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Mental Health

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The effects of mental health problems in childhood and adolescence in young adults: Results of the KiGGS cohort

Abstract

Mental health problems in childhood and adolescence may have effects into adulthood. With the KiGGS cohort, data are available for the first time that can be used to track the effects of internalising and externalising problems in childhood or adolescence into young adulthood on a national database. From the KiGGS baseline survey (2003–2006) to KiGGS Wave 2 (2014–2017), a total of 3,546 children and adolescents aged 11 to 17 years were tracked over a period of eleven years into young adulthood. Mental health problems in childhood or adolescence were variously associated with impaired mental health, lower life satisfaction and poorer quality of life and indicators of sexual and reproductive health in young adulthood.

When psychosocial protective factors at the time of the KiGGS baseline survey were considered, the longitudinal correlations of internalising and externalising problems with indicators of mental health, life satisfaction and physical and psychological quality of life decreased, as did, to a lesser extent, the correlations with indicators of sexual and reproductive health and, for externalising disorders, also with low educational status (reference: medium). Implications for prevention and intervention are discussed.

🏷 INTERNALISING · EXTERNALISING · YOUNG ADULTS · DEVELOPMENT OUTCOMES · POPULATION-BASED

1. Introduction

Mental health problems affect the developmental opportunities of children and adolescents and may have effects into adulthood [1–3]. More than half of all mental disorders in adulthood begin in childhood or adolescence [2, 4, 5]. However, not only children with diagnosed mental disorders may present with mental health problems later in life [6]. Also, children and adolescents with symptoms that do not fully meet the criteria for the diagnosis of a mental disorder are at increased risk for impaired mental health in adulthood [3].

Previous studies have shown that internalising and externalising problems (Info box) in childhood and adolescence can be associated with various effects in adulthood regarding the mental health, quality of life or academic achievement [9–13]. For example, subjects with internalising disorders in childhood or adolescence are more likely to display symptoms of anxiety or depression and impaired health-related quality of life as adults [9, 10, 12, 14, 15]. On

Mental health problems in childhood and adolescence include emotional and behavioural problems. Common internalising (i.e., more inwardly directed) problems are, for instance, anxiety, shyness, experiences of rejection, brooding, frequent worrying or frequent crying and peer problems. More outwardly directed, expansive behaviours such as motor restlessness, a high degree of distractibility, attention problems, frequent interrupting and disturbing others or aggressive and dissocial or rule-breaking behaviour up to and including delinquency are referred to as externalising problems [7, 8].

the other hand, children and adolescents with externalising problems often have lower educational success than their unaffected peers and are at an increased risk of later use of psychoactive substances in later life [9, 10].

In the research of resilience, protective factors for the mental health have been discussed since the late 1950s [16]. Psychosocial resources at the individual or environmental level (i.e., family and social level) that contribute to mitigating developmental risks of children and adolescents or to maintaining and protecting their mental health can be described as protective or compensatory factors [16, 17]. Children and adolescents who develop into socially successful adults despite existing developmental risks such as poverty, experiences of violence, family discord, parental divorce, parental psychopathology, physical illnesses or disabilities are referred to as resilient [16, 18]. However, long-term studies on a nationally representative level still remain rare.

For the first time, the German Health Interview and Examination Survey for Children and Adolescents (KiGGS) provides, on a national level, a population-based longitudinal data set, which can be used to track individuals with internalising and externalising problems over a period of eleven years, from childhood or adolescence into young adulthood.

The first research question of this contribution adresses the relationship between mental health problems in childhood or adolescence and developmental outcomes in young adulthood as operationalized in the KiGGS study. These include aspects of mental health, life satisfaction and health-related quality of life, latest educational status, partnership status as well as aspects of sexual and repro-

ductive health. The second research question investigates to what extent the availability of personal, family and social protective resources in children and adolescents as captured in the KiGGS study [19] is related to developmental outcomes in young adulthood in subjects with childhood internalising and externalising problems.

2. Methods
2.1 Sample design and study procedure

Within the framework of the KiGGS cohort, the children and adolescents who were first examined and interviewed in the baseline survey in the years 2003–2006 are followed up. The KiGGS baseline survey has so far been followed by two further survey waves, KiGGS Wave 1 (2009–2012) and KiGGS Wave 2 (2014–2017) at intervals of six and eleven years, respectively [20] (Figure 1). The present analyses are based on two survey periods, the KiGGS baseline survey and KiGGS Wave 2.

