023; Maani et al. 2023.

²² German National Academy of Sciences Leopoldina, Union of the German Academies of Sciences and Humanities, acatech – German National Academy of Science and Engineering 2021.

Development of the statement

The working group that prepared this statement brings together the scientific disciplines relevant to the subject: psychology, psychiatry, child and adolescent psychiatry, paediatric medicine, educational research, philosophy of mind, ethics, sports science, computer science and statistics. During the preparation process, the working group also included contributions from experts, such as student and parent representatives, teachers, representatives from teacher training programmes, school administrations and ministries of education.

Structure of the statement

The second section of this statement takes account of the well-being and development opportunities of children and adolescents in Germany on the basis of empirical studies. The ability to self-regulate is the focus of this statement because it is central to the well-being and development opportunities of children and adolescents. We demonstrate this in the third section. We explain the psychological and neuroscientific foundations of self-regulation and its significance for the various aspects of well-being and opportunities for development of children and adolescents. The results of the second and third section emphasise the need to promote self-regulation skills in young people. Corresponding evidence-based promotion strategies are then included in the fourth section. We describe approaches for such promotion strategies, provide examples and explain the research-based evidence for their efficacy. This forms the basis for the concluding section of the statement, in which specific recommendations for action are formulated.

Background: Research methods used

This statement is based on various types of scientific studies, which differ in terms of research objective and design: These include observational studies, randomised controlled trials (RCTs), cross-sectional studies and longitudinal studies as well as meta-analyses. Each type of study has its specific strengths and weaknesses and is suitable for different research questions.

- **Observational studies** collect data without intervening in the study process. Researchers observe a random selection of participants in their natural environment or collect data retrospectively. While these studies can show correlations, they cannot prove causality (clear cause-and-effect relationship).
- **Randomised controlled trials (RCTs)** are the gold standard in clinical research. Participants are randomly assigned to one of at least two groups: the intervention group, which receives the treatment being tested, and the control group, which receives a standard treatment, a placebo or no treatment. Randomisation minimises systematic selection bias and increases the likelihood that differences between the groups are actually due to the intervention.
- **Double-blind design** can be a feature of RCTs. A double-blind design, in which neither the participants nor the researchers know who belongs to which group, minimises the placebo effect and the influence of researchers.
- **Scalability** of promotion strategies means that the efficacy of studies with a small number of participants in laboratory conditions can also be demonstrated in everyday conditions with many participants (field experiments).
- **Meta-analyses** quantitatively summarise the results of several studies in order to gain a more comprehensive understanding of the efficacy of an intervention. They make it possible to compare and generalise the effect sizes across different studies.
- **Cross-sectional studies** collect data from statistically randomised participants at a specific point in time and can show relationships between variables, though cannot detect changes over time.
- **Longitudinal studies** follow statistically randomly selected individuals over a longer period of time to document developments or changes, which makes them particularly valuable for investigating cause-effect relationships.
- **Cohort studies** are an epidemiological or observational type of study that follows a group of people (a cohort) over a specific period of time to investigate the development of diseases or the occurrence of certain events. The common features of a cohort, e. g. common age or common school entry, focus on a specific group of participants, but generally allow a more effective comparison than longitudinal studies.

When looking at the results of these studies, the results are communicated in different ways:

- **Effect sizes** measure the size of an effect regardless of the sample size. They are crucial for understanding the practical significance of research findings.
- Not all observed effects are sustained. **Follow-up studies** help to measure the long-term efficacy of interventions.
- **Replication**, the repetition of studies, increases the quality of research as it confirms the reliability and validity of the results.
- A key concern in research is the distinction between **causality and correlation**. While correlation indicates a relationship or connection between two variables, causality means that one variable causes changes in another. Many study designs, in particular observational studies, can show correlations, but experimental designs are often needed to prove causality.
- The quality of a study depends heavily on its **design**. A high-quality design includes clear definitions of the target group, valid and reliable measurement instruments and consideration of confounding factors. However, it is also important to be flexible and recognise that in some research contexts, compromises need to be made in order to collect relevant data.
- For each type of study, it is necessary to evaluate whether there are **systematic reasons** that encourage or discourage participation and whether these systematics affect the conclusions drawn from the study.

Measuring self-regulation skills in children and adolescents

Self-regulation skills are often measured using questionnaire scales. However, as this is only possible with older children due to the need for linguistic reflection skills, external assessments by parents, carers or teachers are often used, but these (as with the self-report) can be associated with different types of bias. In contrast, cognitive tests, which are often computer-based and carried out under standardised conditions, are predominantly used to measure executive functions. Although these promise objectivity and precision in the recording of characteristics, it is often difficult, especially with younger children, to achieve the necessary reliability of measurements with a reasonable duration of the test sessions. For certain behavioural tests, such as the well-known marshmallow test²³ to record the ability to delay gratification, only one test session is planned, meaning that it is not possible to determine and increase reliability through multiple test sessions. Limited reliability is one possible reason why different tasks that are actually intended to measure the same cognitive construct (e. g. inhibition ability) only correlate with each other to a low degree. Another reason is that individual tasks always also measure task-specific aspects (e. g. the ability to use certain strategies) that are irrelevant to the theoretical construct of interest. The heterogeneity of the aspects and measures summarised under the concept of self-regulation (executive functions, reward delay tasks, self-report and external report) is also reflected in the fact that they only correlate with each other to a low degree on average.²⁴

²³ Mischel & Ebbsen 1970.

²⁴ For example: Duckworth & Kern 2011.

2 Vulnerability and resilience

In this section, the considerable extent to which the well-being and development opportunities of children and adolescents are impaired and at risk is explained in more detail. We will focus on the dimensions, for which data is available: mental and physical health, education and the opportunity to develop talents and abilities, as well as social participation.²⁵

Mental health is of particular importance in this context. According to the WHO definition²⁶ (see also above) mental health is a state of mental well-being that enables people to cope with the stresses of life, develop their abilities, learn and work well and contribute to the community. In this broad sense, mental health is a key prerequisite for the realisation of all other aspects of children's and adolescents' well-being and for opportunities for development. Impairments in mental health therefore also have a significant negative impact on all these aspects, and promotion of mental health has a positive impact on well-being and development opportunities. The findings of this section and the importance of self-regulation for all aspects of well-being and opportunities for development outlined in the next section underline the need to promote self-regulation skill in children and adolescents.

2.1. Well-being and development opportunities for children and adolescents in Germany

We begin with a review of key aspects of the well-being and development opportunities of children and adolescents in Germany.

2.1.1. Mental health

Important sources for assessing the mental health of children and adolescents in Germany are the health insurance reports of recent years.²⁷ They show that the psychotherapeutic treatment rates for children and adolescents up to the age of 17 have risen significantly. From 2009 to 2019, i. e. even before the coronavirus pandemic, the number of children and adolescents undergoing psychotherapy increased²⁸ 104% to 823,000.²⁹ This is around 4% of all children and adolescents, with reactions to severe stress and adjustment disorders – for example after experiences of grief or bullying – as well as

²⁵ However, the data situation is still unsatisfactory in many cases (see section 2.1.5). This is why one of our recommendations for action is to significantly improve this.

²⁶ <https://www.who.int/news-room/fact-sheets/detail/mental-health-strengthening-our-response>

²⁷ The most recent reports providing information on the mental health of children and adolescents at the time of writing are used here.

²⁸ Psychotherapy in the broader sense, i. e. including counselling sessions, probationary sessions and acute therapies; if only approved short-term and long-term therapies are considered, the increase amounts to 46%.

²⁹ BARMER 2021; the analyses were based on anonymised data on around nine million BARMER policyholders. The results in the BARMER Medical Report are standardised according to the gender and age structure of the German population (according to data from the German Federal Office of Statistics). This allows the results to be transferred to the German population as a whole.

depressive episodes which are the most common causes of treatment. According to the DAK report on children and adolescents in 2022, girls between the ages of 10 and 17 have been particularly affected with a sharp increase in new cases of depression.³⁰

Even more important than the disease and treatment rates, however, is the alarming number of healthy years of life lost due to mental disorders (disability-adjusted life years [DALYs]).³¹ These refer to the years lost not only due to the illness itself, but also due to its consequences. With regard to the ten most common causes of DALYs, the following picture emerged in 2019: Among 10 to 14-year-olds, the number of years of life lost was 6137 per 100,000; 28% of these were due to anxiety disorders, depressive disorders and behavioural disorders. Among 15 to 19-year-olds, the figure was 8961 DALYs per 100,000, 25% of which were attributable to anxiety disorders, depressive disorders, behavioural disorders and bipolar disorders. Other relevant causes of DALYs included back and neck pain, migraines, and self-harm.³²

A further comprehensive picture of the mental health of adolescents is provided by several studies: the Robert Koch Institute's Study on the Health of Children and Adolescents in Germany (KiGGS)³³ – as a part of which in particular the BELLA study (**BE**-fragung zum see**L**ischen Woh**L**befinden und Verh**Ä**lten)³⁴ – and the WHO-coordinated study "Health Behaviour in School-aged Children (HBSC study)"³⁵. KiGGS is a longitudinal study that collects comprehensive data on the health, well-being and health behaviour of children and adolescents in Germany.³⁶ The HBSC study is a cohort study that is conducted every four years. It collects data on the health behaviour and well-being of schoolchildren aged 11, 13 and 15 in over 40 countries. Between 2009 and 2012, between 17 and 20% of the children and adolescents aged 3 to 17 surveyed in the BELLA study showed mental health problems.³⁷ This is in line with a meta-analysis of 33 primary studies, which show an average prevalence of emotional and behavioural disorders in children and adolescents in Germany of 17.6%.³⁸ According to the German Federal Chamber of Psychotherapists, these include in particular anxiety and depressive symptoms as well as behavioural and attention deficit/hyperactivity disorders.³⁹ The HBSC 2022 study shows that 34%, 43% and 50% of 11, 13 and 15-year-old schoolchildren respectively have multiple psychosomatic complaints. In addition, according to this study, 21% of 15-year-old students have rather poor subjective health and 19% have low life satisfaction, with this applying significantly more frequently to girls than to boys. These values are lower for 11 and 13-year-olds. According to the 2022 PISA report, as many as 22% of children and adolescents have low life satisfaction.⁴⁰

³⁰ Witte et al. 2023.

³¹ <https://www.daly.rki.de/>

³² This is shown by the latest figures of the WHO; see <https://www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/global-health-estimates-leading-causes-of-dalys>

³³ https://www.rki.de/DE/Content/Gesundheitsmonitoring/Studien/Kiggs/kiggs_node.html

³⁴ The KiGGS study group et al. 2008.

³⁵ Robert Koch Institute 2024.

³⁶ The baseline survey (KiGGS wave 1) took place from 2003 to 2006. KiGGS wave 2 was conducted between 2009 and 2012, and KiGGS wave 3 ran from 2014 to 2017.

³⁷ Klasen et al. 2017.

³⁸ Barkmann & Schulte-Markwort 2012.

³⁹ German Chamber of Psychotherapists 2020.

⁴⁰ OECD 2022a.

With the onset of the coronavirus pandemic, the frequency of mental health problems increased and the health-related quality of life and life satisfaction of children and adolescents deteriorated significantly. This is shown by the longitudinal study “COVID-19 and Psychological Health” (COPSY), which was modelled on the BELLA study.⁴¹ It provides a picture of the mental health of children and adolescents during the pandemic and also shows medium-term effects beyond the acute pandemic situation. Over the course of the COPSY surveys, there was initially a dramatic increase in almost all measured variables: poor health-related quality of life, psychosomatic complaints, mental health problems and anxiety symptoms. The school closures in Germany were identified as an important cause of this.⁴² However, not all of these variables returned to their pre-pandemic levels after the acute pandemic situation.⁴³ For anxiety symptoms in particular, the incidence in winter 2020/2021, autumn 2021 and February 2022 was still significantly higher than the pre-pandemic level at 30%, 27% and 28% respectively. The psychosomatic complaints of children and adolescents, in particular abdominal pain, back pain and headaches, also increased steadily during the measurement period. In autumn 2022, every second child surveyed suffered from such complaints at least once a week. Other complaints such as nervousness, sleep problems and irritability were also significantly higher than before the pandemic. In line with these complaints, a significant proportion of children and adolescents were quite or very worried about the current crises, such as the enormous consequences of climate change and the war in Ukraine, and around half of those surveyed said they were very worried about their own future prospects.

Data from the COPSY study is comparable with international data which has been summarised in various meta-analyses, e.g. in the study by Racine et al. 2021, where 29 studies from East Asia, Europe, North, Central and South America and the Middle East were evaluated⁴⁴, and in the study by Madigan et al. 2023, which is based on 53 studies from North America, Europe, Asia, Australia and Israel.⁴⁵

2.1.2. Physical health

A balanced and appropriate diet plays an important role, particularly in childhood and adolescence, as it forms the basis for healthy development. The EsKiMo II nutrition study⁴⁶ conducted by the Robert Koch Institute showed that most adolescents in Germany ate too little fruit, vegetables and plant-based foods with a high carbohydrate content, such as wholemeal bread and potatoes, during the measurement period of 2014 to 2017. In addition, the consumption of meat, sausage products and “tolerated foods”, including sweets, soft drinks and snacks, was significantly too high.⁴⁷ In this period around 15% of children and adolescents in Germany were overweight.⁴⁸

41 Ravens-Sieberer et al. 2021.

42 Felfe et al. 2022.

43 Ravens-Sieberer et al. 2023.

44 Racine et al. 2021.

45 Madigan et al. 2023.

46 Robert Koch Institute 2021.

47 Robert Koch Institute 2021.

48 Robert Koch Institute 2018c.

Health problems, but also psychological disorders, are closely linked to a lack of physical activity, especially in childhood and adolescence.⁴⁹ The results of the Motorik Modul study (MoMo)⁵⁰ show that this is problematically low: In 2023, only 17% of boys and 13% of girls aged 6 to 17 achieved the WHO recommendation of one hour of moderate to vigorous physical activity every day of the week⁵¹. The MoMo study also shows that unorganised activity (not in institutions such as schools or sports clubs) of children and adolescents in their free time decreased from 81 to 52 minutes per week between 2003 and 2017 among 4 to 17-year-olds, although this is partially compensated for by organised sport.⁵² The results of the meta-analysis by Tapia-Serrano et al. 2022 are also concerning.⁵³ The authors refer to the recommendation of the WHO, which states that children aged 1 to 4 years should be physically active for three hours a day, screen time for children aged 2 to 4 years should be a maximum of 60 minutes and sleep time for 1 to 2-year-old children should be 11 to 14 hours and for 3 to 4-year-old children 10 to 13 hours.⁵⁴ It has been shown that only 10% of children in these age groups comply with all three recommendations and 8% comply with none of the recommendations. However, these figures relate to Europe.

2.1.3. Education

Due to the overall strategy for monitoring the education sector in Germany, reliable data is now available on the skills of schoolchildren, including cohort comparisons.⁵⁵ However, such data is still lacking for pre-school children. The data on students is very sobering overall. For example, the latest PISA study from 2022 shows the lowest levels of proficiency in maths, reading and science for Germany since the PISA study began in 2000.⁵⁶ The study reveals a significant decline in the academic skills of German students compared to the previous study in 2018 and an even greater decline in performance compared to 2009 and 2012, when Germany performed rather well, particularly in a European comparison. The decline in the scores of the PISA study between 2018 and 2022 is particularly striking for maths⁵⁷, but the results are also lower for reading⁵⁸ and science⁵⁹. A similarly negative trend has been shown by the IQB Education Trend, which monitors the development of skills in the core areas of school learning for the federal states of Germany.⁶⁰ It can be assumed that although the coronavirus pandemic has contributed to this negative development, it has simply deepened an already negative trend. What is likely to be more significant in the long term is that the composition of students has changed substantially as a result of refugees and immigration, and it has not yet been possible to provide students with refugee and immigrant backgrounds with learning environments that lead to the assimilation of skills as quickly as possible.⁶¹

49 Nigg et al. 2021; Schmidt et al. 2020; Wunsch et al. 2019.

50 Schmidt et al. 2024.

51 World Health Organization 2020.

52 Schmidt et al. 2020.

53 Tapia-Serrano et al. 2022.

54 World Health Organization 2019.

55 Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany 2016.

56 OECD 2023.

57 475 points (previously 500).

58 480 points (previously 498).

59 492 points (previously 503).

60 Stanat et al. 2023.

61 Stanat et al. 2023.

Two additional aspects that have emerged from the above and other education reports are of particular relevance to this statement. Firstly, the skills of a substantial proportion of students are below the “minimum standards”, which are considered a prerequisite for full participation in and with society. For example, the IQB Education Trend 2022 showed that the performance of almost a third of all students was below this minimum standard for reading.⁶² Secondly, wherever corresponding analyses are carried out, significant positive correlations are found between the skills achieved by students and their motivation, their commitment to school and their well-being.⁶³

2.1.4. Social participation

Co-determination and self-determination in school and leisure are key aspects for children and adolescents when it comes to actively shaping their own lives. The World Vision Children’s Study 2018 analysed the opportunities for co-determination of children and adolescents in Germany. It showed that these opportunities remain low at school, while the vast majority of children and adolescents have a say in the organisation of their leisure time and everyday family life.⁶⁴ Furthermore, in a 2019 study by the Bertelsmann Foundation on the needs of children and adolescents in Germany, more than 90% of respondents stated that they experience co-determination and self-determination in the family.⁶⁵ The 2019 Shell Youth Study also shows that the subjective feeling of young people in Germany that they can make a difference has increased since 2002.⁶⁶

While the long-term trend of young people being interested in politics declined slightly before the coronavirus pandemic, the Shell Youth Study 2019 shows an increase in engagement and willingness to discuss politics in those who consider themselves politically interested.⁶⁷ The proportion of young people in Germany who use political forms of participation is in the middle of the European average.⁶⁸ Digital media plays a major role in the social participation of children and adolescents, but there is no evidence of a division between digitally connected and less digitally affine individuals in German young people.⁶⁹

2.1.5. Critical examination of the data

Longitudinal studies are required in order to research and evaluate the development of children’s and young people’s well-being and opportunities for development in Germany and to derive a need for action. These take into account data on the same individuals from early childhood to adulthood and focus on the various aspects of children’s and adolescents’ well-being and development opportunities, with the initial survey date being as early as possible. Due to the various aspects of well-being and development opportunities, such studies require very large numbers of cases and a high frequency of data collection, i. e. short intervals between the survey dates. This is suggested, for example, by the methodological investigations of the study “Data on the

62 Stanat et al. 2023, p. 67.

63 OECD 2017.

64 Andresen et al. 2018.

65 Andresen et al. 2019.

66 Albert et al. 2019.

67 Albert et al. 2019.

68 Gaiser et al. 2016.

69 Albert et al. 2019.

participation in the labour market of persons with disabilities in Germany”.⁷⁰ Existing longitudinal studies such as KiGGS, BELLA and COPSY as well as the Mannheim Risk Child Study (MARS)⁷¹ do not yet meet these requirements because their case numbers and frequencies are too low. One way of obtaining a better data basis in the future could be to collect data in real time, e. g. via smartphones, provided that the target population is adequately represented and the target variables are adequately measured. It would also be possible to use health insurance data or data from medical examinations, e. g. as part of the early detection programme for children and adolescents financed by the statutory health insurance companies.⁷² This may require adjustments to the data protection framework.

2.2. Risk factors

In this section, we describe risk factors for the well-being and development opportunities of children and adolescents, in particular with regard to their mental health. It should be noted that there is a close interaction between the risk and protective factors mentioned separately here. For example, a low socio-economic status can be a burden on family.

2.2.1. Family burden

A significant risk factor for the mental health of children and adolescents is family burden due to physical illness or mental disorders of the parents as well as financial hardship, e. g. the receipt of income support. The AOK Health Report 2023 shows that every second child insured with AOK in the Rhineland and in Hamburg is growing up in a household experiencing at least one such stressful situation.⁷³

The number of children in Germany whose parents are affected by mental illness is estimated to be three to four million.⁷⁴ These children have a much higher risk of developing mental illness themselves.⁷⁵ To make matters worse, the children of mentally ill parents are often not sufficiently informed about the illness⁷⁶, are not educated about it and in most cases are unable to name the diagnosis.⁷⁷ Due to this lack of education and information as well as the concealment and taboo of a parental illness, children and adolescents develop highly problematic explanatory models: for example, they may blame themselves for the illness of the parent or believe that the mental illness is contagious like a cold.⁷⁸ This results in feelings such as worry, guilt and shame, which can lead to social withdrawal and the development of a mental illness in the children themselves. Educational institutions play a key role in the early detection of such tendencies. In addition, family neglect can also have a negative impact on the social participation of children and adolescents.⁷⁹

⁷⁰ Schnell & Stubbra 2010.

⁷¹ MARS has been following 384 children with psychosocial and organic risks from birth for over 30 years.

⁷² <https://www.g-ba.de/themen/methodenbewertung/ambulant/frueherkennung-krankheiten/kinder/>

⁷³ AOK Rhineland/Hamburg 2023.

⁷⁴ Geiger et al. 2021.

⁷⁵ Beardslee et al. 2011.

⁷⁶ Gladstone et al. 2011; Monds-Watson et al. 2010.

⁷⁷ Riebschleger 2004; Maybery et al. 2005.

⁷⁸ Maybery et al. 2005.

⁷⁹ Schmid et al. 2022.

2.2.2. Socio-economic status

Another risk factor is that, according to numerous studies, children and adolescents from families with a low socio-economic status are much more frequently affected by mental health problems than those with a high socio-economic status.⁸⁰ This inequality of opportunity that already exists in childhood and adolescence has an impact on both mental health and social and educational participation in adulthood.⁸¹

The physical health of children and adolescents in Germany is also linked to the socio-economic status of their family of origin. The longitudinal findings of the MoMo study show that children and adolescents whose parents have a high socio-economic status are at a lower risk of developing obesity⁸². As this study also shows, there is also a reciprocal relationship between low socio-economic status and lower physical activity and increased use of digital media. Of the children and adolescents in the highest socio-economic status group, 18% achieve the WHO's physical activity recommendations (see Section 2.1.2), compared to just 6% in the lowest group⁸³. In addition, parents with a low socio-economic status are significantly more likely to rate the general health of their children as average, poor or very poor than parents of high socio-economic status.⁸⁴ The same applies to the self-assessment of adolescents.

Furthermore, parental poverty significantly reduces children's opportunities for social participation.⁸⁵ Lastly, the connection between the socio-economic background of children and adolescents and their academic success in Germany is striking.⁸⁶

2.2.3. Violence, abuse and bullying

Experiences of violence and abuse outside and within the family represent a significant risk factor for the well-being and development opportunities of children and adolescents⁸⁷ – particularly for their mental health.⁸⁸ As long as 16 years ago, the KiGGS study showed that around a quarter of 11 to 17-year-old children and adolescents in Germany have experienced at least one instance of violence, either as a victim, perpetrator or both.⁸⁹ The 2019 yearbook of police crime statistics has a record of 242370 criminal offences involving children, adolescents and young adults (up to the age of 21) as victims. This accounts for 24% of all criminal offences, which predominantly involve bodily harm. In addition, 46% of all victims of crimes relating to sexual self-determination are children, adolescents or young adults.⁹⁰

80 Klasen et al. 2017; Kuntz et al. 2018; Lampert et al. 2016.

81 Robert Koch Institute 2018a.

82 Rittsteiger et al. 2022.

83 Schmidt et al. 2024.

84 Robert Koch Institute 2018b.

85 Hähnle et al. 2023.

86 Baumert & German PISA Consortium 2012.

87 Schmid et al. 2022.

88 Baldwin et al. 2023.

89 Schlack et al. 2021.

90 German Criminal Police Office 2021.

In a survey conducted in Germany 21% of the 15-year students stated that they were victims of bullying, i. e. repeated and systematic harassment, bullying or humiliation, several times a month.⁹¹ The HBSC 2022 study showed that 14% of the 11, 13 and 15-year-olds surveyed had direct experience of bullying at school. 7% reported experiences of cyberbullying as victims and/or perpetrators.⁹² The Cyberlife IV study, which was conducted by the Alliance Against Cyberbullying in cooperation with the Health Insurance Company for Technicians, shows even higher figures. It found that 16.7% of students between the ages of 8 and 21 are affected by cyberbullying.⁹³ A study including a vulnerable population of mentally ill 6 to 20-year-olds revealed an even higher number (24.5%) of bullying experiences.⁹⁴ The school performance of bullying victims also develops unfavourably.⁹⁵ In addition, bullying can lead to physical, psychological, social and socio-economic impairments in both victims and perpetrators that last into adulthood and are comparable to those following experiences of violence and abuse.⁹⁶

2.2.4. Use of digital media

Digital media, such as social platforms and computer games, are often portrayed to the public as risk factors for the mental health of children and adolescents. However, current research shows that a differentiated view is important here and that the relationship between the use of digital media and the well-being of children and adolescents is generally not a case of direct cause-and-effect-relationship.⁹⁷ It needs to be considered which types of media are being consumed and how and in which development window.⁹⁸ There are, however, clear indications of the negative consequences of using digital media on the physical and mental health of children and adolescents. A cluster analysis of the KiGGS data indicates that very high media use in conjunction with poor nutrition and low levels of physical activity favours the development of obesity.⁹⁹ In the international WHO HBSC study, correlations were found between the frequent use of social media and risk behaviours such as tobacco consumption or bullying as well as poorer perceived health.¹⁰⁰ The study by Ruiz De Zarate et al. 2023 shows that the screen time of children and adolescents is negatively associated with their well-being, while physical activity and personal social contacts are positively associated with the well-being of adolescents.¹⁰¹ Together with the findings that the intensive use of digital media contributes to less sleep, exercise and social contact, this suggests that there is a link between poor mental health and digital media use.¹⁰² An analysis of the risks and

91 OECD 2022b, Table II.B1.3.31.

92 Fischer 2024.

93 Beitzinger et al. 2022.

94 Kranhold et al. 2021.

95 Ladd et al. 2017.

96 Duffy & Sperry 2012.

97 Orben & Przybylski 2019.

98 Committee on the Impact of Social Media on Adolescent Health et al. 2023.

99 Spengler et al. 2014.

100 Richter et al. 2021.

101 Ruiz De Zarate et al. 2023.

102 Viner et al. 2019.

benefits of social media was published by the US Surgeon General in 2023.¹⁰³ On the risk side, the negative consequences of exposure to content and excessive and problematic use have been examined in particular.

It can be assumed there are complex causal relationships at work with regard to the educational success of children and adolescents. In addition to the positive effects of computer games on certain cognitive skills that are trained in the games¹⁰⁴ there are also correlations between the time spent playing computer games and academic performance.¹⁰⁵ Also, the excessive use of television and computers has a negative impact on academic development. There is also evidence that the intensive use of social networks is associated with poorer academic performance.¹⁰⁶

2.2.5. Refugee and migrant background

The refugee and background of children and adolescents, often also referred to as migration background, also represents a risk factor for their well-being and their opportunities for development. The vast majority of adolescents with a refugee or migrant background rate their state of health as good or very good. This corresponds to the responses of children and adolescents without a migration background. However, children and adolescents from refugee and migrant backgrounds are more frequently affected by overweight (including obesity).¹⁰⁷ In the school performance studies such as PISA¹⁰⁸ and IQB Education Trend¹⁰⁹ substantial correlations are found for Germany between the refugee and migrant background of students and lower educational success. These correlations are also significant because the proportion of students from refugee and migrant backgrounds in Germany has risen significantly over the last two decades or so. In addition, the socio-economic status of families with a refugee or migrant background is on average lower than that of families without a refugee or migrant background. Therefore, the risks described in Section 2.2.2 also affect the group under consideration here.

2.3. Protective factors

Research distinguishes between two types of protective factors for mental health.¹¹⁰ Protective factors in the narrower sense have a buffering effect on particularly stressed children and adolescents, while protective factors that promote resilience have a positive effect on the mental health of children and adolescents regardless of their stress levels. This distinction is also helpful when analysing protective factors relating to other aspects of children and adolescents' well-being and opportunities for development. Protective factors that promote resilience should be carried out for all adolescents (pri-

103 The U.S. Surgeon General 2023.

104 Bediou et al. 2023.

105 Mundy et al. 2020.

106 D. Liu et al. 2017.

107 Koschollek et al. 2019.

108 OECD 2023.

109 Stanat et al. 2023.

110 A study by Emmy Werner (Werner 1993) is a pioneering longitudinal study on the resilience of severely stressed children, in which she analysed the lives of all 700 children born on the Hawaiian island of Kauai in 1955 over several decades. The results have been replicated several times, e. g. in the Mannheim risk study Esser & Schmidt 2017, the BELLA study (the BELLA study group et al. 2008) and internationally in the meta-analysis by Yule et al. 2019.

mary prevention), while the protective factors for vulnerable children and adolescents should also be strengthened (secondary prevention). In the following, we also distinguish between individual protective factors, which relate to the mental development of the individual, and social protective factors, which relate to the behaviour of children and adolescents' caregivers.

2.3.1. Individual protective factors

The meta-analysis by Yule et al. 2019 identifies a positive self-image and strong self-regulation skills in children and adolescents as the most important individual resilience-promoting and protective factors for mental health.¹¹¹ The positive self-image is used here as an umbrella term for various constructs that were recorded in the primary studies, e.g. positive assessment of own skills, a positive self-concept (see Section 3.1) and high self-efficacy. This is in line with the results of the Emmy Werner longitudinal study, the Mannheim risk study and the BELLA study, in which a positive self-concept and a high expectation of self-efficacy were identified as resilience factors.¹¹²

Positive self-esteem and functioning problem-solving skills are also individual protective and resilience-promoting factors for maintaining and expanding the social participation of children and adolescents, e.g. after stressful events.¹¹³ Problem-solving skills and well-developed executive functions, which underlie self-regulation skills (see Section 3.3.1), do not appear to have protective effects according to the meta-analysis, but they do have resilience-promoting effects. Sufficient physical activity, as recommended by the corresponding WHO guideline, has numerous positive effects on the biopsychosocial health of children and adolescents. Sufficient physical activity in childhood and adolescence also helps to prevent a variety of diseases, e.g. metabolic and cardiovascular diseases in adulthood.¹¹⁴ A healthy diet is also an important protective factor for mental and physical health.¹¹⁵

2.3.2. Social protective factors

In addition to the individual protective factors mentioned above, important social protective factors for the mental health and well-being of children and adolescents have also been identified. Key resilience-promoting and protective factors for mental health are warm and loving family relationships.¹¹⁶ In adolescence, support from peers, support and appreciation from educational professionals and a feeling of security at school are particularly protective and resilience-promoting protective factors.¹¹⁷ After stressful events, for example, support from the social environment is an important protective factor.¹¹⁸ In addition, a high socio-economic status of the family and professional support can act as protective, resilience-promoting protective factors for social participation.¹¹⁹

111 Yule et al. 2019.

112 See preceding footnote.

113 Rassenhofer & Fegert 2023.

114 Fernandes & Zanesco 2010; Ortega et al. 2011.

115 Hayhoe et al. 2021.

116 Chen & Harris 2019.

117 Haugstvedt 2023; Wang et al. 2020.

118 Afifi & MacMillan 2011.

119 Rassenhofer & Fegert 2023.

2.4. Consequences of the impairment of the well-being and development opportunities of children and adolescents

The impairments to the well-being and development potential of children and adolescents described in Section 2.1 have significant consequences for individuals and for our society as a whole.

2.4.1. Individual consequences

Impairments to mental and physical health, to education, to the development of talents and abilities and opportunities for social participation have highly negative and long-term consequences for individual children and adolescents. Mental impairments have a particularly negative effect. They increase the risk of mental impairments in adulthood (see 2.4.2). As numerous studies have shown, they also make it more difficult for children and adolescents to cope with numerous developmental tasks in the transition to adulthood, e. g. completing an education, finding and keeping a job, and avoiding delinquent behaviour. It has been shown that children and adolescents with so called externalising disorders such as attention deficit hyperactivity disorder (ADHD) or social behaviour disorders have lower educational success than their unaffected peers.¹²⁰ This correlation is also evident in the KiGGS study mentioned above, which however found no correlation with educational success for children and adolescents with so-called internalising disorders such as depression and anxiety disorders. On the other hand, there were other negative social consequences for this group, e. g. lower probability of entering into a stable partnership in young adulthood or a higher probability of having unplanned children.¹²¹ The “Great Smoky Mountain” study from the USA points in a similar direction.¹²² This showed that mental disorders in childhood and adolescence have negative effects on subsequent health and can lead to legal, financial and social problems in adulthood. According to this study, persistent depressive symptoms in childhood and adolescence in particular have a strong and stable correlation with the level of functioning in adulthood. A further evaluation of this study also shows that not only psychological problems in childhood and adolescence, but also early stressful experiences or traumatic experiences¹²³ have a negative effect on social participation opportunities in adulthood.¹²⁴ Regardless of the type of stress experienced in childhood, there are lasting negative effects on health and social participation opportunities in adulthood.¹²⁵

2.4.2. Social consequences

The described impairments to effects on the well-being and development opportunities of children and adolescents are also associated with considerable negative social consequences. Corresponding figures are available for the area of mental disorders. Thus

¹²⁰ McLeod et al. 2012.

¹²¹ Schlack et al. 2021.

¹²² Copeland et al. 2015; Copeland et al. 2021.

¹²³ Traumatic experiences are divided into 4 categories: Threats in the sense of experiencing violence oneself or to those close to you; material deprivation; changes that are unforeseeable and/or cannot be influenced, e. g. a parent moving out or changing schools, as well as loss, in the sense of the death of close relatives or friends, termination of a friendship, or separation from a partner.

¹²⁴ McGinnis et al. 2022.

¹²⁵ McGinnis et al. 2022.

in Germany each year 27.8% of all people are affected by a mental illness requiring treatment.¹²⁶ 75% of mental disorders begin before the age of 24 and half even before the age of 15.¹²⁷ This not only means enormous suffering for those affected and their relatives but also has massive economic consequences as a result of sickness-related absences from work and early retirement. In 2023, mental disorders were responsible for 16.1% of days of incapacity to work.¹²⁸ The direct costs, i.e. costs incurred within the healthcare system directly from mental illness, amounted to around 56.4 billion euros in Germany in 2020. The total cost of mental illness, including the cost of medical care and social benefits as well as indirect costs, e. g. productivity losses, amounted to 4.8% of Germany's gross domestic product in 2015, i. e. around 147 billion euros¹²⁹.

In addition to the socio-economic consequences of mental disorders in childhood and adolescence, there are many other social consequences of restrictions to the well-being and development opportunities of adolescents, although these consequences are difficult to quantify. For example, insufficient participation in education and training has a negative impact on the labour market and Germany's economic performance.

126 Jacobi et al. 2014.

127 Kessler et al. 2007.

128 Dehl et al. 2024.

129 DGPPN e. V. 2024.

3 Self-regulation

The previous section has shown that the well-being and opportunities for development of children and adolescents in Germany are considerably restricted and at risk. In recent years, psychological and neuroscientific research has increasingly shown that the self-regulation skills of children and adolescents are of central importance to this. The following section presents important concepts, research approaches and theories on self-regulation. We then look at the importance of self-regulation for the well-being and development opportunities of children and adolescents, in particular for physical and mental health as well as for education, professional success and social participation. We then describe the development of self-regulation in childhood and adolescence and discuss the biological and environmental factors influencing this development. Finally, we discuss the relevance of our remarks on self-regulation to the upbringing and education of children and adolescents.