The KiGGS baseline survey
The KiGGS baseline survey was conducted in 167 representatively selected cities and municipalities in Germany with a total of 17,641 girls and boys aged 0 to 17 years. It was the first nationally representative, population-based survey on child and adolescent health in Germany and included physical, mental, and social aspects of health as well as aspects of the health behavior of children and adolescents. The children were physically examined and tested and the parents filled in written questionnaires about the health of their offspring. From the age of eleven on the children and adolescents were also interviewed themselves [22, 23].
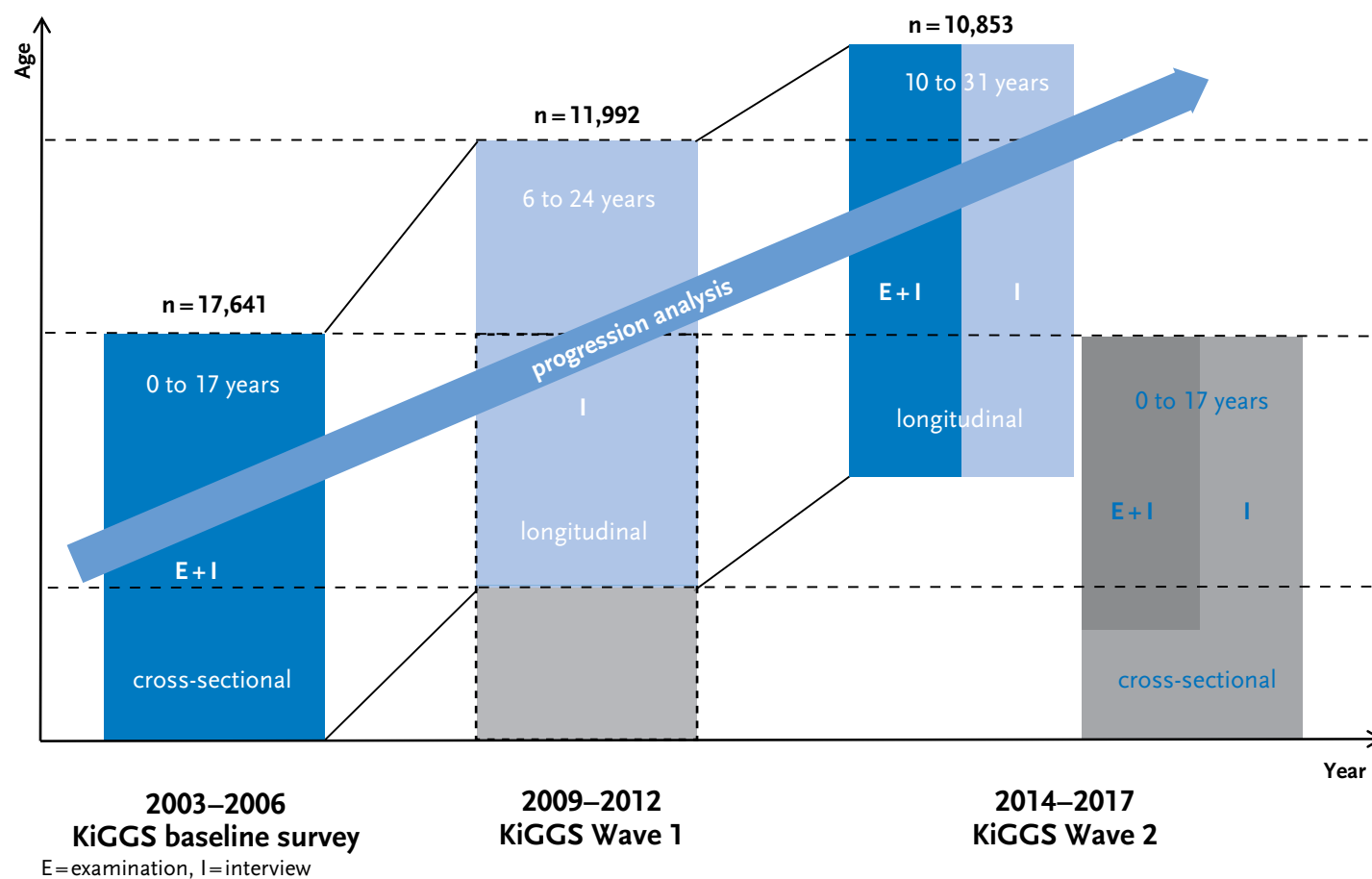
KiGGS Wave 2

The second follow-up survey, KiGGS Wave 2 (2014–2017), was conducted as an examination and survey, too [21]. In addition to a newly drawn cross-sectional sample for the age cohorts from 0 to 17 years in the 167 study sites [24], all participants of the KiGGS baseline survey who were still available and willing to participate again were invited to a written survey and – if they still lived in the study sites – to the examination component. In the meantime, they were 10 to 31 years old. A total of 10,853 longitudinal participants (KiGGS cohort) aged 10 to 31 years could be re-interviewed at the time of KiGGS Wave 2 this way [25]; the total re-participation rate was 62% [26].

2.2 Instruments and indicators

KiGGS baseline survey

Mental health problems were assessed with the Strengths and Difficulties Questionnaire (SDQ) in the parent rated version. The SDQ captures the most important areas of mental health problems in childhood and adolescence based on four so-called problem scales (1) 'Emotional problems' (item contents e.g. 'Many worries; often seems worried', 'Many fears; easily scared'); (2) 'Behavioural problems' (item contents e.g. 'Often has temper tantrums or hot tempers', 'Often lies or cheats'); (3) 'Hyperactivity problems' (item contents e.g. 'Constantly fidgeting or squirming', 'Easily distracted, concentration wanders'); and (4) 'Peer problems' (item contents e.g. 'Picked on or bullied by other children', 'Has at least one good friend') with five items each [27]. In addition, the SDQ contains the strengths scale 'Prosocial Behaviour', which, however, is not considered here. Using normative data, participants can be classified as 'normal', 'borderline' and 'abnormal' (see [28]). For the present paper, participants with 'borderline' or 'abnormal' scores on the subscales 'emotional problems' or 'peer problems' were combined into a subgroup with predominantly internalising problems. Participants with 'borderline' or 'abnormal' scores on the subscales 'behavioural problems' or 'hyperactivity problems' were combined into a subgroup with predominantly externalising problems [29, 30].