3.1. Definition and framework

As already mentioned in the introduction, self-regulation includes behavioural skills that make it possible to achieve personal goals and adapt to changing circumstances.¹³⁰ Specifically, these are cognitive, emotional, motivational and social skills. With regard to cognitive skills, this can include, for example, being able to focus your attention with the aim of working on a task in a concentrated manner; in the area of emotional skills, it can include, for example, the use of relaxation exercises for improving your mood. The motivational component relates to the formulation and achievement of action goals and/or their modification. The term self-control is often used in this connection. It means that, in the event of a conflict of interests, a person is able to choose an action that will be more favourable for them over the long term. This is therefore one aspect of self-regulation (see Section 3.3.1.). Finally, it should be noted that self-regulation is required in social contexts and therefore has social determinants as well as effects. The basis of self-regulation is the development of an individual's self-model¹³¹, which enables conscious and goal-oriented self-development.¹³² Self-efficacy is closely linked to the ability to self-regulate, i. e. the conviction that an individual can control their own actions and achieve goals.¹³³

130 Karoly 1993; Berger et al. 2007.

131 Metzinger 2003; 2012; 2015.

132 Brandtstädter & Greve 2006.

133 Bandura 1997; Greve 2018.

The ability to self-regulate is of fundamental importance for goal-oriented agency¹³⁴ in all areas of life and is of increasing relevance due to social changes that require individuals to adjust. At the centre of the concept of self-regulation skills is the assumption that a person can use them to gain more room for manoeuvre and is therefore better able to influence their environment or have more self-efficacy. Improved self-regulation can also contribute to a better self-concept (perception and assessment of oneself) and thus to improved self-esteem in the sense of an increased appreciation of oneself.¹³⁵

3.2. Models

The so called “phase models of action control” provide a comprehensive framework for analysis of self-regulated behaviour.¹³⁶ A distinction is made between a motivational phase, in which goals are selected and intentions to act are formed, and a volitional phase, in which an attempt is made to translate these intentions into actual action. For the volitional phase, in central models of self-regulation a cyclical control model with different sub-phases is used, comparable to control processes such as those known from the temperature control of heating systems.¹³⁷ In a pre-actional phase, a target state is defined based on selected goals, e. g. mastering a learning task, establishing social contacts with classmates or reducing stress. In addition, one or more goal-oriented actions are selected and planned. These actions are carried out in the actional phase. Various cognitive or behavioural strategies can be used here. In the post-actional phase, the results of the actions are re-evaluated, i. e. the actual state achieved is compared with the target state. If there is a discrepancy between the two states, a further cycle of action is initiated until the target state is reached or the goal is changed or abandoned. Motivational, cognitive and emotional factors are relevant to the entire process. The selection of goals is primarily determined by motivational factors. However, self-efficacy expectations also come into play here, i.e. beliefs regarding the ability to successfully carry out the necessary actions. Cognitive resources are primarily used to monitor the execution of the action in the action phase and the subsequent evaluation in the post-action phase, in which emotional reactions (e.g. satisfaction versus disappointment) also play an important role. Self-regulation processes can therefore be very complex and influenced by the interaction of various psychological mechanisms. They are also influenced by the social context (Figure 1). While these general modelling concepts can be applied to any goals, comparable cyclical models have also been adapted and further developed for specific fields of application. In the context of school, models of self-regulated learning should be mentioned in particular.¹³⁸

134 Bandura 2006.

135 Perels et al. 2020.

136 Achtziger & Gollwitzer 2006.

137 Carver & Scheier 1998.

138 Zimmerman 2000.

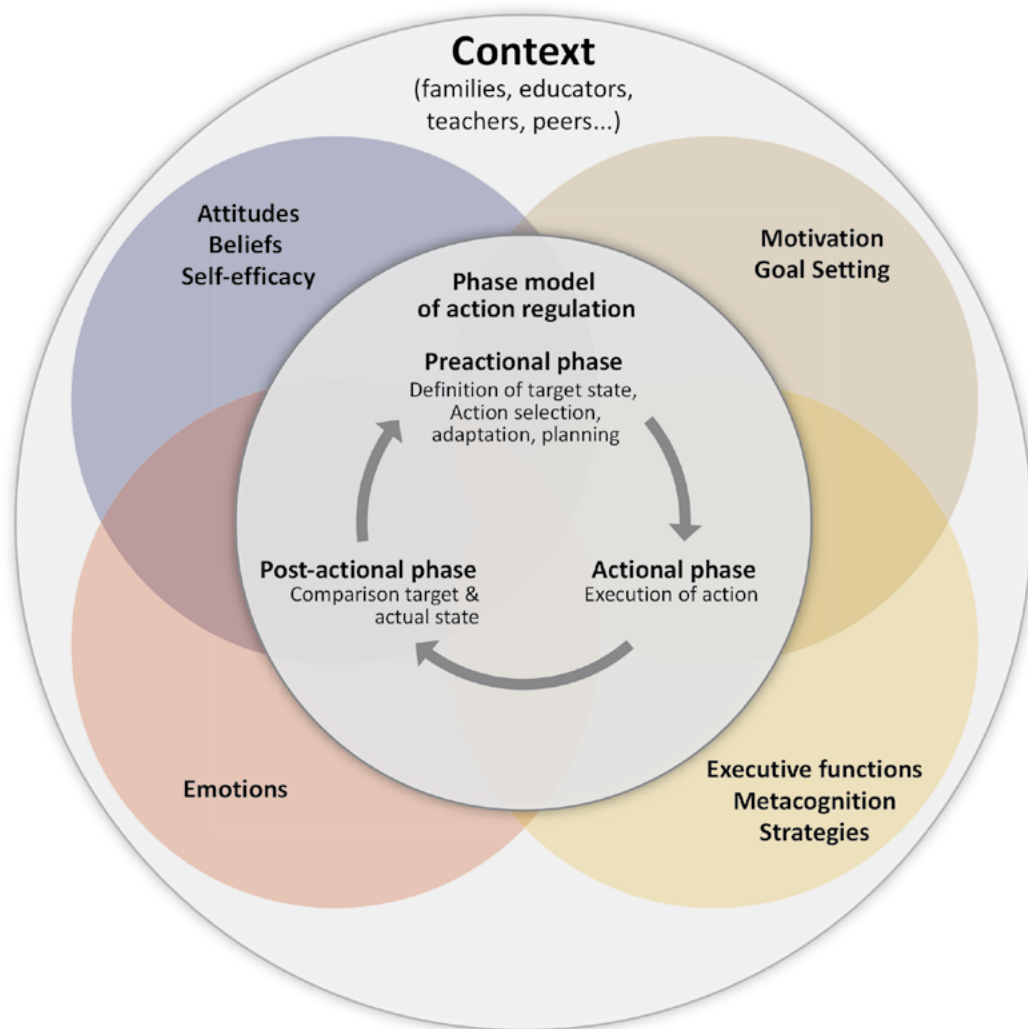


Figure 1: Ability to self-regulate (according to Achziger & Gollwitzer, 2006; Zimmerman, 2000)

Central to self-regulation processes is a phase model in which goals are (repeatedly) set, goal-oriented actions are selected and carried out and the results of actions are assessed until a desired target state is achieved. These various aspects of the dynamic self-regulation process are influenced, among other things, by beliefs as well as cognitive, motivational and emotional factors. Self-regulation also always takes place in certain environmental contexts and in the context of interaction with various social partners (e. g. parents, teachers, peers) as well as in consideration of social norms and social expectations and is influenced, restricted or supported thereby (summarised as “context” in the figure).

3.3. Mechanisms of self-regulation

3.3.1. Cognitive mechanisms

The cognitive mechanisms that underpin self-regulation processes are analysed within the framework of various theoretical approaches. With regard to superordinate mechanisms that are necessary for the implementation of action goals, in addition to basic cognitive functions such as perception or the retrieval of memory content, several so called “executive functions” have been established in cognitive and neuroscientific research.¹³⁹ These are involved in the active regulation of attention and cognitive processes and include (a) *working memory*, (b) *cognitive flexibility* and (c) *inhibitory control* as central resources.¹⁴⁰

¹³⁹ Diamond 2013.

¹⁴⁰ Miyake & Friedman 2012.

Working memory is the cognitive system that allows us to keep different pieces of information available at the same time and use them for cognitive operations. This is necessary, for example, to remain aware of the individual steps of a planned sequence of actions, to adapt them if necessary and to be able to carry out the cognitive operations required for the individual steps at the same time. In general, working memory is essential in key academic skills, such as understanding demanding texts or solving mathematical problems, as well as in complex problem solving and reasoning. An example of this is retaining intermediate results in mental arithmetic (e.g. when multiplying multi-digit numbers). It is important to note that the capacity of the working memory is limited to a relatively small amount of simultaneously available information, although this capacity varies from person to person and increases on average over the course of childhood and adolescence.

Cognitive flexibility is important when several tasks are processed simultaneously (multitasking) or when it is necessary to switch quickly between different tasks (*task shifting* or *switching*) and a corresponding coordination of attention is required. Switching between different possible cognitive strategies, e.g. in maths tasks that can be solved in different ways, also requires cognitive flexibility. Furthermore, cognitive flexibility is necessary when different task requirements or rules need to be taken into account depending on the context or when rules change over time, e.g. when originally desired behaviours are suddenly no longer desired.

Inhibition is a collective term for various aspects of controlling thoughts, attention and behaviour. This includes suppressing thoughts that are irrelevant to tasks and distracting, e.g. thinking about the impression on others during a presentation. Attention is often about focussing on something and suppressing distracting stimuli (selective attention). Another important aspect is the inhibition of impulsive behaviour or habitual reactions that are inappropriate in a particular situation – an aspect that is also referred to in the literature as *self-control* or *effortful control*. This important aspect of self-regulation relates to situations in which different goals are in conflict with each other, e.g. the short-term goal of enjoying a tasty but high-calorie meal with the long-term goal of losing weight. In this context, the distinction between “hot” vs. “cool” systems of self-control is also relevant.¹⁴¹ Whereas the executive functions enable “cool”, i.e. considered, strategic, emotionally neutral and relatively slow information processing in the service of goal pursuit, “hot” control is driven by emotional impulses (e.g. wanting to leave a situation when anxiety arises) and strong motivational stimuli (e.g. incoming mobile phone messages from social media). Regulating the resulting tendencies to act solely through the system of cool executive functions can be a major challenge that people repeatedly fail to achieve in everyday life.

So called *metacognitive abilities* are also important for self-regulated behaviour – especially in connection with self-regulated learning processes.¹⁴² They include two areas that influence each other: declarative and procedural metacognitive abilities. Declarative metacognition is about knowing how cognitive mechanisms work, e.g. that it is easier to store educational content in the memory if it is processed in depth and linked to

¹⁴¹ Metcalfe & Mischel 1999.

¹⁴² Flavell 1979.

existing knowledge. Procedural metacognitive skills include *metacognitive monitoring* and *metacognitive control*. Monitoring refers to the continuous monitoring, reflection and assessment an individual's own cognitive processes, e.g. questioning possible answers. Metacognitive control refers to regulating activities, e.g. the selection of exercises or the decision on whether additional learning time should be invested in a task. With regard to learning processes, metacognition is therefore relevant for all phases of action regulation.¹⁴³ For procedural metacognitive processes, the different executive functions are required in a variety of ways, e.g. when both the processes necessary for the task processing itself and the monitoring of the execution need to be represented simultaneously in working memory. However, they tend to be located at a slower and higher control level.¹⁴⁴ Successful learning processes then come from the functioning interaction of executive functions and metacognitive abilities.

Findings from developmental psychology show that the interplay of metacognitive monitoring processes and metacognitive control only develops gradually over the course of the school years. School starters are already able to recognise problems during learning activities – monitoring therefore operates at an early stage – but they are rarely able to solve these problems with appropriate control processes, for example through more effort or more learning time. From the end of primary school, the link between monitoring and metacognitive control becomes increasingly close and has a positive influence on learning outcomes.¹⁴⁵

Overall, executive functions and metacognitive abilities enable the individual to use information processing for the efficient pursuit of individual goals and to adapt flexibly and adaptively to new situations and unexpected changes. The mutual importance of these limited cognitive resources – for both school comprehension processes and the self-regulation of emotions (see next section) and behaviours not directly related to learning – therefore also means that there may potentially be competition if, for example, the control of motor impulses takes up so much attention that the lesson can no longer be adequately followed.

3.3.2. Emotional and motivational mechanisms

Although the concept of self-regulation is often primarily associated with cognitive behavioural control, emotional and motivational aspects of self-regulation are also important, as already indicated by the difference between “cool” (cognitive) and “hot” (emotional-motivational) systems of control. It should be noted that non-conscious and automated processes characterise the “hot” system, which is activated by certain innate stimuli (e.g. the startle response) or stimuli acquired through associative learning (e.g. an environment associated with unpleasant experiences or a specific person). It used to be assumed that cognitive processes in particular were important for self-regulation and that emotions tended to interfere and lead to a lack of regulation. It is currently increasingly recognised that emotional indicators of events such as the occurrence of fear or anger provide important indications of the need for self-regulation processes and can also indicate conflict resolution.¹⁴⁶ This means that emotional and motivational skills are an essential aspect of self-regulation.

143 Zimmerman 2000.

144 Roebbers 2017.

145 Schneider et al. 2022.

146 Dignath et al. 2020.

In this context, the term emotion regulation is often used, which refers to the modulation and regulation of emotions as an essential component of self-regulation.

Emotion regulation refers to all processes that enable a person to influence the intensity, duration and type of their emotions and the associated behaviour in a certain direction.¹⁴⁷ Different phases have been identified in which emotion regulation can be influenced, which occur one after the other and sometimes overlap. For example, first of all a relevant situation needs to be recognised, e.g. an anxiety-inducing maths exam and attention needs to be focussed on it. The situation then needs to be evaluated as negative and finally a reaction needs to be selected, e.g. avoiding the situation by falling ill. Emotion regulation processes can be used in each of these phases.¹⁴⁸ A distinction is made between implicit (automatic) mechanisms, e.g. the cancellation of an aversive association through habituation to the situation, and explicit aspects of emotion regulation (associated with cognitive effort), e.g. directing attention. They both contribute equally and need to be taken into account in interventions.¹⁴⁹ Another important factor with regard to the efficacy of emotion regulation is its flexible adaptation to different contexts with regard to the selection of goals, the change and evaluation of goals and strategies.¹⁵⁰ Improved self-awareness can also promote emotion regulation.¹⁵¹ The concept that effective self-regulation, especially in emotionally stressful situations, is associated with good adaptation to the environment and a high degree of flexibility in the use of coping strategies comes from the literature on stress management.¹⁵²

In addition to emotional aspects, motivational mechanisms also play an important role in self-regulation, which primarily influence the choice of goals. . These range from the short-term fulfilment of certain wishes and needs up to long-term life planning goals. The latter again need to be broken down into short-term goals that can be translated into specific actions. Self-efficacy expectations are important in the selection of goals and intentions for action. It may also be necessary for the benefit of mental and physical well-being to adapt, change or completely abandon goals depending on the context.¹⁵³

3.4. Social aspects

Social skills play an important role in self-regulation. They make it possible to classify one's own behaviour within social norms, understand the reactions of others, perceive threats, especially in complex social situations, and have the flexible ability to resolve social conflicts.

147 Gross 2015.

148 Magen & Gross 2010.

149 Braunstein et al. 2017.

150 Pruessner et al. 2020.

151 Herwig et al. 2010.

152 Bonanno & Burton 2013; Skinner & Zimmer-Gembeck 2023.

153 Wrosch & Scheier 2020.

The social context also affects self-regulation skills in a variety of ways. These develop during the continuous interaction of children and adolescents with their environment. Initially, parents and other influential carers play a key role in this. With increasing age, teachers and peers also play a role.¹⁵⁴ Interaction with parents and other influential educators is of great importance for the development of executive functions and other aspects of self-regulation. The sensitivity and responsiveness of these caregivers as well as cognitive stimulation and enabling the experience of autonomy and competence are important facilitating factors here.¹⁵⁵ However, implicit and explicit mechanisms of social learning, adaptive support (“scaffolding”, i. e. support for learning by providing a “scaffold” that provides appropriate assistance) and the linguistic communication of strategies also play an important role.¹⁵⁶ Corresponding to the central role of parents or guardians, family instability, i. e. frequent changes of important caregivers, can have a negative impact on the development of self-regulation.¹⁵⁷

There is clear evidence from studies on the influence of schooling on the development of self-regulation skills, which makes use of school enrolment dates and compares children of approximately the same age with one year more or one year less school attendance. Children with higher school attendance show higher levels of executive functions and other aspects of self-regulation.¹⁵⁸ A close, trusting relationship between children and teachers also results in a greater improvement of self-regulation skills.¹⁵⁹

The socio-economic conditions of children and adolescents also play an important role. If they are poor, this can have a negative impact on the quantity and quality of parental and (pre-)school promotion. There are also clear links between poverty and poor self-regulation skills¹⁶⁰, which are also discussed as an important explanatory mechanism for the impact of poverty on the long-term development of children.¹⁶¹ Improvements or worsening of the social environment, such as the incidence of poverty in a particular neighbourhood, also had a negative effect on the self-regulation skills of year five students.¹⁶² There is also evidence that the (pre)school promotion of self-regulation skills has a positive effect, especially on children from socio-economically disadvantaged backgrounds.¹⁶³

In general, while there is a clear indication that environmental factors and social influences play an important role, this in no way contradicts the effect of genetic factors mentioned in Chapter 3.6, and instead emphasises the importance of conducive environmental conditions in achieving individual genetic potential.

154 Wesarg-Menzel et al. 2023.

155 Blair et al. 2014.

156 Hughes & Ensor 2009.

157 Vernon-Feagans et al. 2016.

158 Morrison et al. 2019.

159 Cadima et al. 2016.

160 Finch & Obradović 2017.

161 Raver 2012.

162 Roy et al. 2014.

163 Blair & Raver 2015.

3.5. Importance of self-regulation

Many scientific findings confirm the connection between the various aspects of children's and adolescents' self-regulation skills and their well-being and opportunities for development, in particular their mental and physical health, their success at school and the development of a wide range of skills such as social participation and responsibility as well as dignity and autonomy. This has already been mentioned in the introduction and in Section 2.3.1. In this section, we report in detail on these connections and explain why this statement recommends the systematic promotion of children's and adolescents' self-regulation skills.

3.5.1. Mental health and well-being

General mental well-being and mental health are both closely related to the ability to self-regulate.¹⁶⁴ This has been investigated in cross-sectional studies, but above all in longitudinal studies. For example, the Dunedin Study with 1037 children from the 1972/1973 birth cohort showed that the ability to self-regulate at preschool age leads to better mental health and, in particular, to a lower incidence of addiction later in life, regardless of socioeconomic status, intelligence and gender.¹⁶⁵ Children who improved their ability to self-regulate over the course of the study also showed such positive results in adulthood. In 2020, in a meta-analysis of 150 studies, Robson et al. investigated the extent to which the self-regulation skills of children of pre-school age (approx. four years) are associated with mental health problems in later childhood (approx. eight years), adolescence (approx. 13 years) or adulthood (over 30 years).¹⁶⁶ The researchers found that externalising and internalising behaviours, e.g. anger or social withdrawal, as well as depression, addictions, anxiety disorders and obesity, occurred less frequently with better self-regulation. Mental-health disorders characterised by a lack of self-regulation include attention deficit/hyperactivity disorder, borderline personality disorder and addiction.¹⁶⁷

Interestingly, studies are very heterogeneous with regard to the correlation between self-regulation skills and problematic internet use¹⁶⁸. In 2022, Zahrai et al. showed that automatic, unconscious aspects of self-regulation are more likely to be linked to excessive internet use than conscious aspects and that interventions should therefore focus on unconscious attitudes.¹⁶⁹ For this purpose, it is necessary to record such unconscious attitudes using suitable methods and to develop procedures to influence these attitudes over the longer term. Physiological measurements or behavioural tests (e.g. to record implicit, unconscious associations) could also be used here. Improved self-regulation also leads to increased resilience in stressful situations and can thus prevent negative consequences of stress such as post-traumatic stress disorder or chronic pain.¹⁷⁰

164 de Ridder et al. 2012; Tangney et al. 2004.

165 Moffitt et al. 2011a.

166 Robson et al. 2020.

167 Bohus et al. 2021; Shiels & Hawk 2010; Tang, Posner, et al. 2015.

168 Billieux 2012.

169 Zahrai et al. 2022.

170 Rutter 2013.

However, McRae and Gross 2020 point out that laboratory situations do not always adequately depict the use of adaptive strategies of self-regulation with which a person controls themselves appropriately in a given situation and therefore cannot capture the particularities of certain mental disorders.¹⁷¹ For example, there are people who can react adequately in given structured situations such as in the laboratory, but who are unable to use appropriate strategies spontaneously in everyday life. As already mentioned in Section 2.1.5, smartphone-based studies in real or virtual contexts are useful here, for example, as they can capture such processes in a moment-to-moment analysis and combine them with interventions relevant to everyday life.¹⁷²

3.5.2. Physical health

The connection between self-regulation skills in childhood and later physical health was investigated in a similar way to mental health. For example, the Dunedin study found that a lack of self-regulation skills is associated with metabolic disorders (including obesity), respiratory diseases, periodontal diseases, sexually transmitted infections and inflammatory biomarkers.¹⁷³ Positive correlations were also found between the ability to self-regulate and the level of physical activity, which is a key prerequisite for physical health according to Section 2.1.2. Conversely, physical activity also has a positive effect on self-regulation.¹⁷⁴

3.5.3. Education and social participation

The importance of various aspects of self-regulation for academic performance and success is both theoretically well-established and empirically demonstrated in numerous studies. Executive functions – especially working memory – are fundamental for attention, comprehension and learning processes and are therefore of central importance for the acquisition of knowledge and skills. It is also empirically well documented that executive functions are crucial for intelligence and academic skills in children and adolescents¹⁷⁵ and are of great importance for successful school entry.¹⁷⁶ The meta-analysis by Robson et al. 2020 showed positive correlations between self-regulation at preschool age and general academic performance as well as specific skills in the areas of maths, reading, writing and school engagement.

There are also meta-analytical findings on positive correlations with school performance for the metacognitive processes and cognitive learning strategies investigated in the research field of self-regulated learning.¹⁷⁷ For various measures of self-control (e.g. reward delay), there are a number of studies that show predictive power for school grades and standardised competence tests.¹⁷⁸ Furthermore, in the field of clinical-psychological and medical research on attention deficit/hyperactivity disorder, which is characterised by substantial limitations in the ability to self-regulate, a wide range of findings have been collected that show an increased risk of academic failure in the presence of this disorder.¹⁷⁹

¹⁷¹ McRae & Gross 2020.

¹⁷² Boemo et al. 2022.

¹⁷³ Moffitt et al. 2011b.

¹⁷⁴ Boat & Cooper 2019.

¹⁷⁵ Friso-van Den Bos et al. 2013; Malanchini et al. 2019; Richland & Burchinal 2013.

¹⁷⁶ For example: Duncan et al. 2007.

¹⁷⁷ Dent & Koenka 2016a.

¹⁷⁸ For an overview see: Duckworth & Kern 2011.

¹⁷⁹ Polderman et al. 2010.

For various aspects of social behaviour, the meta-analysis by Robson et al. 2020 shows significant correlations with self-regulation skills at preschool age.¹⁸⁰ Higher self-regulation skills are associated with higher social competence, a lower tendency to aggression and a lower probability of becoming a victim of aggression by classmates. The meta-analysis by de Ridder et al. 2012 also revealed a positive correlation between self-regulation skills and social behaviour.¹⁸¹

The aforementioned Dunedin study also shows a correlation – albeit small – between the socioeconomic status achieved in adulthood, including income, and self-regulation in preschool age.¹⁸² The meta-analysis by Robson et al. 2020 also shows positive correlations between early self-regulation skills and the probability of completing higher education in adulthood and not being unemployed.¹⁸³

The extent to which better self-regulation skills also lead to greater participation in social and political processes and also promote autonomy and dignity has hardly been empirically investigated to date, although this is to be expected as a result of better self-awareness and self-control. A high level of mental health, which goes hand in hand with improved self-regulation, also promotes social participation. For example, one study shows that promoting the self-regulation skills of schoolchildren in adulthood led to greater political participation, e.g. higher voter turnout.¹⁸⁴ Conversely, greater participation in social and political processes in turn has a positive effect on the ability to self-regulate.¹⁸⁵ However, these are only individual findings and greater consideration of social processes is required when researching the effect of self-regulation skills.

3.6. Development of self-regulation

3.6.1. Cognitive development

Basic processes of self-regulation can already be detected in the first years of life and significant increases can be seen in early childhood in particular. However, the development of basic mechanisms continues throughout adolescence and into young adulthood. It can partly take place at different times and at different speeds and precedes the successful coordination of sub-aspects in the service of more complex self-regulation processes at the behavioural level. For example, certain inhibition functions (e.g. delaying rewards) can already be demonstrated in the first years of life.¹⁸⁶ The capacity of the working memory increases significantly during childhood¹⁸⁷ and the metacognitive monitoring and control functions continue to improve in adolescence.¹⁸⁸ Overall, particularly pronounced increases in various executive functions can be

180 Robson et al. 2020.

181 de Ridder et al. 2012.

182 Moffitt et al. 2006.

183 Robson et al. 2020.

184 Holbein 2017.

185 Malafaia et al. 2016.

186 Hendry et al. 2022.

187 Gathercole et al. 2004.

188 Weil et al. 2013.

observed at pre-school age.¹⁸⁹ On the one hand, starting school and the demands associated with this increasingly challenge these cognitive self-regulation skills, while on the other hand, schools represent an important context for promoting these skills, in which teachers in particular play an important role¹⁹⁰ (see also Section 3.3.3).

In the school context, it also seems significant that not only do metacognitive monitoring and control processes continue to improve from late childhood to adolescence, but that this is also accompanied by an increase in declarative metacognitive knowledge about self-regulation. An example from the OECD PISA study from 2009 illustrates this. Artelt and Schneider 2015¹⁹¹ used the data set of almost 300,000 students from 34 countries to investigate the relationship between the performance and metacognitive knowledge of 15-year-old participants about meaningful reading strategies.¹⁹² The result was largely comparable for all countries included: medium to high correlations were found between knowledge of reading strategies and students' reading comprehension as assessed in the PISA study.

3.6.2. Emotional development

Emotion regulation strategies also change as children and adolescents get older. At the beginning of life, emotion regulation still needs to be strongly supported by the child's environment (interpersonal regulation, co-regulation). These early co-regulatory processes by caregivers are complex (e.g. parents as a learning model, perception of and reaction to children's emotions, family climate) and are of central importance for the further development of emotional self-regulation processes.¹⁹³

As children get older, not only does the type of external support change, but also its form and content¹⁹⁴ For example, parents support the emotion regulation of infants and toddlers by carrying out the strategies themselves (e.g. giving the child physical closeness or distracting the child). From late infancy, specific cues to a regulation strategy are sufficient (e.g. "Can you play with the ball for this long?"), which are then increasingly replaced by metacognitive cues as the child develops. With increasing age, emotion regulation can be taken over by the children themselves (intrapersonal regulation), although the importance of social regulation processes remains until adulthood.

The regulatory strategies available to children themselves change over the course of their development: While infants and toddlers mainly use passive strategies (i.e. emotions to regulate behaviour; e.g. avoidance, self-soothing and seeking closeness), more active strategies are increasingly used from the age of three (e.g. problem-solving, behaviour-based distraction). In preschool and early primary school age, simple behaviour-based strategies (e.g. behaviour-based distraction, problem solving) are replaced by more complex, cognitively demanding strategies (e.g. cognitive distraction, cognitive reappraisal). The development of these more complex strategies also continues in adolescence, as the few research studies on adolescence show.¹⁹⁵

189 Zelazo & Carlson 2020.

190 Vandenbroucke et al. 2018.

191 Artelt & Schneider 2015.

192 Artelt & Schneider 2015.

193 Morris et al. 2007.

194 Silkenbeumer et al. 2016.

195 Gullone et al. 2010.

Adolescence is considered a particularly critical developmental phase for emotion regulation strategies. It is characterised by detachment from the parental home (co-regulators in childhood) and confrontation with particular biological, social and educational challenges.¹⁹⁶ Unlike in childhood, when adult caregivers in particular support the regulation of emotions, peers, friends and partners become increasingly important for adolescents. With the increasing importance of friends for the development of emotion regulation, social conflicts in the context of bullying experiences also have an enormous potential to have a negative impact.¹⁹⁷

3.6.3. Motivational development

Motivational development from early childhood through primary school age and into adolescence is characterised by a series of developmental trends with regard to the meaning, nature and structure of personal goals.¹⁹⁸ For example, the goals of young children are primarily focused on the immediate satisfaction of basic needs, achieving autonomy and understanding the environment. In the course of childhood and adolescence, goals become more diverse, abstract and increasingly long-term, i. e. focussed on the future. Children increasingly learn to prioritise and balance different goals and to assess their own skills more realistically when choosing goals. Adolescence is characterised by an increasingly complex goal structure. School and leisure-related (especially social) goals need to be in harmony, with both approach goals (e. g. passing exams successfully) and avoidance goals (e. g. not embarrassing oneself in front of the class) being formulated. Goals that relate to mastering age-appropriate developmental tasks (e. g. identity development in adolescence) are particularly important at every age group.

3.6.4. Social development

Research findings increasingly show that the development of aspects of self-regulation is socially and contextually embedded and goes far beyond the influence of the child's family.¹⁹⁹ The caregivers and the conditions in the children's other living environments are particularly important here, especially in day care centres, schools and leisure contexts such as sports clubs (see also Section 3.4). However, values, social expectations and past and current socio-economic living conditions also influence the development of emotional and motivational self-regulation²⁰⁰ and, conversely, are significantly shaped by the community and culture in which children and adolescents grow up.²⁰¹ This ecological perspective is highly relevant for the successful implementation of possible promotion strategies and should not be neglected.²⁰²

196 Silvers 2022.

197 Herd & Kim-Spoon 2021; see also section 2.2.3.

198 Wesarg-Menzel et al. 2023.

199 Trommsdorf & Heimkamp 2013; Doebel 2020; Niebaum & Munakata 2023; Wesarg-Menzel et al. 2023.

200 Ng-Knight & Schoon 2017; Griskevicius et al. 2011.

201 Gys et al. 2023.

202 Murray et al. 2022.

3.7. Biological basis

Biological factors such as genetic predisposition, brain maturation and brain plasticity determine the framework within which self-regulation skills can develop in interaction with the environment.

3.7.1 Genetics

The interplay of genetic and environmental factors plays a key role in the development of self-regulation. A meta-analysis of twin studies on self-control, self-regulation and emotion regulation reports a relatively high genetic component of this trait, which is, however, moderated by the environment.²⁰³ Specific analyses of gene variants revealed that genes that modulate the stress response²⁰⁴, and genes associated with reward processing²⁰⁵, are particularly relevant here. Although genetics plays an important role in the ability to self-regulate, environmental factors interact with genetic predispositions and can influence the activity and thus the effects of genes. This mechanism, known as epigenetics, can mean that the same genetic predisposition is expressed in different ways. Furthermore, gene-environment interactions also have the effect that the genetic predisposition can influence the impact of certain environmental variables, such as reducing or increasing the effect of stress, for example.

In addition, gene-environment correlations need to be taken into account, in which the genetic make-up can change the probability of encountering a certain environment.²⁰⁶ This means, for example, that parents with good self-regulation skills create an environment that facilitates self-regulated behaviour in their children. This can also be achieved through modelling and does not have to be a direct intervention. In addition, children can seek out an environment that further supports their self-regulation and in which they are treated differently by the people there (e.g. teachers). A high genetic component of self-regulation therefore does not mean that environmental factors do not play a role, as heredity and environment interact in many different ways.

Vulnerability-stress models assume that genetically vulnerable individuals experience negative behavioural consequences in negative environments. They have been supplemented by differential susceptibility models, which postulate that people with a certain genetic predisposition react more strongly to both negative and positive environmental variables, i.e. show a high degree of plasticity in their reactions in both positive and negative directions.²⁰⁷

While intelligence only shows an increased genetic predisposition with increasing age, a study on executive functions showed that the latter already has a high genetic component in childhood.²⁰⁸ In view of the important role that environmental factors play in the impact of genetic factors, these findings suggest early, pre-school promotion of self-regulation skills.

203 Willems et al. 2019.

204 Like FKBP5 (FK506 binding protein 5); Halldorsdottir et al. 2019.

205 Like the dopamine transporter gene; Cimino et al. 2019.

206 Moffitt et al. 2006.

207 Belsky et al. 2007; Ellis et al. 2011.

208 Engelhardt et al. 2015.

3.7.2. Brain plasticity and brain development

Understanding brain changes during the development of self-regulation skills is important because not all sub-functions develop synchronously and this is important for the selection of promotion strategies. The neural basis of self-regulation is anchored in a subcortical-cortical network that includes the ventromedial prefrontal cortex, the lateral prefrontal cortex and the cingulate gyrus as well as limbic structures (e.g. the amygdala and the striatum).²⁰⁹ While limbic structures are important for emotional-motivational responses, the frontal, cortical structures play a central role in cognitive control and behavioural inhibition. Some studies have also revealed the importance of the insular cortex and parietal areas, such as the temporoparietal junction, which are significantly involved in self-perception and body awareness.

The role of prefrontal structures in self-regulation has been well documented in lesion studies, for example the famous case of Phineas Gage, who lost parts of his frontal cortex in a work accident which primarily affected his self-regulation abilities.²¹⁰ For the other brain regions, studies have mainly been conducted using imaging techniques in cognitive and behavioural tasks aimed at self-control, which relate to different aspects of executive functions and emotion control and often produced heterogeneous results. Data from task-related imaging procedures are difficult to interpret. The increased activation of one area may simply represent the effort a person needs to exert to solve a task and not indicate better performance. Recently, recording the neural basis of self-regulation processes in the laboratory has been supplemented by analyses of self-regulation abilities in everyday situations. Here, some studies show a close correlation²¹¹, while others were unable to predict everyday behaviour from laboratory findings.²¹² This is very dependent on the study design and the laboratory parameters investigated.

As the prefrontal brain region is so important for self-regulation, its development needs to be carefully considered when promoting self-regulation skills. In fact, frontal brain regions only develop up to the age of 30 years and later²¹³ and only connect with sensory and subcortical structures at a later stage. In addition to functional changes in brain activity, structural changes in the grey and white matter (nerve cells and their connections) have also been investigated. It has been shown that here too there is a comparatively slow maturation and networking of the prefrontal areas relevant for self-regulation.

On the other hand, areas of the brain associated with emotion and motivation, such as those involved in reward processing, develop earlier.²¹⁴ Interventions that use this high sensitivity to reward could therefore be beneficial for children and adolescents.²¹⁵

²⁰⁹ Kelley et al. 2015; Etkin et al. 2015; Turner et al. 2019.

²¹⁰ Damasio et al. 1994.

²¹¹ Krönke et al. 2020.

²¹² Saunders et al. 2022.

²¹³ Choudhury et al. 2008.

²¹⁴ Larsen & Luna 2018.

²¹⁵ Sahi et al. 2023.