Personal resources were assessed applying a scale comprising three items from the General Self-Efficacy Scale WIRKALL (e.g. 'I can usually handle whatever comes my way.') [31, 32] and one item each from the Bern Questionnaire for Optimism ('My future looks bright.') [33] and the Sense of Coherence Scale ('The things I do every day give me pleasure and are fun.') [34]. Answers were given by children and adolescents aged eleven and older.

Family cohesion was assessed using a modified version of the Schneewind, Beckmann and Hecht-Jackl family climate scale (item contents e.g. 'In our family, everyone is responsive to everybody else's worries and needs', 'We all really get along well with each other') [35]. The nine items were answered by children and adolescents aged 11 to 17.

Social support was measured with a modified version of Donald and Ware's Social Support Scale [36] with a total of eight items. The items were answered by children and adolescents aged eleven and older.

KiGGS Wave 2

The five item Mental Health Inventory (MHI-5) was used to assess overall mental health. It assesses the frequency of various emotions over the past four weeks [37]. The eight-item version of the Patient Health Questionnaire (PHQ) was used to capture symptoms of depression during the last two weeks [38–40]. Panic disorder symptoms in the past four weeks were assessed with the five item PHQ-Panic screener [40]. Eating disorder symptoms were assessed with the SCOFF (Sick, Control, One, Fat, Food) questionnaire [41]. This questionnaire comprises five items related to core symptoms of anorexia and bulimia nervosa. Health-related quality of life was assessed with the German version of the eight-item Short-Form Health Survey (SF-8) [42] with two subscales pertaining to mental and physical health-related quality of life. General life satisfaction was measured using the Personal Wellbeing Index (PWI-A) [43].

Mental health problems during childhood or adolescence are associated with detrimental developmental outcomes in young adulthood.

The PWI-A consists of seven items on standard of living, health, personal relationships, security, belonging to a community, and security in the future.

The educational status of young adults aged 18 years and older was captured using the ISCED-11 (International Standard Classification of Education) [44], which allows classification into the educational categories low, medium and high.

Smoking and risky alcohol consumption were used as indicators of substance use. Smoking was recorded with a binary yes/no question. Occasional smokers were classified as smokers. Risky levels of alcohol consumption were assessed with the AUDIT-C (Alcohol use disorders identification test – consumption) [45]. The AUDIT-C is the short version of the AUDIT screening questionnaire and allows the calculation of a sum score for risky alcohol consumption based on three items.

Regarding partnership and sexual and reproductive health, participants were asked whether they were currently in a stable partnership. In addition, they were asked about their age at first sexual intercourse and the number of sexual partners. Condom use was assessed with the question 'Do you use condoms during sexual intercourse?' with three possible answers offered ('Yes, always', 'Yes, occasionally', 'No'). All adult participants were asked whether they had biological children and whether they were planned or unplanned.

2.3 Statistical methods

To analyse the effects of internalising and externalising problems in childhood or adolescence on developmental outcomes in young adulthood, logistical and linear regression models were specified depending on the discrete or continuous character of the dependent variable. The developmental outcomes in young adulthood served as dependent variables and internalising and externalising problems as independent variables.

In a first model, the outcomes in young adulthood (at KiGGS Wave 2) were predicted by internalising and externalising problems in childhood or adolescence (at KiGGS baseline survey) and controlled for age (in years), gender, migration background and socioeconomic status (SES). In a second model, the protective factor scales 'personal resources', 'family cohesion' and 'social support', (at KiGGS baseline survey), were also included. The models for risky alcohol consumption, condom use and contraception were additionally adjusted with a quadratic age term and the models for condom use and contraception moreover adjusted for stable partnership and number of sexual partners. Differences between groups with a p-value <0.05 were considered statistically significant.

All analyses were conducted with Stata (version 15.1) using survey procedures and longitudinal weights to compensate for study design and putative sampling bias due to selective re-participation.

3. Results
3.1 Sample description

The present analyses are based on data from a total of 3,546 21- to 31-year-old participants (average age 25.0 years): 55.4% were female and 44.6% were male. The proportion of participants with low SES was 10.0%, with medium SES 61.5%, and with high SES 28.4%. The proportion of participants with a migration background of both parents was 9.3%.

A total of 22.6% of the sample was presenting with internalising (women: 22.9%, men: 22.1%) and 15.4% were presenting with externalising problems in childhood or adolescence (women: 12.8%, men: 18.6%).

3.2 Internalising problems

Participants with internalising problems in childhood or adolescence report poorer general mental health, more

Outcome in young adulthood[2]	Coefficient for internalising problems in Model 1[3]	Coefficient for internalising problems in Model 2[3,4]
Mental health		
General mental health (MHI-5) (n=3,449)	B=-6.03***	B=-5.10***
Depressive symptoms (PHQ-8) (n=3,456)	B=1.35***	B=1.21***
Panic disorder (PHQ panic) (n=3,421)	OR=1.95	OR=2.11*
Eating disorder symptoms (SCOFF) (n=3,481)	OR=1.80***	OR=1.73***
Life satisfaction and quality of life		
General life satisfaction (PWI-A) (n=3,455)	B=-6.67***	B=-5.27**
Physical quality of life (SF-8) (n=3,480)	B=-1.06**	B=-0.82*
Psychological quality of life (SF-8) (n=3,480)	B=-3.11***	B=-2.68***
Education status (ISCED)		
Low vs. medium (n=3,463)	RRR=1.24	OR=1.17
High vs. medium (n=3,463)	RRR=0.85	OR=0.89
Substance use		
Risky alcohol consumption (Audit-C)[5] (n=3,479)	B=-0.47***	B=-0.45***
Smoking (n=3,492)	OR=0.84	OR=0.87
Partnership, sexual and reproductive health		
Permanent partnership (n=3,491)	OR=0.79*	OR=0.83
Age of first sexual intercourse (n=3,192)	B=0.50**	B=0.38**
Number of sexual partners (n=3,206)	B=-0.05	B=-0.05
General vs. occasional condom use[5,6] (n=3,177)	RRR=1.01	OR=1.02
No vs. occasional condom use[5,6] (n=3,177)	RRR=0.91	OR=0.94
Risk for unplanned children (n=340)[7]	OR=2.24*	OR=2.40**