3.8. Relevance for upbringing and education

Self-regulation skills undergo significant changes over the course of childhood and adolescence, which are caused by neuronal maturation processes and a variety of environmental influences. There are differences in terms of the characteristics and development of the various mechanisms and aspects of self-regulation as well as in relation to individual children and adolescents. Strategies for promoting self-regulation skills need to take this heterogeneity into account. This is a major challenge, particularly with regard to providing promotion strategies in day care centres and schools that are aimed at all children and adolescents. It should be noted that children and adolescents not only differ from one another in their average levels of self-regulation skills (*trait differences*) but also exhibit fluctuations in self-regulation over time and situations (*state differences*). This can be seen in studies in which participants are asked, often repeatedly, about their daily experiences in everyday life.²¹⁶ The extent of such fluctuations as well as relevant influencing factors (e.g. sleep, stress, social influences) can differ from individual to individual. In order to improve the overall average self-regulation skills of children and adolescents, it is therefore important to understand the individual influencing factors so as to be able to influence them or to give children and adolescents the chance to deal more effectively with challenging situations through developing an expanded behavioural repertoire and helpful strategies.

Ways of providing a direct and sustainable improvement of basic executive functions through cognitive training, in which, for example, working memory tasks are practised intensively, are very limited.²¹⁷ However, as described in Section 4, the transfer of knowledge and learning and practice of strategies for self-regulation and emotion regulation seem to be fundamentally promising.²¹⁸ Findings that relate to the influence of schooling and quality of pre-school care show that day care centres and schools are central places for the development of self-regulation skills and are well suited for the use of corresponding targeted promotion strategies. There are now many findings in the literature that show that teachers can effectively support the development of learning and memory strategies. Memory skills play a significant role, particularly in the school context. In this context, longitudinal studies have shown that primary school children whose teachers taught in a memory-orientated way from the outset and thereby specifically promoted metacognitive knowledge achieved better memory and learning performance towards the end of primary school than primary school children whose teachers tended to neglect this aspect.²¹⁹ Since the development of sensitivity to reinforcers (e.g. the ability to change behaviour based on behavioural consequences such as rewards) precedes the development of inhibitory skills (e.g. changing behaviour based on insight), reinforcing processes (e.g. positive reactions mediated by peers) should be an important component of promotion strategies. Implicit processes (e.g. those associated with reinforcement learning) and explicit processes (e.g. those associated with cognitive control strategies) need to be given equal consideration. The promotion of self-regulation skills should also focus on organising school, family and social environments in such a way that they support the development of self-regulation skills.

216 Blume & Schmiedek 2024.

217 For example: Melby-Lervåg et al. 2016.

218 Dignath & Büttner 2008a; L. Kraft et al. 2023.

219 Coffmann & Cook 2021.

4 Evidence-based promotion strategies

The above analysis has clearly demonstrated the central importance of self-regulation skills in children and adolescents for their well-being and opportunities for development. This section will examine strategic approaches for the sustainable development and strengthening of self-regulation skills in children and adolescents. The implementation of effective promotion measures is crucial to ensure the holistic development of the younger generation and to prepare them for the challenges of life.

4.1. Individualised support versus systemic change

As mentioned in the introduction, in the context of promoting self-regulation skills of children and adolescents, it is essential to consider the following international debate:

Society is facing global problems, some of which were discussed in the introduction and in Section 2: mental and physical health problems, addictions to alcohol, tobacco and social media, experiences of violence and abuse, bullying, significant socio-economic disparities, flight and immigration, climate change, environmental pollution and challenges in retirement planning.

Chater and Loewenstein discuss two strategies for overcoming such challenges: The first approach focuses on individual solutions, while the second one emphasises systemic methods such as regulations and taxation.²²⁰ The authors use various examples to highlight the relevance of systemic solutions. In connection with health, the WHO also supports this position. This can be seen in its statements on the commercial determinants of health, i. e. the activities of the private sector that can positively or negatively influence public health, including the associated political and economic systems and norms.²²¹ The WHO considers that these include the products and services of private companies as well as their marketing strategies and political activities, including lobbying, donations and the spread of misinformation. However, the WHO also recognises that the private sector is an indispensable partner in the development and delivery of health services. According to the WHO, member states need to work to capitalise on these opportunities at the same time as protecting the population from harm.

The authors of this statement focus on promoting the self-regulation skills of individual children and adolescents. As explained in Section 3, this approach is very important for the well-being and development opportunities of adolescents and also contributes to solving the problems mentioned. We are aware that systemic measures are essential for tackling the aforementioned challenges. This is all the more important in light of the increasing tendencies of certain industries to influence the preferences and behavi-

²²⁰ Chater & Loewenstein 2023.

²²¹ World Health Organization 2023.

our of children and adolescents, which has a significant impact on their ability to self-regulate. The focus on promoting self-regulation skills is therefore only one aspect and should not diminish the need for systemic solutions.

4.2. Framework conditions

There are currently a number of structural problems in the German education system that are not conducive to the promotion of self-regulation skills. These include, for example, the considerable shortage of educators and teachers, the stress associated with this and the low level of integration of knowledge about mental health and in particular self-regulation skills in the initial, continuing, and further training of educational professionals.²²² The latter is particularly problematic in view of the mental stress and stress-induced health risks faced by (prospective) teachers.²²³ In addition, the promotion of self-regulation skills of children and adolescents in day care centres and schools needs to take place in the knowledge that such promotion in early childhood is primarily the responsibility of parents and families. This task is then increasingly taken over by the education system. However, parents and other people outside the education system also always play an important role and need appropriate support.

4.3. Promotion objectives

As described in Section 3, strategies for promoting the self-regulation skills of children and adolescents need to focus on strengthening their self-regulation skills (behavioural prevention) on the one hand, and on supporting the appropriate context conditions that favour their promotion (structural prevention) on the other. The resulting promotion objectives are summarised in the following.

Key promotion objectives include strengthening cognitive, emotional, motivational and social skills for self-regulation.

- important cognitive skills include the following executive functions: the ability to control thoughts, attention and behaviour, cognitive flexibility, which allows one to switch quickly between tasks and adapt to changing requirements, and finally working memory, which makes various pieces of information directly available at the same time and usable for cognitive operations. Cognitive skills also include metacognitive skills. They include knowledge about how cognitive processes work (declarative) and enable the continuous monitoring, reflection, evaluation and regulation of one's own cognitive processes (procedural).
- Emotion regulation skills make it possible to influence the intensity, type and duration of emotions and specifically direct the associated behaviour. This also includes stress regulation, i. e. the regulation of emotional stress caused by stressors.
- The motivational part of self-regulation relates to knowing and influencing one's own goals, beliefs and attitudes.
- Finally, social skills play an important role. They make it possible to classify one's own behaviour within social norms, understand the reactions of others, perceive threats, especially in complex social situations, and have the flexible ability to resolve social conflicts.

²²² In 2023, the Federation of German Psychologists' Associations issued a statement recommending the teaching of psychological skills in all teacher training programmes: Federation of German Psychologist Associations 2023.

²²³ Schaarschmidt & Kieschke 2013.

As explained in Section 3, relevant biological and psychosocial conditions such as genetic disposition, brain development and plasticity as well as early childhood socialisation need to be taken into account when promoting these skills.

In addition to the direct development of self-regulation skills, it is also essential to strengthen the framework conditions that favour promotion. In the following, we refer to these as *promotion factors*, which include *destigmatising* mental health problems and illnesses. It is also important for children and adolescents to be able to seek support independently. This requires the further development of conscious self-awareness, i. e. increasing body awareness and reducing unhelpful self-referential processes such as excessive rumination and lack of self-acceptance. It is also important for children and adolescents to have a positive self-image and a high expectation of self-efficacy. An environment that offers cognitive stimulation and enables them to experience autonomy and competence contributes to this. Sensitivity, responsiveness and the self-regulation skills of key caregivers, such as parents, educators, teachers, school psychologists and school social workers, who can serve as role models and provide guidance, are also of considerable importance.

4.4. Target groups

The promotion of self-regulation skills of children and adolescents is firmly embedded in many day care centres and schools worldwide and also in the curricula of some federal states in Germany. There are also a large number of detailed programmes that are used worldwide. These programmes initially differ in terms of their target groups.

The programmes are aimed at different age groups, e. g. children in day care centres (0 to 6 years), children in primary schools (6 to 10 years), lower secondary (10 to 16 years) and upper secondary (16 to 18 years)²²⁴. Some programmes are aimed at particularly vulnerable children and adolescents, e. g. those with a predisposition to mental illness, with mentally ill parents and those with experiences of migration or from socially disadvantaged families. However, most programmes are designed to be universal for all children and adolescents in a particular age group: On the one hand, they are intended to have a preventative effect and reduce the likelihood of mental illness and stress and, on the other, to support the mental development and social participation of children and adolescents. They are either offered to all children and adolescents or specifically to particularly vulnerable groups. Many programmes are aimed not only at children and adolescents, but also at their caregivers such as parents, educators, teachers, school social workers and school psychologists. It should be noted that universally applicable programmes are desirable from a health policy perspective and can benefit many children and adolescents. At the same time, however, there are also efforts to personalise interventions, as a “one size fits all” approach is not always suitable for all individuals.²²⁵

224 In many German states, the primary stage includes children and adolescents aged 6 to 12 and the secondary stage includes young people aged 12 to 18.

225 Brannick O Cillin 2022; Boaler & Bond 2023.

4.5. Development and learning environments

It has long been known that developmental and learning environments do not always meet the psychological needs of children and adolescents and that school in particular can contribute to stress, impaired well-being and mental illness.²²⁶ In this connection, poorly developed self-regulation skills are considered to be predictors of problematic learning and development²²⁷, while the support of self-regulation skills is considered to be particularly effective for the development of adaptive behaviour and resilience.²²⁸ Accordingly, self-regulation skills are a target criterion in various curricula and education plans of the German federal states²²⁹; this also applies to the early childhood sector.²³⁰ However, the term self-regulation is generally undefined in education plans: Operational strategies are not provided and attempts to develop standards for self-regulation skills have so far failed to materialise. At the same time, increasing efforts can be observed at the level of individual day care centres and schools to systematically incorporate the topic of self-regulation into educational work. On the one hand, the emphasis is on educational professionals in day care centres and schools designing the daily routine and integrating educational activities into everyday life and lessons in such a way that they have a beneficial effect on self-regulation skills (this approach is discussed in this section). On the other hand, specific promotion programmes are also used as selective interventions over a certain period of time (as we will describe in Section 4.6). It should be noted that there is fluidity between the two approaches.

4.5.1. Basic quality dimensions

In schools, self-regulation skills can be promoted by working to improve the dimensions of learning or teaching quality that are known to be positively associated with numerous desirable outcomes²³¹ or, more broadly, the whole school learning environment. These range from better learning success, greater motivation and commitment to lower levels of externalising behaviour and reduced stress.²³² It has proven useful to distinguish between at least three basic dimensions of learning and teaching quality²³³, each of which can be assumed to have a beneficial effect on self-regulation skills: effective classroom management, cognitive activation (instructional support) and constructive support (student support). Even if the focus on these three basic dimensions is particularly widespread in the school sector, this approach is also receiving attention in the preschool sector – albeit more in the Anglo-American world than in Germany – through the empirical work of Hamre et al. 2014.²³⁴ The authors also speak quite naturally of “teachers” and “learning processes” in the preschool sector. This is due to the fact that in the USA and some other countries, pre-school staff have similar qualifications to primary school teachers and have at least a Bachelor’s degree. Furthermore,

²²⁶ Eccles et al. 1993.

²²⁷ Moffitt et al. 2006.

²²⁸ Bavarian Industry Association (VBW) 2022.

²²⁹ Ministry of Culture, Youth and Sport Baden-Württemberg 2016.

²³⁰ see the comments on the “Baden-Württemberg orientation plan” of 2011, in which the development of self-regulation is addressed under the heading “Motivation and effort” [only available in German].

²³¹ Cefai 2021.

²³² Wang et al. 2020.

²³³ Kieme 2019; Pianta & Hamre 2009; Praetorius et al. 2018.

²³⁴ Hamre et al. 2014.

in the USA and many other countries, there is not as much physical and personnel separation between the pre-school and school sectors as in Germany. In the following, this use of language is adopted in the knowledge that it will sound unfamiliar to some readers in Germany.

The first basic dimension, effective classroom management, contributes to the smooth running of the learning process. The teacher ensures that learners understand the objectives and structure of the lesson and that disruptions to the lesson and disputes between students are prevented wherever possible and that as many learners as possible are actively involved. On the one hand, effective classroom management utilises the explicit establishment of rules and procedures. On the other hand, it is also based on a well-planned structure of the lesson, which makes disruptions and interruptions less likely. The high degree of structure, clarity of expectations and reliability makes it easier for learners to develop a sense of control and actively participate in the lesson. The proximity to indicators of behavioural self-regulation is evident.²³⁵

The second dimension, the potential for cognitive activation, is prominent when as many learners as possible engage particularly intensively with the learning material, building on their previous knowledge and taking in key learning content or concepts. During the learning activity, new knowledge can be acquired or existing misconceptions can be corrected. In many cases, cognitive activation is accompanied by the use of appropriate learning strategies and metacognitive regulation of learning activities and encourages the development of these self-regulatory skills.

The third relevant dimension is constructive support. This is expressed in that teachers provide learners with appropriate help in the event of comprehension problems and the interaction between teachers and learners is characterised by respect and appreciation. Particularly effective components of constructive support include the teacher's interest (perceived by the students) in the positive development of the students, the associated individualised feedback and the use of adaptively designed assistance for individual learners so that they can achieve challenging learning goals. A high level of constructive support enables children and adolescents to develop their motivational resources, see themselves as at least partially autonomous individuals and acquire a positive self-image.

In the meantime, a large number of studies have shown that there are substantial differences in the three basic dimensions of teaching quality between teachers or between individual learning groups and classes, which are also reflected in the different learning and developmental trajectories of children and adolescents.²³⁶ It has also been shown that improvements in teaching quality can be achieved through further training measures for teachers.²³⁷

²³⁵ Hamre et al. 2014.

²³⁶ Hamre et al. 2014; Kunter et al. 2013; Praetorius et al. 2018.

²³⁷ Gregory et al. 2014; Korpershoek et al. 2016.

4.5.2. Promotion of self-regulation in the pre-school sector

In addition to broad approaches to improving the quality of learning and teaching, there are also numerous concepts that are more specifically geared towards promoting self-regulation skills in childcare centres. These are presented in this section. Firstly, we report on programmes from the USA and Canada and then we look at studies from German-speaking countries.

A well-known and empirically tested programme for promoting self-regulation in pre-school settings is “Tools of the Mind”²³⁸. This programme is characterised by its comprehensive nature: it is not an add-on to other activities; rather, the principles and approaches of “Tools of the Mind” are linked to day-to-day activities. “Tools of the Mind” supports the cognitive and social development of pre-school and primary school children, with particular emphasis on self-regulation and executive functions. Through structured playful activities – including the systematic use of role-playing games and targeted interactions – children are supported in improving their attention, memory and problem-solving skills. Social learning and co-operation play a special role here. Overall, “Tools of the Mind” shows high effect sizes with regard to success measures such as self-control, attention, (pro)social behaviour and cognitive performance measures and has proven itself empirically, in some cases also in randomised field studies.²³⁹

The “Brain Games” programme, developed by Jones and her team, also aims to promote children’s social and emotional skills.²⁴⁰ It comprises a series of short, playful activities that can be easily integrated into the daily routine of childcare facilities. They often differ from other play-based activities only in that more emphasis is placed on systematically practising individual skills. For example, certain rules need to be adhered to or social exchange processes need to take place according to predefined patterns. These games are designed to strengthen various self-regulation skills, e.g. attention, the ability to work together and solve problems as well as emotion regulation. Through regular practice and frequent reflection, children learn to better control their emotions and manage social conflicts constructively. The programme is based on neuroscientific findings and is used to improve the general learning environment. The aim is to teach children skills that are not only important for success at school, but also for everyday life. There are now also a number of evaluation studies on brain games that confirm the positive effect on a range of success measures related to self-regulation.²⁴¹

In addition to “Tools of the Mind” and “Brain Games”, encouraging effects on self-regulation have been documented in empirical studies for other approaches (e.g. PATHS, Head Start REDI).²⁴² From a methodological perspective, the following needs to be taken into account: An evaluation of the efficacy of early childhood promotion programmes is made more difficult by the fact that, although proven, traditional measures from laboratory research are available, there is a simultaneous lack of valid behavioural measures that can be recorded objectively, reliably and economically in a normal learning context.

²³⁸ Bodrova & Leong 2007.

²³⁹ Blair et al. 2018; Diamond et al. 2019.

²⁴⁰ Jones & Imm 2016.

²⁴¹ Barnes et al. 2021.

²⁴² Diamond & Lee 2011; Diamond & Ling 2016.

In recent years, Anglo-American research has increasingly emphasised that particularly strong positive effects on self-regulation skills with a good cost-benefit ratio can be observed when programmes are not used in addition to the normal daily programme, but when their promotion principles permeate the entire daily routine and are highly efficient.²⁴³ In addition, Diamond and Ling 2016 formulated a number of principles that influence the effect size of the programmes.²⁴⁴ These include:

- that the more skills are practised in different contexts, the broader their development;
- that skills are more stable when there has been sufficient time to practise them;
- that skills develop best when children are repeatedly presented with tasks that really challenge them and are then given adaptive support;
- and that positive effects disappear again if skills are no longer practised or used.

With this in mind, Diamond and Lee have also stressed that many activities in childcare facilities around the world already use concepts that have a particularly strong supportive effect in terms of self-regulation skills.²⁴⁵ The authors cite the central principles of the Montessori tradition for designing the learning environment as a positive example. However, it should be mentioned that these and other supportive principles are not yet implemented systematically and sustainably enough in many day care centres.

Promotion programmes for self-regulation are also increasingly being established in German-speaking countries. For example, Schiller et al. 2023 propose an everyday integrated promotion of emotion regulation and social self-regulation skills for day care centres through “emotion coaching” and co-regulation.²⁴⁶ Emotion coaching prepares children to regulate their emotions. Emotions are mirrored, labelled, validated and linked to specific occasions, evaluations, emotional expressions, readiness to act and regulation options. This takes place inside and outside of acute, socially and emotionally challenging situations for the children. Emotion coaching is characterised by having an accepting, appreciative attitude towards the emotional experience. However, preschool children still find it difficult to self-regulate their own emotions in many situations, which is why these children are still dependent on the support of caregivers. This happens through co-regulation, which can take place on three levels. At the first level, caregivers take over all aspects of reflexive emotion regulation for the child. At the second level, the caregiver guides the child with specific cues that help them to regulate themselves. At the third level, the caregiver only uses non-specific, metacognitive cues to remind the child of emotion regulation strategies because the child already has a repertoire of emotion regulation strategies.

Another approach for day care centres that is integrated into everyday life is the “Learning to regulate emotions” (Emotionen regulieren lernen, EMIL) programme.²⁴⁷ This is a qualification measure for educational professionals. EMIL offers teams at

243 Diamond & Ling 2016; Jones & Bouffard 2012.

244 Diamond & Ling 2016.

245 Diamond & Lee 2011.

246 Schiller et al. 2023.

247 Quante et al. 2016.

childcare facilities numerous suggestions for designing activities that promote self-regulation without committing them to a standard programme and the implementation of specific content. Instead, the educational professionals learn to examine and, if necessary, adapt programmes for their self-regulation-promoting potential and to develop activities for the children that strengthen their cognitive and emotional self-regulation. The EMIL programme has now been tested many times in practice and there are initial indications of its positive effects.²⁴⁸ However, this study is not entirely convincing in terms of methodology. Since 2020, day care centres in the state of Baden-Württemberg have had the opportunity to take part in training courses on this measure. The efficacy of co-regulation strategies in day care centres is also shown in Havighurst et al. 2024.²⁴⁹

Positive effects were also observed for the Swiss promotion programme “Nele and Noa in the Rainforest”²⁵⁰ which is carried out in small groups with 5 to 6-year-old children and includes eight games that train executive functions. Initial trials of this programme showed significant improvements in various dimensions of executive functions, e. g. attention, executive control and working memory.²⁵¹ Internationally renowned promotion programmes such as “ENGAGE” (Enhancing Neurobehavioural Gains with the Aid of Games and Exercise) were also able to demonstrate the long-term effects of this approach.²⁵²

In addition to the approaches that aim to promote general self-regulation skills, there are also programmes that are primarily dedicated to promoting self-regulated learning (see Section 4.5.3) in the preschool sector, at least partially involve educators and have elements integrated into everyday life and for which initial empirical evidence of the promotional effect is available.²⁵³

The effect of preschool programmes on promoting self-regulation has now been proven several times and the preschool promotion of self-regulation skills is an underestimated resource in the long-term promotion of well-being and development opportunities. This requires further research, particularly in German-speaking countries.

4.5.3. Self-regulated learning at school

Probably the best-known and most widely implemented approach to promoting self-regulation in schools focuses on the self-regulation of specific learning processes or in specific learning contexts, referred to as self-regulated learning. This is based on educational psychology research, which often distinguishes between self-regulation skills in general and skills for self-regulated learning²⁵⁴, with much greater attention in educational psychology being paid to the specific case of self-regulated learning.²⁵⁵ Self-regulated learning refers to the process in which learners independently set their own learning goals, select strategies to achieve their goals, monitor their learning

248 Walk et al. 2018.

249 Havighurst et al. 2024.

250 Roebbers et al. 2023.

251 Röthlisberger et al. 2012.

252 Healey & Halperin 2015.

253 See: Grüneisen et al. 2023; Dörr & Perels 2020.

254 Greene 2017.

255 Schunk & Greene 2018.

progress and adapt their approach if necessary. It includes the ability for self-motivation, controlling emotions and managing attention and time efficiently. Self-regulated learners are able to flexibly change their learning strategies and respond to challenges. They continuously reflect on their learning processes and results in order to improve their skills. Research on self-regulated learning (cf. Zimmerman's work cited above) postulates similar hypotheses on processes of self-regulation as, for example, the more generic theories of self-regulation, which are presented in detail in Section 3. Despite a rather thin empirical evidence base, it seems plausible to assume that the promotion of self-regulated learning is also reflected in improved general self-regulation skills.²⁵⁶

In self-regulated learning, self-regulation skills are practised by means of specific learning tasks. The specific skills are taught either directly (for example, by teaching specific cognitive, metacognitive or motivational strategies) or indirectly, for example, by the teacher modelling self-regulated learning or designing the learning environment in such a way that it is likely that learners will apply effective self-regulated learning strategies²⁵⁷. Learning achievement is generally used as a criterion for the successful use of self-regulated learning strategies, whereas broader behavioural or experiential measures are rarely used in research.²⁵⁸

Empirical studies confirm that self-regulated training can be successfully influenced by interventions. For example, Dignath and Büttner found in a comprehensive meta-analysis that interventions to promote self-regulated learning in both primary and secondary schools showed substantial positive effects on learning performance, strategy use and motivational outcomes.²⁵⁹ From a methodological perspective, however, it should be noted here that many of the primary studies considered did not randomise the students or classes to experimental and control groups.

In the meta-analysis by Dignath and Büttner, the effects were greater on average for studies in which the training of self-regulation skills was carried out by researchers (and not by regular teachers). In contrast, individual studies suggest that training to promote self-regulated learning is particularly effective when it is integrated into regular lessons and the strategies learnt are continuously applied.²⁶⁰

4.6. Specific promotion approaches

The previous section described how learning and development environments can be designed to promote the self-regulation skills of children and adolescents in day care centres and schools. In this section, we describe specific programmes that are designed to promote the self-regulation skills of children and adolescents. Most of the programmes aim at several of the goals mentioned in Section 4.3. They are usually aimed at all children and adolescents in an age group. Some of them are intended specifically for groups of vulnerable children and adolescents; many also include components for the children's caregivers such as parents, educators and teachers.

²⁵⁶ Perels et al. 2020.

²⁵⁷ Perels et al. 2020.

²⁵⁸ Dent & Koenka 2016b.

²⁵⁹ Dignath & Büttner 2008b.

²⁶⁰ Schunk & Zimmerman 2007.

In the following, we first explain the most important approaches on which the programmes are based. They relate to the mental health competence of children and adolescents or their adult caregivers, are based on methods of behavioural therapy and cognitive behavioural therapy or are based on mindfulness, compassion or the body. We provide examples of programmes based on these approaches. Where available, evidence of efficacy is also cited. Many of these approaches also play a role in the promotion strategies described in Section 4.5.2 on promoting self-regulation in child day care centres. Section 4.6.6 contains a systematic overview of the efficacy of the approaches described with regard to the promotion objectives outlined in Section 4.4. It shows that there are promising indications of such efficacy, but that further research is required, particularly with regard to the long-term impact of the promotion.

Given the wealth of existing programmes, our overview cannot be exhaustive and there are other related approaches, such as music-based programmes.²⁶¹

By compiling promotion approaches and evidence of their efficacy, we aim to show that it is possible to effectively promote self-regulation skills of children and adolescents. However, the design of a corresponding curriculum for German day care centres and schools requires further research and development, such as the adaptation of successful strategies to the German education system and the development of a compendium of all effective promotion strategies.

4.6.1. Promotion of mental health literacy

An essential basis for promoting self-regulation skills is the development of appropriate mental health skills in children, young people and the adults responsible for them. This includes the age-appropriate teaching of relevant psychological and neurobiological principles as well as an understanding that such skills can be learnt. Mental health literacy also includes identifying one's own strengths and weaknesses in terms of self-regulation and knowing methods and procedures that are particularly effective for oneself, being able to integrate them into one's own life and seeking help if necessary.

An important example of a programme that systematically promotes mental health skills is BEWARE (“Bewusstsein, Aufklärung, Resilienz”, Awareness, Education and Resilience), which is being developed and tested by the Leibniz Institute for Resilience Research.²⁶² It is aimed at lower secondary school students from all types of schools. The programme provides annual project days for the individual class levels, which build on each other and are carried out by trained teachers. An internationally recognised training programme is “Mental Health First Aid” (MHFA).²⁶³ This was developed to enable people to provide first aid to people with mental health problems, i. e. to recognise the problems, respond appropriately and provide support until professional help is available. The “Youth” module²⁶⁴ is specifically geared towards the needs of schools and is currently being established in Germany under the direction of the Central Institute of

²⁶¹ Blasco-Magraner et al. 2021; Geipel et al. 2018.

²⁶² <https://lir-mainz.de/beware>

²⁶³ <https://mhfainternational.org/>

²⁶⁴ <https://www.mentalhealthfirstaid.org/population-focused-modules/youth/>

Mental Health in Mannheim. The “MindMatters”²⁶⁵ and “Healthy Minds for Schools”²⁶⁶ programmes also focus on the development of mental health skills.

In addition to dedicated programmes to promote mental health literacy, most of the approaches described in the following sections also include the teaching of relevant skills.

4.6.2. Behavioural and cognitive-behavioural approaches

Behaviour-oriented promotion strategies aim to strengthen self-regulation skills through long-term changes in behavioural patterns. This can be achieved on the one hand by modifying the consequences of behaviour and on the other hand by changing the corresponding cognitive processes. There are a large number of such programmes worldwide. We give a few examples here that illustrate how diverse these programmes are.

Training programmes to support learning and memory strategies have been used successfully with primary and secondary school students over the past 30 years. Overall, research results show that such programmes lead to significant improvements in meta-cognitive skills from an early primary school age, with the targeted support of reading strategies having a particularly strong influence on reading comprehension. Similar positive effects were also found in late childhood and early adolescence.²⁶⁷

Examples of school promotion strategies that are based on changing behavioural patterns and support attention and emotion regulation as well as motivational mechanisms of self-regulation are the US programmes “Good Behaviour Game”²⁶⁸ and “Positive Behavioural Intervention & Supports” (PBIS).²⁶⁹ Both programmes can be adapted so that they can be implemented from nursery to secondary school. In the “Good Behaviour Game”, school classes are divided into two teams that compete against each other to minimise clearly defined negative behaviours. They get small rewards in return. The PBIS programme is also based on the principle of positive reinforcement. It is aimed not only at all children and adolescents, but also at students with an increased risk of problematic behaviour or with serious behavioural problems. Both programmes also aim to improve the learning atmosphere and school climate. Their efficacy has been positively evaluated.²⁷⁰

One cognitive-behavioural programme is WOOP²⁷¹ (Wish-Outcome-Obstacle-Plan). It is also suitable for all age groups and promotes cognitive and motivational self-regulation mechanisms. In this programme, children are guided to formulate a goal (“wish”) and to understand why this goal is desirable for them (“outcome”). They also identify possible obstacles or challenges on the way to achieving the goal (“obstacle”) and develop a specific plan for this. Among other things, the programme supports motivational and

265 <https://mindmatters-schule.de/home.html>

266 <https://www.healthymindsprogram.com/for-school>

267 Schneider et al. 2022.

268 https://en.wikipedia.org/wiki/Good_Behavior_Game

269 <https://www.pbis.org/>

270 What Works Clearinghouse 2023; Jolstead et al. 2017.

271 https://characterlab.org/wp-content/uploads/2019/03/characterlab_WOOP.pdf

cognitive mechanisms of self-regulation and thus goal-oriented behaviour.²⁷² The “Feel Your Best Self” (FYBS) programme²⁷³ however focuses on emotional self-regulation mechanisms and is suitable for children aged three to eight years. It teaches children simple coping strategies that support their emotion regulation in everyday life and has three main focuses: calm yourself, notice your feelings and connect with others. Initial studies indicate the efficacy of the programme.²⁷⁴

4.6.3. Mindfulness and compassion-based approaches

Since the introduction of the MBSR programme²⁷⁵ towards the end of the 1970s²⁷⁶ mindfulness-based programmes have been used to support mental well-being and self-regulation skills in children, adolescents and adults, both for at-risk groups and universally.²⁷⁷ Their aim is to support conscious, non-judgemental attention in the present moment. Examples of mindfulness exercises include breathing meditation and body scanning, as well as mindful walking, eating and communicating. Mindfulness also has an increasingly important role in sport.²⁷⁸ Closely linked to mindfulness are compassion-based programmes. They encourage empathic understanding and the ability to perceive other people’s suffering or one’s own as well as the willingness and ability to alleviate it. They can also contribute to the promotion of self-regulation skills.²⁷⁹

Mindfulness and compassion-based programmes are also increasingly being used in day care centres and schools, both for children and adolescents and for the adults responsible, such as educators and teachers. As shown in Tables 1 and 2, such programmes strengthen most of the mechanisms of self-regulation mentioned in Section 4.1. This is shown in particular in meta-analyses by Phan et al. 2022 and Pandey et al 2018.²⁸⁰ Mindfulness-based programmes are also offered for teachers and have positive effects on their mental health.²⁸¹ In addition, such programmes can also have a positive influence on the school climate and the overall school situation and thus reinforce important factors for the self-regulation of children and adolescents.²⁸²

Examples of mindfulness programmes in schools include the German framework curriculum AISCHU²⁸³ for teaching mindfulness in schools and the MindUp programme used in the USA and Canada.²⁸⁴ Both programmes use the aforementioned mindfulness techniques and aim to strengthen self-awareness, emotion and stress regulation and resilience. They are also aimed at teachers and aim to establish a school culture of mindfulness. There are initial indications of the efficacy of both programmes. The AISCHU

²⁷² Duckworth et al. 2013; Gawrilow et al. 2013.

²⁷³ <https://feelyourbestself.collaboration.uconn.edu/>

²⁷⁴ Iovino et al. 2021.

²⁷⁵ MBSR stands for Mindfulness-Based Stress Reduction.

²⁷⁶ Kabat-Zinn 2013.

²⁷⁷ Crane et al. 2017; van Agteren et al. 2021; Pandey et al. 2018; Galante et al. 2023; Santa Maria et al. 2023.

²⁷⁸ Jekauc et al. 2022.

²⁷⁹ Ferrari et al. 2019; Perkins et al. 2022.

²⁸⁰ Pandey et al. 2018; Phan et al. 2022.

²⁸¹ Klingbeil & Renshaw 2018.

²⁸² Kuyken et al. 2022.

²⁸³ <https://www.aischu.de/>

²⁸⁴ <https://mindup.org/>

programme has been effective in terms of reducing stress in teachers.²⁸⁵ The MindUp programme has been shown to be effective in relation to behavioural problems²⁸⁶. However, further research is necessary. Other mindfulness and compassion-based programmes include “Mindful Schools”²⁸⁷, “calm classroom”²⁸⁸ and programme “.b”²⁸⁹ as part of “The Mindfulness in Schools Programme” (MiSP)²⁹⁰. An evaluation of the latter programme showed efficacy in relation to the mental health of teachers and the atmosphere in schools²⁹¹. However, the desired success was not achieved for students²⁹², which suggests that this programme should be developed further.

4.6.4. Body-orientated approaches

Mindfulness-based approaches include a strong body-orientated component; conversely the spectrum of body-orientated approaches to promote self-regulation skills is much broader. In addition to breathing exercises, it also includes, for example, progressive muscle relaxation, yoga, Feldenkrais, forms of movement meditation, such as Qigong or Tai Chi, through to games and sports-oriented programmes for the targeted support of coordination, strength and endurance skills. Different aspects are often combined. A special feature of such promotion strategies is the possibility of supporting all children and adolescents, even beyond language barriers.

Body-oriented promotion strategies can support stress regulation and stress resilience through targeted alternation between activation and relaxation. They also focus on cognitive, emotional, motivational and social self-regulation skills, e.g. through physical experiences of self-efficacy.

The efficacy of body-oriented promotion strategies for self-regulation skills is well documented, for example on emotion regulation, executive functions, attention regulation and stress management.²⁹³ However, little research has been conducted into the influence of the type, intensity and duration of the individual physical promotion programmes on their efficacy. In addition, the relevance of other physical factors such as sleep and nutrition for the development of self-regulation skills in childhood and adolescence still needs to be investigated.

The first programmes such as TigerKids²⁹⁴, EMYK²⁹⁵ or “ket relaxation training”²⁹⁶, have been developed for preschool and primary school children and systematically combine elements from autogenic training, Qigong, yoga and progressive muscle relaxation in

285 J. Kraft et al. 2022.

286 Crooks et al. 2020.

287 <https://www.mindfulschools.org>

288 <https://calmclassroom.com/>

289 <https://mindfulnessinschools.org/teach-dot-b/dot-b-curriculum/>

290 <https://mindfulnessinschools.org/>

291 Kuyken et al. 2022.

292 Dunning et al. 2022.

293 Biddle et al. 2019; Liau et al. 2018.

294 <https://www.tigerkids.de/>

295 Stück 2011.

296 https://www.ifss.kit.edu/Karlsruher_EntspannungsTraining_ket.php

a child-friendly way and use them as part of group programmes.²⁹⁷ CoMiK²⁹⁸ is an evaluated programme for day care centres in which executive functions are systematically encouraged through the playful training of coordinative skills (including balance, rhythm, differentiation). There are intervention programmes for schools that are used both as part of movement breaks in lessons and as extra-curricular, movement-based breaks to support body-related self-regulation. In addition to more unspecific movement-related promotion strategies, there are also very specific, primarily coordination and endurance-oriented movement programmes to promote individual executive functions in schools, e.g. working memory and inhibition, in physical education.²⁹⁹

EPHECT³⁰⁰ – a concept for promoting stress management skills in PE lessons – aims to strengthen body-related stress management. There are also programmes for secondary schools, e.g. “Health.edu”³⁰¹ or GEKOS³⁰² which target the (exercise-related) health skills of school students.