B = Beta coefficient, OR = Odds Ratio, RRR = Relative Risk Ratio, MHI = Mental Health Inventory, PHQ = Patient Health Questionnaire,
SCOFF = Sick, Control, One, Fat, Food, PWI-A = Personal Wellbeing Index, SF = Short-Form Health Survey,
ISCED = International Standard Classification of Education, Audit-C = Alcohol use disorders identification test – Consumption
* p<0.05, ** p<0.01, *** p<0.001
[1] Model 1 without and model 2 with consideration of protective factors at KiGGS baseline survey
[2] All models adjusted for age, gender, socioeconomic status, migration background and externalising problems
[3] OR for categorical outcomes (binary logistic regression), RRR for categorical outcomes (multinomial logistic regression), B for metric outcomes (linear regression), negative coefficients indicate an opposite, positive coefficients an concordant association of the predictor with the respective outcome
[4] With adjustment for protective factors
[5] Models additionally adjusted for quadratic age term
[6] Models additionally adjusted for fixed partnership
[7] Lower case number due to filtering in the questionnaire

Children and adolescents with mental health problems often display impaired mental health, lower life satisfaction and poorer health-related quality of life as adults.

Table 1
Predicting developmental outcomes in young adulthood (age 21 to 31 years) in the presence of internalising problems in childhood or adolescence using linear and logistic regression models[1]
Source: KiGGS baseline survey (2003–2006), KiGGS Wave 2 (2014–2017)

Individuals with internalising problems in childhood or adolescence are, on average, older at first sexual intercourse and are more likely to have unplanned children.

depressive symptoms and a higher likelihood of presenting eating disorder symptoms (Table 1). On average, they show lower overall life satisfaction and lower physical and psychological quality of life as young adults aged up to 31 years. Internalising problems are not significantly associated with academic achievement. Further, there is no increased probability of suffering from panic disorders in young adulthood. Similarly, no increased risk of smoking or risky alcohol use was found for those participants. The latter even appears to be less likely among participants with internalising problems in childhood or adolescence. The probability of being in a stable partnership in young adulthood is significantly lower for participants with internalising problems in childhood or adolescence than for participants without those problems. Furthermore, these individuals show a higher age at first sexual intercourse and an increased likelihood of having unplanned children.

Effects of protective factors in childhood or adolescence: internalising problems

When including personal, family and social protective factors at KiGGS baseline in the model, the coefficients for internalising problems in childhood or adolescence decrease in the models for general mental health, depressive symptoms and eating disorder symptoms in young adults. This is also true for the models of general life satisfaction and physical and psychological quality of life in adults. With regard to educational status and smoking or alcohol consumption, no or only very slight effects were found. The relationship between internalising problems in childhood or adolescence and a lower probability of living in a stable partnership in young adulthood is

not significant after adjusting for the protective factor scales. When the protective factor scales are considered, the age of first sexual intercourse increases as does the probability of having unplanned children.

3.3 Externalising problems

Externalising problems in childhood or adolescence are associated with poorer general mental health, higher incidence of depressive symptoms and an increased likelihood of suffering from eating disorder symptoms in young adulthood (Table 2). They are significantly associated with lower overall life satisfaction and lower physical health-related quality of life in young adulthood. No significant association with psychological health-related quality of life was found. Participants reporting externalising problems in childhood or adolescence have an increased probability of lower educational status and of being smokers in young adulthood. In contrast, no correlations with risky alcohol use are found. On average, participants with externalising problems in childhood or adolescence are younger at first sexual intercourse and have had a larger number of sexual partners. On the other hand, they are less likely to have unplanned children.

Effects of protective factors in childhood or adolescence: externalising problems

After adjusting for personal, family and social protective factors, the coefficient for externalising problems in childhood or adolescence decreases in the model for general mental health, depressive symptoms and eating disorder symptoms in young adulthood. The coefficient in the

model for life satisfaction is no longer significant, the coefficient in the model for physical quality of life in young adulthood decreases in extent but remains significant. The coefficient for low versus medium educational status decreases slightly after adjustment with the protective factor scales. After adjustment with the protective factor scales, the probability of being a smoker in young adulthood decreases. The average age at first sexual intercourse remains