Socio-emotional skills and their activation are the focus of the Bern intervention programme BISS³⁰³ and the MOVIGEN programme³⁰⁴ for promoting social skills in school sport run by the Research Centre for Physical Education and Sports of Children and Young People (FoSS).³⁰⁵ The first programmes for promoting the mental health of children and adolescents are now also being developed by organised sport in Germany and offered in association with day care centres, schools, open youth work and sports clubs. One example of this is the MOVE HEALTH project³⁰⁶ of German Sports Youth.

4.6.5. Role of digital media

Digitalisation also plays an important role in promoting self-regulation skills. In recent years, digitalisation has played a key role in almost all areas of life, especially in the lives of children and adolescents. Digital media, e.g. TikTok and Instagram, play a key role in communication, interaction and in shaping one’s view of oneself, other people and the environment. As explained in Section 2.2.4, this may have problematic consequences for the mental health and development of children and adolescents. The promotion of self-regulation skills therefore also needs to relate to this area. At the same time, digital technologies can make a significant contribution to promoting self-regulation skills.

There are a number of school programmes that support self-regulation skills in the area of digital media. The aim of the “Medienhelden” programme³⁰⁷ of FU Berlin, for example, is to prevent cyberbullying and support media skills in secondary school

297 Müller 2016.

298 Everke 2010.

299 De Greeff et al. 2016; Aadland et al. 2019.

300 Lang et al. 2019.

301 Sygusch et al. 2020.

302 Volk et al. 2021.

303 Conzelmann et al. 2011.

304 Woll et al. 2018.

305 <https://www.ifss.kit.edu/foss/index.php>

306 <https://www.move-sport.de/>

307 <https://www.medienhelden.info/>

students aged 13 to 16. The evaluation³⁰⁸ shows the efficacy of the programme. In the “Medienscouts NRW” programme, students advise each other and help each other with questions relating to digital media. An evaluation report is also available for this programme.³⁰⁹

One approach to promoting digital self-regulation skills is to support children and adolescents by designing the user environment of apps and internet services in such a way that it supports their own preferences. There is already extensive research in this area for adults.³¹⁰ One possibility is the use of apps such as “one-sec”, which delays access to social media apps and thus supports the ability to make a conscious decision on whether to use an app or not. An evaluation shows their efficacy.³¹¹ Such approaches can be integrated into corresponding promotion strategies.

Digital apps can also support other strategies for promoting self-regulation skills of children and adolescents. For example, a meta-analysis shows the efficacy of mental health apps for emotion regulation in adults.³¹² There are also a large number of mindfulness apps, many of which are aimed at children and adolescents. Another meta-analysis suggests the possibility that mindfulness apps can support well-being and mental health in adults.³¹³ One example is the “My Coping Plan” app.³¹⁴ Its efficacy was shown by Stallman in 2019.³¹⁵ In 2020, corresponding apps for children and adolescents were analysed by Nunes et al. using the Mobile Health Rating Scale (MARS) for mobile health apps.³¹⁶ MARS uses criteria such as user friendliness, content and therapeutic persuasion, but does not focus on the efficacy of intervention objectives. The result of the study was that most apps for children and adolescents are not satisfactory in terms of the MARS criteria. There is thus a considerable need for research and development in this area.

4.6.6. Overview of the efficacy of individual approaches

This section provides an overview of the scientific evidence for the efficacy of the promotion approaches presented. Tables 1 and 2 show which promotion objectives from Section 4.3 can be achieved with which promotion approaches. In accordance with the distinction made in Section 4.3, the promotion objectives consist of developing the various self-regulation mechanisms on the one hand and strengthening the promotion factors on the other. The entry M in a field means that there are one or more meta-analyses that prove the efficacy with regard to the respective promotion objective. The entry E indicates that the effect has been confirmed by one or more controlled individual studies. Positive effects proven by meta-analyses can be regarded as stronger evidence of efficacy, provided that the individual studies used are of appropriate quality. A brief description of the research studies used can be found at the end of this section. Most of

308 Zagorscak et al. 2019.

309 Kerres et al. 2012.

310 Kozyreva et al. 2020.

311 Grüning et al. 2023.

312 Eisenstadt et al. 2021.

313 Gál et al. 2021.

314 <https://www.usc.edu.au/about/unisc-news/news-archive/2021/september/academic-creates-app-to-help-people-cope-with-stress>

315 Stallman 2019.

316 Nunes et al. 2020; Stoyanov et al. 2015.

them relate to children and adolescents and many to day care centres or schools. This is indicated in the descriptions. The effect sizes in all these studies are typically in the small to medium range. Empty fields indicate that we are not aware of any relevant studies, but this does not rule out potential efficacy.

The tables show that there is evidence for the efficacy of mindfulness and compassion-based programmes in relation to almost all promotion objectives; cognitive-behavioural, behavioural and body-based approaches are also effective for many promotion objectives. In the promotion of mental health literacy, on the other hand, the focus is more on knowledge transfer; metacognitive skills in particular are thus being further developed and work is being done to destigmatise mental health problems and illnesses.

The tables therefore make it seem likely that the self-regulation skills of children and adolescents can generally be promoted by the approaches described. At the same time – as many of the scientific studies cited here point out – further research is needed, particularly with regard to the long-term effects of the promotion.

Individual studies also show negative effects, e.g. the evaluation of the “.b” programme as part of the “My Resilience in Adolescence” (MYRIAD) programme.³¹⁷ This study cites inadequate implementation for the respective target group as the reason – an indication that promotion programmes need to be carefully designed with the respective target groups in mind.

Table 1: Promotion of self-regulation skills

The entry M in a field means that there are one or more meta-analyses that prove the efficacy of the approach in the row for self-regulation skills in the column. The entry E shows that this efficacy is proven by one or more controlled studies. A brief description of the relevant research can be found at the end of this section. Empty fields mean that we are not aware of any controlled studies demonstrating such efficacy; however, this does not rule out potential efficacy.

Skill \ Promotion approach	Mental health literacy	Cognitive-behavioural- and behavioural-based	Mindfulness-, compassion-based	Body-oriented
Cognitive mechanisms: control over thoughts, attention and behaviour, cognitive flexibility, working memory		E	M	M
Metacognition: declarative and procedural	M	E	M	
Emotion regulation	M	M	M	M
Stress regulation		E	M	E
Motivational skills		E	M	E
Social skills		M	M	E

Table 2: Promotion factors for self-regulation skills

The entry M in a field means that there are one or more meta-analyses that prove the efficacy of the approach in the row for the promotion factor in the column. The entry E indicates that such efficacy is proven by one or more controlled studies. A brief description of the relevant research can be found at the end of this section. Empty fields mean that we are not aware of any controlled studies demonstrating such efficacy; however, this does not rule out potential efficacy.

Promotion factor \ Promotion approach	Mental health literacy	Cognitive-behavioural- and behavioural-based	Mindfulness-, compassion-based	Body-oriented
Destigmatisation of mental health problems and illnesses	M			
Self-awareness: body awareness, regulation of self-referential processes				E
Self-image: self-concept, self-efficacy expectation		E	M	M
Environment in day care centres and schools		M	E	
Parents, educators and teachers: behaviour and self-regulation skills			M	

We now present evidence for the entries in Tables 1 and 2. Further evidence collected while working on this statement is available on the Leopoldina website.³¹⁸

A meta-analysis by Frejtan et al. 2021 shows that promotion strategies with a focus on mental health literacy can improve long-term knowledge of cognitive processes (listed in the table as declarative metacognition) in children and adolescents between the ages of 9 and 18 and reduce the stigmatisation of mental illness.³¹⁹ A further meta-analysis shows that psychoeducation on acceptance can have a positive effect on emotion regulation in 13 to 17-year-olds.³²⁰

Many programmes use behavioural and cognitive-behavioural promotion strategies. With the “Good Behaviour Game” programme, positive effects on concentration (as an executive function) and on prosocial behaviour were observed in a study of 6 to 7-year-old children.³²¹ Long-term reductions in aggressive behaviour were also observed in a longitudinal study, which can be interpreted as an indicator of positive effects on emotion regulation.³²² In a randomised controlled trial, the “Teaching Recovery Techniques” programme achieved a reduction in PTSD symptoms in war-affected

318 https://www.leopoldina.org/fileadmin/redaktion/Publikationen/Nationale_Empfehlungen/Leopoldina_Stellungnahme_Selbstregulationskompetenzen_Evidenz.pdf

319 Frejtan et al. 2021.

320 Helland et al. 2022.

321 Troncoso & Humphrey 2021.

322 Kellam et al. 2008.

children aged 10 to 13 through stress regulation.³²³ A non-group-specific meta-analysis of “Cognitive Bias Modification”³²⁴ showed an improvement in metacognitive skills. In a non-age-specific, controlled study, it was observed that mental contrasting as a motivational skill can be improved on a cognitive-behavioural basis.³²⁵ The intervention examined here corresponds to part of the WOOP programme; the planning step of the WOOP programme was not examined in this study. The “Resourceful Adolescent Program” was found to improve self-esteem in adolescents (12–16 years old) in one randomised controlled trial.³²⁶ A study of 58 schools also showed that the implementation of broad cognitive-behavioural programmes can improve the atmosphere of schools when their implementation is supported.³²⁷ A meta-analysis of social-emotional learning (SEL) programmes in schools revealed an improvement in prosocial behaviour and the atmosphere in schools as well as a reduction in emotional stress.³²⁸ SEL uses cognitive-behavioural promotion strategies but has a broader focus on the development of social and emotional skills.

For mindfulness-based promotion strategies, a meta-analysis has shown that numerous aspects of self-regulation skills can be improved through school programmes, e. g. concentration and cognitive inhibition (executive functions), metacognition, emotion regulation, stress regulation, prosocial behaviour and empathy (social skills).³²⁹ An improvement in self-acceptance and self-compassion was also observed. A meta-analysis relating to children and adults shows an improvement in motivational skills through mindfulness.³³⁰ A review of neurophysiological research on mindfulness suggests that self-awareness plays a central role in terms of the positive effects.³³¹ The meta-analysis by Klingbeil and Renshaw shows that mindfulness-based promotion strategies can also improve the behaviour and skills of teachers.³³² Another randomised controlled study shows evidence of positive effects on the school climate.³³³

The meta-analysis by de Greeff et al. 2018 shows that executive functions in children (6–12 years old) can be improved by long-term programmes that encourage regular physical activity.³³⁴ In a cross-sectional study of adults, positive effects were shown in relation to body awareness in adults depending on the type of exercise.³³⁵ The meta-analysis by J. Liu et al. 2022 found that physical activity improves emotion regulation.³³⁶ In the study by Wunsch et al. 2019, the negative effects of stress were found to

323 Qouta et al. 2012.

324 Martinelli et al. 2022.

325 Fritzsche et al. 2016.

326 Rivet-Duval et al. 2011.

327 Bradshaw et al. 2021.

328 Cipriano et al. 2023.

329 Phan et al. 2022.

330 Li et al. 2023.

331 Tang, Hölzel et al. 2015.

332 Klingbeil & Renshaw 2018.

333 Kuyken et al. 2022.

334 De Greeff et al. 2018.

335 T. Tihanyi et al. 2016.

336 J. Liu et al. 2022.

be reduced by physical activity.³³⁷ A randomised controlled study of trainees with an average of 16 years also shows that stress can be regulated specifically by physical activity programmes.³³⁸ In their 2012 study, Vazou et al. came to the conclusion that sport can increase motivational skills in the school context.³³⁹ According to the meta-analysis by Knittle et al. 2018, the motivation for sport itself can also be increased by using targeted programmes.³⁴⁰ According to the systematic review by Schüller and Demetriou 2018, social skills can also be promoted in students (6–19 years old) by way of physical activity interventions.³⁴¹ The meta-analysis by Liu et al. 2022 shows evidence of the positive effects on self-concept, including self-esteem, through physical activity programmes in children and adolescents (3–20 years old).

4.7. Qualification measures for those in responsible positions

Qualified staff are necessary for the successful application of the promotion strategies. Many of the programmes mentioned can be used by educators and teachers. The WOOP programme can be adopted and integrated into lessons by teachers using the teaching materials provided without additional training.³⁴² Other programmes, such as the “Blues Programme”, the “Resourceful Adolescent Programme” or the “Good Behaviour Game”, are generally more complex and require training for teachers and/or school psychologists. This can either be integrated into teacher training programmes or take the form of further and continuing education and training. In addition to imparting skills, acceptance of the learning objective of “self-regulation skills” also need to be conveyed.

Another prerequisite for the successful promotion of self-regulation skills is a high level of mental health literacy of those in responsible positions. This helps with the selection of suitable promotion measures and with their application. In Germany, there is as yet very little data on the existing mental health literacy of teachers.³⁴³ The mental health literacy of adults can be specifically supported, for example through qualification measures during studies.³⁴⁴

4.8. Structural requirements

The successful promotion of self-regulation skills in day care centres and schools requires appropriate structural framework conditions. These framework conditions can range from individual measures at school level, supported by education authorities, to political support from the German federal states.

337 Wunsch et al. 2019.

338 Lang et al. 2017.

339 Vazou et al. 2012.

340 Knittle et al. 2018.

341 Schüller & Demetriou 2018.

342 A manual can be obtained on <https://woopmylife.org/de/home> a specific application for ADHD is presented in Gawrilow et al. 2018.

343 Kirchoff et al. 2023.

344 Liang et al. 2023.

In educational institutions, for example, it is necessary to integrate promotion strategies into the timetable, to provide suitable rooms, qualified teachers, a budget for further training and the opportunity to involve external experts as well as regular supervision. All stakeholders, including school students, teachers, parents, school psychologists, social workers and the leadership of educational institutions, need to be involved in the development. Co-operation with other institutions, such as sports clubs or psychotherapists, can also be helpful. The support of school authorities is also very important.

Political support from German federal states and the Ministries of Education and Cultural Affairs is also essential. The educational goal of “self-regulation skills” is already embedded in the education plans of German federal states such as Baden-Württemberg³⁴⁵ and Hesse³⁴⁶. The KMK’s framework guidelines for early childhood education³⁴⁷ and primary school³⁴⁸ also emphasise the relevance of promoting self-regulation skills. Its integration into education and teaching curricula would now be a decisive factor. This is already more advanced in other countries. In New Zealand, for example, metacognition is part of the curriculum.³⁴⁹ In Finland, the school curriculum includes a focus on “caring for yourself and others”.³⁵⁰ The Australian curriculum also focuses on mental health and well-being.³⁵¹

345 https://www.bildungsplaene-bw.de/,Lde/Startseite/BP2016BW_ALLG/BP2016BW_ALLG_LP_PG

346 https://sts-ghrf-ruesselsheim.bildung.hessen.de/modul/diagnostizieren_foerdern_beurteilen/bep_2019_web.pdf

347 https://www.kmk.org/fileadmin/veroeffentlichungen_beschluesse/2004/2004_06_03-Fruhe-Bildung-Kindertageseinrichtungen.pdf

348 https://www.kmk.org/fileadmin/pdf/PresseUndAktuelles/2015/Empfehlung_350_KMK_Arbeit_Grundschoole_01.pdf

349 https://education.nsw.gov.au/content/dam/main-education/teaching-and-learning/education-for-a-changing-world/media/documents/Metacognition_Full_Report_FINAL.pdf

350 Lähdemäki 2019.

351 <https://www.australiancurriculum.edu.au/f-10-curriculum/health-and-physical-education/structure/>

5 Recommendations for action

In Section 2, we described the highly problematic situation relating to the well-being and development opportunities of children and adolescents and highlighted the associated long-term individual and social consequences. Section 3 explained that the promotion of self-regulation skills is of central importance in addressing this situation and sustainably promoting the well-being and development opportunities of children and adolescents. Section 4 also showed that there are many empirically proven measures that can promote the self-regulation skills of children and adolescents.

On the basis of these findings, we recommend

- making the promotion of self-regulation skills of children and adolescents a further guiding principle of the German education system,
- developing indicators for the self-regulation skills of children and adolescents and including them in the nationwide education monitoring system and the data-based school and teaching development in the German federal states, and
- developing effective strategies for promoting self-regulation skills in German day care centres and schools, integrating them into education and teaching curricula nationwide and continuously evaluating and improving them.

As already made clear in the introduction, the promotion of self-regulation skills is only one aspect in developing well-being and development opportunities in children and adolescents – albeit a key aspect in terms of efficacy. Of course, it is still extremely important to improve the political, economic and social framework conditions. However, the local, personal skills of individuals in self-regulating their own behaviour and the successful global self-regulation of whole societies are two aspects of the same phenomenon. Due to the aforementioned importance of self-regulation in all aspects of well-being and development opportunities, this statement and the recommendations for action relate to the first aspect, without in any way diminishing the importance of the second.

The implementation of these recommendations for action requires the co-operation of all stakeholders in the German education system:

- parents and guardians,
- education professionals such as nursery school teachers, school teachers, school social workers and school psychologists,
- those responsible for the initial, further and continuing training of education professionals, such as specialised universities and teacher training courses,
- centres for educational quality and development in the German federal states,
- decision-makers and advisory bodies in educational institutions such as day care centre and school management boards, parents' and school councils,
- state and private providers of educational institutions such as local authorities, churches, welfare and sports organisations and parents' initiatives,

- those responsible for administration and policies such as school authorities, Ministries of Education and Cultural Affairs and other state ministries, the KMK, the German Ministry of Education and Research (BMBF) and other German ministries as well as state and federal parliaments.
- the relevant associations and trade unions such as the Federal School Students' Council, the Federal Parents' Council, the Trade Union for Education and Science (GEW), the Association for Education and Training (VBE) and the Philologists' Association,
- research institutions involved in education and the promotion of mental health.

Children and adolescents also need to be involved in its implementation and it is necessary to have intensive co-operation between the education and health systems.