Outcome in young adulthood[2]	Coefficient for externalising problems in Model 1[3]	Coefficient for externalising problems in Model 2[3,4]
Mental health		
General mental health (MHI-5) (n=3,449)	B=-3.71**	B=-2.75*
Depressive Symptoms (PHQ-8) (n=3,456)	B=1.05***	B=0.79**
Panic disorder (PHQ panic) (n=3,421)	OR=1.08	OR=1.04
Eating disorder symptoms (SCOFF) (n=3,481)	OR=1.43**	OR=1.31*
Life satisfaction and quality of life		
General life satisfaction (PWI-A) (n=3,455)	B=-4.01**	B=-2.48
Physical quality of life (SF-8) (n=3,480)	B=-1.63**	B=-1.36*
Psychological quality of life (SF-8) (n=3,480)	B=-0.75	B=-1.25
Education status (ISCED)		
Low vs. medium (n=3,463)	RRR=2.53***	OR=2.37**
High vs. medium (n=3,463)	RRR=0.68*	OR=0.68*
Substance use		
Risky alcohol consumption (Audit-C)[5] (n=3,479)	B=0.18	B=0.13
Smoking (n=3,492)	OR=2.50***	OR=2.39***
Partnership, sexual and reproductive health		
Permanent partnership (n=3,491)	OR=1.13	OR=1.13
Age of first sexual intercourse (n=3,192)	B=-0.71***	B=-0.71***
Number of sexual partners (n=3,206)	B=0.36*	B=0.34
General vs. occasional condom use[5,6] (n=3,177)	RRR=0.95	OR=1.00
No vs. occasional condom use[5,6] (n=3,177)	RRR=0.96	OR=0.98
Risk for unplanned children (n=340)[7]	OR=0.38*	OR=0.33*

B=Beta coefficient, OR=Odds Ratio, RRR=Relative Risk Ratio, MHI=Mental Health Inventory, PHQ=Patient Health Questionnaire, SCOFF=Sick, Control, One, Fat, Food, PWI-A=Personal Wellbeing Index, SF=Short-Form Health Survey, ISCED=International Standard Classification of Education, Audit-C=Alcohol use disorders identification test – Consumption
* p<0.05, ** p<0.01, *** p<0.001
[1] Model 1 without and model 2 with consideration of protective factors at KiGGS baseline survey
[2] All models adjusted for age, gender, socioeconomic status and migration background and internalising problems
[3] OR for categorical outcomes (binary logistic regression), RRR for categorical outcomes (multinomial logistic regression), B for metric outcomes (linear regression), negative coefficients indicate an opposite, positive coefficients indicate a same-sense association of the predictor with the respective outcome
[4] Adjusted for protective factors
[5] Models additionally adjusted for quadratic age term
[6] Models additionally adjusted for steady partnership and number of sexual partners
[7] Lower case number due to filtering in the questionnaire

On Average, children and adolescents with externalising problems come up with lower academic success, tend to be smokers and to having had more sexual partners.

Table 2
Predicting developmental outcomes in young adulthood (age 21 to 31 years) in the presence of externalising problems in childhood or adolescence using linear and logistic regression models[1]
Source: KiGGS baseline survey (2003–2006), KiGGS Wave 2 (2014–2017)

unaffected, the coefficient in the model for the number of sexual partners is no longer significant, and the probability of having unplanned children decreases.

4. Discussion

According to the data of the KiGGS cohort, internalising and externalising problems in childhood or adolescence impact on the mental health, life satisfaction, health-related quality of life, academic achievement, risky health behaviour and sexual and reproductive health in young adulthood.

Internalising problems

In this study, the mental health outcomes of participants with predominantly internalising problems in childhood or adolescence in young adulthood are often poorer and subjects report lower life satisfaction and decreased psychological and physical health-related quality of life. Comparable associations were also found in a longitudinal study in the US [15]. In that study, respondents who were presenting with internalising problems when they were five to twelve years old showed lower physical and psychological quality of life in young adulthood, too; they were less physically active and presented eating disorder symptoms more frequently. This was particularly true for young women [15]. Like in our study, in other international studies internalising problems in childhood and adolescence were shown to be stable into adulthood [14, 46]. For example, a US study with an observation period of 30 years showed temperament differences in infancy to be associated with internalising symptoms in adulthood: children who were shy or anxious at the age of 14 months were more introverted, had more social problems, and suffered more depressive and anxiety symptoms in adulthood [14]. In line with other studies [47], we did not find associations between internalising problems in childhood or adolescence and later academic achievement.

In addition, we did not find a higher likelihood for risky alcohol or tobacco consumption in young adulthood for participants with internalising problems in childhood or adolescence. According to our data, risky alcohol consumption is actually lower among those than among participants without such problems in childhood or adolescence. A longitudinal study from Australia came up with similar results, as children with internalising problems at the age of five were less likely to smoke in adolescence (at the age of 14 years) than non-affected children [49]. In a Finnish cohort study, the use of psychoactive substances such as alcohol, cannabis or other illicit drugs was not associated with internalising problems in childhood, too [50].

Additionally, the KiGGS data indicates that individuals with internalising problems in childhood or adolescence are less likely to be in a stable partnership in young adulthood. Also, participants with internalising problems in childhood or adolescence tend to become sexually active at a later point in life than the non-affected. They display, however, an increased likelihood of having unplanned children. Several studies have shown associations between internalising problems and early parenthood, both for young mothers and young fathers [51, 52]. However, there are gender-specific aspects concerning the association between early internalising problems and sexual and reproductive health. For instance, boys with internalising problems at

The availability of psychosocial protective factors in childhood or adolescence may attenuate the effects of initial mental health problems with respect some adverse developmental outcomes in young adulthood.

the age of eight to ten years tend to become sexually active at a younger age, whereas this association was not found in girls [54]. Further associations between internalising problems in childhood and adolescence with sexual and reproductive health have been previously described in research literature. A New Zealand longitudinal study found that internalising problems were associated with a lower likelihood of early first sexual intercourse and with a decreased likelihood of risky sexual behaviour in young adulthood, such as frequently changing sexual partners or not using condoms during sexual intercourse [55].

Externalising problems

Externalising problems in childhood and adolescence have long been in the focus of developmental psychopathology research due to their considerable impact on the further course of life [56]. In line with our data, the literature shows that externalising problems in childhood and adolescence are associated with higher risks for depressive and anxiety symptom. Such associations hold also true with externalising disorders such as attention deficit/hyperactivity disorder (ADHD), substance use disorders or antisocial personality disorders [57, 58]. In line with our results, a Norwegian study showed that individuals with a high and stable trajectory of externalising problems from age 1.5 to 14.5 years displayed significantly lower life satisfaction in young adulthood [59]. Also in line with our data, the Dutch TRAILS study showed that externalising problems in childhood or adolescence were associated with lower educational success later in life [47]. In our study, children or adolescents with externalising problems had significantly higher risks

of smoking in adulthood, but not for risky alcohol consumption. In contrast, the BELLA study, the in-depth mental health module of the KiGGS study, for which the data was collected in parallel to KiGGS Wave 1, the likelihood of risky alcohol consumption in young adulthood is 1.6 times higher for participants with externalising problems than for individuals without behavioural problems However, this discrepancy may be explained by age differences of the participants and different definitions of externalising problems. According to our data, the likelihood of becoming sexually active at an early age is significantly higher for children or adolescents with externalising problems. However, they were not less likely to be in a stable partnership in young adulthood than participants without such problems in childhood or adolescence. Comparable results were found in the previously mentioned New Zealand cohort study, where externalising problems in childhood were similarly associated with early sexual intercourse (before the age of 16), sexual intercourse without condom use and with more frequent changes of partners [54, 55]. For boys in particular, an early onset of externalising problems at the age of five was found to be predictive of an early onset of sexual activity (before the age of 16) [54].

Effects of protective factors

The present study is among the few to examine the effects of protective factors on the relationship between internalising and externalising problems in childhood or adolescence and developmental outcomes in young adulthood on a national level. The present analyses show that the availability of psychosocial protective factors in childhood

or adolescence impacts most on mental health, life satisfaction and health-related quality of life in young adulthood. This holds true for both children and adolescents with internalising and externalising problems. Even when controlling for important confounding factors such as age, gender, migration background, and socioeconomic status, the overall risk for poorer educational achievement in the presence of externalising problems in childhood or adolescence remains. To some – albeit small – extent, protective factors appear to mitigate the risks of low (versus medium) educational status for those with externalising problems. To a certain extent, a young adult person's sexual and reproductive health also seems to be related to the available psychosocial protective resources in childhood and adolescence. For example, when adjusting for the protective factors young adult participants with internalising problems in childhood or adolescence displayed the same likelihood of being in a stable partnership as non-affected individuals in our study. However, protective factors did not impact on the increased likelihood of having unplanned children. If the protective factors were taken into account, the increase in number of sexual partners in the group of participants with externalising problems in childhood or adolescence became non-significant. These results highlight for both subjects with internalising and externalising problems potential starting points for sexual education interventions considering also psychosocial resources. Notably, the risk of having unplanned children appears lower among participants with externalising problems in childhood or adolescence, regardless of protective factors. A yet unpublished analysis on the basis of our data shows individuals diagnosed with ADHD in childhood or adolescence presenting

with a higher probability of having unplanned children. This will require further in-depth analyses.

In our analyses, we considered personal, family and social protective factors in toto regardless of their respective dimensions. Specific analyses remain a task for future investigations.

It is known from other studies that protective factors have positive effects on later mental health and quality of life, both in the presence of internalising and externalising problems in childhood and adolescence. For example, a meta-analysis of 57 randomised controlled trials on the effects of interventions that focus on strengthening personal protective factors shows that strengthening the resilience of children and adolescents may have a protective effect regarding the development of later mental health problems. The development of internalising disorders in particular can apparently be significantly reduced by promoting personal protective factors during childhood and adolescence [60]. However, family and social protective factors also play an important role in mitigating risks to physical and mental health. In a US longitudinal study, family protective factors were found to be protective against the adverse effects of childhood violence on the development of externalising problems [61].

Limitations and strengths

There are a number of limitations to the present analyses. For case number reasons in the group of the young adults, only the data from the first and third survey date of the KiGGS cohort were used. Despite the longitudinal character of the data, and not withstanding evidence for a causal effect, the

results should therefore not be interpreted causally. Although the KiGGS cohort is based on the participants of the nationally representative KiGGS baseline survey it has to be kept in mind that a cohort's representativeness decreases over time for various reasons: for example due to changes to the panel such as changes in marital status, the birth of children or changes in occupational and educational status, or due to panel mortality (i.e. changes in the composition of the sample due to the selective drop-out of participants). For instance, the proportion of participants with a low SES is 10% in the cohort sample and therefore only half as high as in the baseline sample. However, the analyses were weighted for drop-outs and additionally all analyses were controlled for SES. The present analyses provide a first overview of the correlates and the possible impacts of internalising and externalising problems in childhood or adolescence as well as the putative role of psychosocial protective factors. The statistical adjustment of the models with the protective factor scales does, however, not allow to evaluate whether the examined risks (internalising or externalising problems in childhood or adolescence) are actually buffered by the protective factors. Such thesis would require interaction analyses. However, the present results allow to conclude that the promotion of psychosocial protective factors in childhood and adolescence may be related to improvements to some of the developmental outcomes. Strengths of the present analyses include the longitudinal approach, the follow-up of participants over a period of eleven years, the large number of available indicators and the sample, which for the first time allowed to examine longitudinal data on the longterm development of children and adolescents with mental health problems at a national level in Germany.