In the following, we explain our recommendations for action in detail.

5.1. Making the promotion of self-regulation skills of children and adolescents a further guiding principle of the German education system

The development of education plans and curricula is the responsibility of the Ministries of Education and Cultural Affairs in the German federal states. Many of these plans already contain several references to the promotion of self-regulation skills of children and adolescents, but these often remain relatively vague. In view of their central importance for the well-being and development opportunities of children and adolescents, we recommend that the Ministries of Education and Cultural Affairs of the German federal states now include this promotion as a further guiding principle of their respective educational and teaching curricula and define ambitious goals. This applies to all types of schools and also to day care centres, the substantial development of self-regulation skills takes place in early childhood and children can be sustainably supported in their development. Early promotion also makes sense from an educational economics perspective, as it is particularly effective.³⁵²

Encouraging the self-regulation skills of children and adolescents also needs to become a further guiding principle of the training of educators and teachers. Universities are responsible for the first phase of teacher training and the training of school social workers and school psychologists. Generally, they set their curricula independently³⁵³ and we recommend that they adapt these curricula accordingly. The Ministries of Education and Cultural Affairs of the German federal states set the guidelines for nursery school teacher training and the second phase of teacher training and have a significant influence on the initial, continuing and further training programmes of education professionals.

We recommend that the Ministries of Education and Cultural Affairs make the relevant changes to these guidelines and programmes with the involvement of the institutions that provide this initial, continuing and further training. This should also include the development of the self-regulation skills of those working in the education system. In cases where the effective promotion of self-regulation skills requires a change in the

³⁵² Heckman 2008.

³⁵³ With restrictions for the German federal states in which the first state examination for teachers still exists.

convictions of educational staff on issues relating to developmental support vs. care, this should be sought by the actors and institutions responsible for initial, further and continuing training or the organisations responsible for the facilities.

The KMK is developing standards and recommendations for education in Germany³⁵⁴ as well as for the initial, continuing and further training of educators³⁵⁵ and teachers³⁵⁶ which already include related objectives. We recommend that the KMK includes the promotion of self-regulation skills as a specific goal in these standards and recommendations.

German day care centres and schools and their providers implement the educational plans of the German federal states in a way that is suitable for them and develop specific concepts, for example in the guidelines of providers of day care centres or in individual school programmes. They are supported in this by the German state centres for educational quality and development. We recommend that the relevant bodies of the educational institutions, such as parents' or school councils, be involved in a discussion on the importance and efficacy of promoting self-regulation skills in cooperation with centres for educational quality and development of the German federal states and integrate this promotion into their educational concepts. It would be possible, for example, to hold educational days on this topic in a school with speakers from the respective state centre and for the school councils to adapt the school programme accordingly.

The associations and trade unions of the German education system are promoting the further development of this system in a constructive and critical manner. We recommend a discussion on the importance of encouraging self-regulation skills with these associations and trade unions and that they are involved in making this promotion a further guiding principle of the German education system.

5.2. Developing indicators for self-regulation skills of children and adolescents and include them in nationwide education monitoring and data-based school and teaching development in the German federal states

Despite the fact there is evidence showing the importance of promoting self-regulation, this has not yet been given enough attention to enable the initiation of sustainable improvements. This is also due to the fact that self-regulation skills have not yet been made systematically part of educational monitoring, and educational institutions have not been given instruments for the suitable recording of individual developmental processes in self-regulation.

354 <https://www.kmk.org/themen/qualitaetssicherung-in-schulen/bildungsstandards.html>

355 https://www.kmk.org/fileadmin/Dateien/veroeffentlichungen_beschluesse/2020/2020_06_18-RVFS-RLP-Sozpaed.pdf

356 https://www.kmk.org/fileadmin/Dateien/veroeffentlichungen_beschluesse/2004/2004_12_16-Standards-Lehrerbildung.pdf

There are several central components of educational monitoring in Germany.³⁵⁷ Particular attention is paid to the educational trends of the Institute for Quality Development in Education (IQB)³⁵⁸, which focus on the evaluation of educational standards with regard to core skills and are carried out in close cooperation with the KMK. We recommend that the self-regulation skills of children and adolescents be included in nationwide educational monitoring. For this purpose, it is necessary to develop indicators for measuring self-regulation skills or to further develop existing indicators and integrate them into the nationwide education monitoring system. This should include a range of different approaches.³⁵⁹ The KMK could commission the IQB or another research institute to develop such indicators, for example. In the future, preschool children should also be included in these surveys.

As soon as reliable data is available, self-regulation skills should also be included as an indicator in the National Education Report, which is compiled by a consortium of educational research institutes on behalf of the KMK and the BMBF and provides a comprehensive overview of the entire education system.

In addition to including self-regulation skills in education monitoring at a federal level, it is also essential to use corresponding indicators in data-supported school and teaching development in the German federal states. For data-supported school and teaching development, data and information are used systematically with the aim of continuously improving schools and teaching. This approach encompasses various aspects. The basis is the collection and analysis of data. Teaching methods, curricula, school development or teacher training are improved on the basis of this data. Data-based development is also used for quality management in individual schools and as a basis for individualised promotion. The Ministries of Education and Cultural Affairs of the German federal states are responsible for data-based school and teaching development. Teachers, school leadership teams, parents, school students and local education authorities should be involved in the process in order to initiate holistic and effective development through monitoring. We recommend that the Ministries of Education and Cultural Affairs, along with introducing promotion of self-regulation skills of children and adolescents as a further guiding principle, include this promotion in data-supported school and teaching development. It should also be examined whether and how indicators of self-regulation skills can also be integrated into tests carried out before starting school.

In addition, the data base on self-regulation, mental health and other aspects of well-being and development opportunities should be improved and integrated into the standard examinations of all health and counselling professions. The use of innovative and everyday survey methods (e.g. real-time surveys via smartphone) should be examined and integrated accordingly.

357 Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany 2016.

358 <https://www.iqb.hu-berlin.de/>

359 Diamond & Lee 2011.

5.3. Developing effective strategies to promote self-regulation skills in German day care centres and schools, introducing them nationwide and continuously evaluating and improving them

Promoting the self-regulation skills of children and adolescents in day care centres and schools involves two key aspects.

Firstly, we recommend that educators and teachers systematically integrate this promotion into the day care and classroom routine. As described in Section 4, they can be guided by empirically proven educational and teaching models. In German-speaking countries, the model of the three basic dimensions of effective teaching (effective classroom management, cognitive activation, constructive support), can be used as a conceptual basis and is now widely used in science, in the training of educational professionals and in practice. All three basic dimensions are based on learning and communication processes in learning contexts that are psychologically designed to require and promote self-regulation skills. In addition, empirically proven promotion programmes that can be integrated into everyday life or the classroom should be introduced into educational practice. In early childhood, programmes such as “Tools of the Mind” and “Brain Games” should be considered, and in schools, the systematic promotion of self-regulated learning. The corresponding support will be particularly effective if educators and teachers design the educational programmes and their lessons to be adaptive – in other words always keep the level of learning and self-regulation within a range that challenges but does not overwhelm the learners. Appropriate support should also pave the way for the next stage of development. It is also possible to integrate elements of the approaches described in Section 4, such as simple mindfulness exercises.

In order to promote self-regulation skills in an age-appropriate manner, educational professionals need to have an in-depth knowledge of self-regulation skills, how they are developed and how to promote them (skills development model of self-regulation). It is also necessary that children and adolescents are not confronted with different concepts within their institutions, but that day care centres and schools work to ensure that corresponding ideas and concepts are shared between education professionals within the institutions.

Secondly, we suggest offering specific programmes for all children and adolescents as well as for individual groups such as particularly vulnerable children and adolescents. These can be implemented, for example, in existing lessons, project days, as part of remedial or class teacher lessons or as an all-day programme, by educational staff and teachers, school social workers or school psychologists with appropriate qualifications or external staff. The approaches and programmes presented in Section 4.6 can be used for this purpose.

We recommend organising the promotion of self-regulation skills so that children and adolescents can learn about a wide range of promotion options and can choose the one most suited to them. Close networking with other stakeholders who also promote self-regulation skills, for example in the health sector and recreational sports, is also important.

To introduce such promotion nationwide in German day care centres and schools, suitable measures need to be continuously researched, developed, evaluated and improved based on the research findings, approaches and programmes for German schools described in Section 4. Formative evaluations should be used, i.e. assessment procedures that are conducted during the learning process to monitor and support learning progress. It is also necessary to conduct summative evaluations, i.e. assessment procedures at the end of a learning segment, course, semester or school year in order to measure the efficacy of the respective measure. To provide nationwide promotion, we recommend creating and continuously updating a comprehensive compendium of promotion strategies for self-regulation skills. This should provide an overview of the content, promotion objectives, target groups, implementation costs and evidence of effectiveness. Existing programme combinations³⁶⁰ can be used for this purpose. Finally, there is a need for research into implementation and scalability³⁶¹, also with the aim of achieving sustainability.

We recommend that research, development, continuous evaluation and improvement be carried out at the relevant university and non-university research institutions in cooperation with childcare facilities and schools as well as the centres for educational quality and development in the German federal states. We also propose that this research and pilot testing be included in the German Federal Ministry of Education and Research (BMBF) programme “Empirical Educational Research” or a separate funding line.

360 e.g. The Green List Prevention of the Lower Saxony State Prevention Council:
<https://www.gruene-liste-praevention.de/nano.cms/datenbank/information>

361 See box “Research methods”

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In accordance with the published “Rules for Dealing with Conflicts of Interest in Science-Based Advisory Activities of the National Academy of Sciences Leopoldina”, the contributing scientists have been obliged to disclose facts that may be likely to lead to conflicts of interest. In addition, reference is made to the present rules

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Glossary

Aversive association: A negative link or association that relates to an unpleasant or painful experience. These associations often lead to the avoidance of potentially unpleasant experiences in the future.

Brain plasticity: The ability of the brain to change and adapt structurally and functionally. This can occur through learning processes, experiences or after injuries, whereby new neural connections are formed and existing ones are altered.

Bullying: Repeated, intentional harassment, intimidation or exclusion of a person by individuals or groups, often at work or at school, with the aim of hurting or humiliating that person.

Cognitive/cognition: Mental processes associated with the processing of information. In addition to basic functions such as perception, learning or the retrieval of memory content, they include →executive functions and →metacognitive abilities.

Cognitive flexibility: The ability to switch quickly between tasks and adapt to changing requirements. Switching between different possible cognitive strategies, e.g. in maths problems that can be solved in different ways, also requires cognitive flexibility. Cognitive flexibility is also necessary when different task requirements or rules have to be taken into account according to the context, or when rules change over time, e.g. when behaviours that were originally desirable are suddenly no longer desirable.

Co-regulation or interpersonal regulation: The process by which two or more individuals work together to control and regulate emotional states. This includes supporting and responding to each other's emotional needs to promote stability and well-being.

Delinquent behaviour: Illegal or criminal behaviour that violates social norms and legal regulations.

Differential susceptibility models: Theories in psychology that state that individuals vary in their sensitivity to environmental influences, both positive and negative. These models differ from traditional approaches, which often only emphasise an individual's susceptibility to negative influences. Instead, it is suggested that some people may be particularly sensitive to their environment as a result of genetic or biological factors, which means that they thrive particularly well in supportive environments but suffer particularly badly in unfavourable environments.

Emotion regulation: Emotion regulation refers to all of the processes that enable a person to control the intensity, duration and type of emotions and their associated behaviours in a certain direction. This also includes stress regulation.

Emotional/emotion: These terms refer to a complex psychophysiological experience which is a response to a situation or stimulus. Emotions include subjective feelings, physiological reactions (such as heart rate or breathing) and behaviours (such as facial expressions or actions). Basic emotions include joy, sadness, fear, anger, surprise and disgust.

Executive functions: Mental processes that help an individual to actively regulate other mental processes, such as attention. They include key resources such as →working memory, →cognitive flexibility and →inhibitory control.

Explicit mechanisms of social learning: Conscious, intentional processes where individuals learn through direct instruction, feedback or conscious practice. This includes formal education, targeted training or conscious imitation of role models.

Externalising disorders: Mental disorders manifested as outwardly directed, disruptive or aggressive behaviour. These include, for example, attention deficit hyperactivity disorder (ADHD), oppositional defiant behaviour and social behaviour disorders.

Genetic predispositions: Congenital tendencies or susceptibilities to certain characteristics, diseases or behaviours that are determined by a person's genetic makeup.

Implicit mechanisms of social learning: Unconscious, involuntary processes by which individuals take on behaviours, attitudes and norms from their environment. This includes imitating behaviours or unconsciously learning social rules through observation.

Inhibition: Inhibition is a collective term for various aspects of controlling thoughts, attention and behaviour. It includes suppressing irrelevant and distracting thoughts, such as thinking about the effect on others during a presentation. Attention often involves focusing on something and suppressing distracting stimuli (selective attention). Another important aspect is the inhibition of impulsive behaviour or habitual but inappropriate reactions to a given situation – an aspect also referred to in the literature as →self-control or effortful control.

Internalising disorders: Mental disorders characterised by inwardly directed behaviour and emotional problems. These include anxiety disorders, depression and social withdrawal. Those affected tend to hide their difficulties and experience them internally.

Intervention: Targeted measures or therapeutic interventions aimed at treating mental health problems, improving well-being and promoting behavioural change. This can be done through counselling, therapy or other supportive approaches.

Lesion studies: Research methods in neuroscience that examine the effects of injuries or damage to specific brain regions to understand their function. By observing behavioural changes or cognitive impairments after a lesion, scientists can draw conclusions about the role of the affected brain areas.

Limbic structures: A group of brain structures that play an important role in regulating emotions, memory and motivation. The most important limbic structures include the hippocampus (important for memory), the amygdala (involved in emotion processing), the hypothalamus (regulates basic physiological processes) and the cingulate gyrus (supports emotional and cognitive functions). These structures work together to control emotional responses and behaviour.

Metacognitive/metacognition: Skills related to an individual's own cognitive processes. They include knowledge about how cognitive processes work (declarative metacognitive skills) and skills for continuously monitoring, reflecting on, evaluating and regulating an individual's own cognitive processes (procedural metacognitive skills).

Motivation/motivational skills: The meaning, nature and structure of personal goals. These range from the short-term fulfilment of specific desires and needs to long-term life goals. Self-efficacy expectations are important for the selection of goals and intentions to act. Motivational skills include knowledge of and influence over one's own goals, beliefs and attitudes.

Phase model of action control: A model that divides the process of goal achievement into various phases. It typically includes the following phases:

1. **Motivational phase** (consideration): Reflecting and considering whether a goal should be pursued.
2. **Pre-actional phase** (planning): Planning the steps and measures that will be necessary to achieve a goal.
3. **Actional phase** (action): Implementing the planned actions to achieve a goal.
4. **Post-actional phase** (evaluation): Reflecting and evaluating the results of the action and the process of achieving a goal.

Primary prevention: Measures aimed at preventing the occurrence of diseases or disorders by reducing risk factors and promoting healthy behaviours.

Protective: Providing protection or safeguarding from harmful influences.

Resilience: The ability to remain healthy or recover and adapt despite experiencing adverse circumstances, stress or traumatic events. Resilience covers both mental and physical resilience.

Responsiveness: The ability and willingness to respond appropriately and sensitively to the needs, signals or requests of others.

Scaffolding: A teaching method in which a person (often a teacher or parent) provides targeted support to help a learner acquire new skills or knowledge. This support is gradually reduced as the learner becomes more independent and competent. Scaffolding promotes development by structuring the learning process and adapting it to the learner's current abilities.

Secondary prevention: Early detection and early intervention in the treatment of existing health conditions or risks to prevent them progressing further or worsening.

Self-concept: An individual's perception and assessment of themselves. A positive self-concept includes an appreciation of oneself (self-esteem).

Self-control: This refers to an individual's ability to choose the course of action that is most beneficial to them in the long term when faced with conflicting goals. It also includes inhibiting impulsive behaviour or habitual reactions that are inappropriate in a given situation, as well as the ability to delay gratification.

Self-efficacy: An individual's belief in their ability to control their own actions and achieve goals.

Self-image: Umbrella term for various beliefs and perceptions relating to one's self. Self-image includes, in particular, →self-concept and →self-efficacy.

Self-perception: How individuals perceive themselves, including their own body.

Self-regulated learning: A process in which individuals set their own learning goals, select strategies for achieving them, monitor their progress and adjust their approach if necessary. This includes the individual's ability to motivate themselves, control their emotions and manage their time and attention efficiently. It is plausible that the promotion of self-regulated learning will also improve general self-regulation skills.

Self-regulation skills: Behavioural skills that enable individuals to achieve personal goals and adapt to changing circumstances. Specifically, they include →cognitive, →emotional, →motivational and social skills. Self-regulation skills are of fundamental importance for goal-oriented behaviour in all areas of life. One of the core concepts of self-regulation is the assumption that the ability to self-regulate gives individuals greater personal freedom, enabling them to interact more effectively with their environment and be →self-effective.

Subcortical-cortical network: A network of communication pathways between subcortical structures (located below the cerebral cortex) and the cerebral cortex. These networks are crucial for many complex functions, including the integration of sensory information, movement control, emotional processing and cognitive functions. Subcortical structures such as the thalamus, basal ganglia and limbic system work closely with cortical areas to control behaviour and the processing of information.

Vulnerable: i.e. susceptible to mental or physical disorders. This may have a genetic cause or be associated with developmental or socio-economic issues.

Working memory: The cognitive system that enables us to hold on to various pieces of information at the same time and use them to perform cognitive tasks. For example, we need working memory to maintain access to the individual steps of a planned sequence of actions, adapt them if necessary and, at the same time, perform the cognitive tasks required for each individual step. In general, working memory is important for key academic skills such as understanding demanding texts or solving mathematical problems, as well as for complex problem solving and deductive reasoning.

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