Conclusion

The present data shows that both internalising and externalising mental health problems in childhood or adolescence appear closely associated with the mental health, life satisfaction and the health-related quality of life as well as with the sexual and reproductive health in young adulthood. Beyond that, externalising problems appear associated with a lower educational status and an increased likelihood of smoking in adulthood. Mental health problems in childhood or adolescence may thus significantly impact the opportunities of enjoying a healthy and socially successful life of those affected. The results thus suggest that fostering protective factors in childhood and adolescence may be beneficial for youths presenting with mental health problems in order to mitigate multifaceted risks in young adulthood. The effects of psychosocial protective factors highlighted by the analyses point to possible opportunities for resource-based prevention and intervention. In-depth analyses on the potentially differential effects of the various protective factor dimensions (personal, familial and social) remain needed.

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Mental health issues in childhood and adolescence, psychosocial resources and socioeconomic status – An analysis of the KiGGS Wave 2 data

Abstract

Mental health burdens are among the most common health issues in childhood and adolescence. Psychosocial resources can act as protective factors and can help in preventing the development and reduce the symptoms of mental health issues. This article discusses this relationship and the availability of these resources within the three different social status groups among 11- to 17-year-olds. The database is the second wave of the German Health Interview and Examination Survey for Children and Adolescents (KiGGS Wave 2, 2014–2017). Mental health issues were assessed via the Strengths and Difficulties Questionnaires; psychosocial resources via self-reported personal, family and social resources; social status was ascertained through a multidimensional index based on the information provided by parents on education, occupational status and income. The analyses show that 11- to 17-year-olds who have psychosocial resources are less likely to show mental health issues (independent of their social status) and that, compared to high social status, mental health issues are more frequently associated with low social status. Children from (socially) worse-off families have less access to resources. The results consequently highlight the importance of prevention and health promotion measures directed at strengthening resources. Focusing such measures on the needs of disadvantaged population groups should contribute to health equity.

🏷 MENTAL HEALTH BURDENS · PSYCHOSOCIAL RESOURCES · KIGGS WAVE 2 · SOCIAL SITUATION-BASED HEALTH PROMOTION

1. Introduction

The course of a person's future health is set very early on in life. From a life-course-epidemiology perspective, mental health issues in childhood and adolescence play an important role for health in later life. The risk of issues manifesting as a disorder, becoming chronic and of various comorbidities developing is great [1, 2, 3]. A pronounced social gradient is observed in the occurrence of mental health issues, with an increased risk for children and adolescents from the low-status groups [4, 5].

Psychosocial resources in terms of personal, family and social resources, are of particular importance, as they act as protective factors and are capable of positively influencing mental health. This protection can help in preventing the development of mental health issues or otherwise ensure that children and adolescents with mental health issues nevertheless develop into mentally healthy adults [6].

However, children and adolescents from socially disadvantaged backgrounds are demonstrably less likely to count on these resources than those from socially better-off families.

Also with regard to health equity, the ties between mental health issues, psychosocial resources and social status are key to strengthening health promotion and prevention. Important references here are the target anchored in Germany's Prevention Act [7, 8] of 'reducing socially rooted and gender-related inequalities in health opportunities', the health goal 'Growing up healthy: life skills, exercise, nutrition' [8, 9, 10], which is also mentioned in the Prevention Act, as well as the Cooperation Network on Equal Health Opportunities [11].

The German Health Interview and Examination Survey for Children and Adolescents (KiGGS) provides data on the physical and mental health of children and adolescents, which are also comprehensively analysed for their relationship with social status [4, 5, 12, 13]. As a supplementary evaluation, this paper intends to examine the relationship between social status, mental health issues and personal, social and family resources, in particular the extent to which children from socially disadvantaged families benefit from corresponding resources. Against this backdrop, we will examine three questions: (1) what is the significance of psychosocial resources for the risk of mental health issues in 11- to 17-year-old children and adolescents?; (2) are there social status-specific differences in the availability of psychosocial resources?; and, (3) how does social status affect the relationship between resources and mental health issues?

2. Methodology

2.1 Data basis

The analyses presented here build on data collected between 2014 and 2017 for the second wave of the German Health Interview and Examination Survey for Children and Adolescents (KiGGS Wave 2). The KiGGS survey has been conducted as a part of health monitoring at the Robert Koch Institute (RKI) since 2003. It also comprises repeated cross-sectional surveys of 0- to 17-year-old children and adolescents representative for Germany. Like the KiGGS baseline survey (2003–2006), KiGGS Wave 2 was conducted as a combined examination and interview survey. KiGGS Wave 1 (2009–2012) was designed and conducted as a telephone interview survey.

The population for the cross-sectional data of KiGGS Wave 2 consists of the group of 0- to 17-year-old children and adolescents with a permanent residence in Germany. Sampling was carried out via residency registration offices and the subsequent invitation of randomly selected children and adolescents from the 167 cities and municipalities of the KiGGS baseline survey. A total of 15,023 study subjects (7,538 girls, 7,485 boys) participated in the cross-sectional KiGGS Wave 2 survey. The participation rate was 40.1%. In addition, 3,567 children and adolescents participated in the screening programme (1,801 girls, 1,766 boys; participation rate: 41.5%) [14]. For the present study, 3,423 girls and 3,176 boys aged 11 to 17 years were included in the analyses.

2.2 Study variables

KiGGS Wave 2 recorded mental health issues based on parental responses to the Strengths and Difficulties Questionnaire (SDQ), a symptoms questionnaire comprising a total of 25 items. These refer to five subscales with five items each, namely the four problem scales Emotional Difficulties, Behavioural Issues, Hyperactivity Problems, Problems with Peers and the strength dimension Prosocial Behaviour. In this paper, however, only the four problem dimensions of the questionnaire were considered. Parents were asked to rate a total of 20 statements regarding their children. A score was calculated from the answers Not true at all (0), True to a certain extent (1) or Very true (2). Children and adolescents with a total score of up to 12 points across all areas are classified as psychologically normal, those with a score between 13 and 16 as borderline and those with a score of 16+ as presenting mental health issues [3, 12, 15]. Based on SDQ scores, respondents in the borderline and mental health issues groups were grouped together as being at risk of mental health issues [12].

Psychosocial resources were surveyed using various items and can be divided into personal, family and social resources [13, 16]. The corresponding data and results are based exclusively on self-reported data from the 11- to 17-year-old children and adolescents.

Personal resources were assessed based on a five-item scale and four possible responses for each item. These items are based on Schwarzer and Jerusalem's self-efficacy scale (e.g. 'for every problem I can find a solution') [17], the Bern Questionnaire on Well-Being' optimism scale (e.g. 'my future looks bright') [18] and the Children's Sense of

Coherence Scale (e.g. 'my daily activities give me pleasure and are fun') [19]. These questions measure personality traits such as a respondent's sense of coherence (the feeling of being understandable, manageable and meaningful) or dispositional optimism (general confidence that things will develop positively, regardless of previous experiences). Another characteristic taken into account is general self-efficacy, i.e. the general conviction that one has the necessary skills to deal with challenges [20].

A modified version of the family health climate scale according to Schneewind et al. [21] was applied to assess family resources. This was summarised into nine items and four answers for each item. Of particular importance here are aspects of family climate, such as family cohesion and the parenting behaviour of parents (e.g. 'we all really get along well with each other' or 'in our family everyone responds to the worries and needs of the others') [20].

Social resources were assessed using a German translation of the Social Support Scale [22] with eight items. The five-stage response categories were coded with values from 1 to 5. The items ask about the social support respondents experience or that is available to them from peers and adults in the form of listening and affection, about support and help to solve problems in life as well as opportunities to do things together [20].

Overall, the item values were coded in such a way that a higher value reflects a greater resource availability. The figures were added up and transformed into values between 0 and 100. Based on an assessment of the item contents, cut-off values were determined that take into account the response distributions established in the KiGGS sample. The scale values were then divided into

Psychosocial resources can positively influence mental health.

the categories of 'inconspicuous or normal', 'below average or borderline' and 'significant deficits' [13, 20]. Dummies were created for the binary logistic regressions (see 2.3 Statistical analyses). The categories 'inconspicuous or normal' and 'below average or borderline' were combined and labelled 'medium/high'. 'Significant deficits' were labelled as 'low'.

KiGGS Wave 2 records socioeconomic status (SES) based on a multidimensional index by calculating a point total score from the information provided by parents on education (school achievement and professional qualifications) and occupational status, as well as on needs-weighted net household income (net equivalent income) [23].

For each individual dimension, point values ranging from one to seven are assigned according to a fixed scheme. Information on education and occupational status is collected from the mother and father and the higher point values taken into account. In the case of single parents, the single value is used. Based on distribution, three groups are distinguished, with 20% of children and adolescents in the low-status group (1st quintile), 60% in the medium status group (2nd to 4th quintile) and 20% in the high-status group (5th quintile) [23].

A detailed description of KiGGS Wave 2 can be found in the S3/2017 issue of the Journal of Health Monitoring [16]. A more detailed description of SES is found in issue 1/2018 [23].

2.3 Statistical analyses

To analyse the questions described at the beginning of this article, a four-step procedure was adopted. In a first step, the distribution of mental health issues with consideration of social status was examined for 11- to 17-year-old children and adolescents. Subsequently, the distribution of psychosocial resources was examined, also segregated by social status. Psychosocial resources were always differentiated as personal, family and social resources. The third step consisted in assessing the significance of psychosocial resources for the occurrence of mental health issues. In the final fourth step, whether and, if yes, the extent to which social status affects the relationship between resources and mental health issues was examined. The analyses were carried out with the statistics programme STATA 14.2. Prevalences are presented with 95% confidence intervals. In addition, binary logistic regressions were calculated and odds ratios with 95% confidence intervals are reported. The odds ratios express the factor by which the statistical chance that the respective outcome is present is increased in a determined group in relation to a defined reference group. All calculations were carried out with a weighting factor that corrects for deviations of the sample from the general population structure with regard to age in years, gender, federal state, German nationality and parental distribution of education [24].
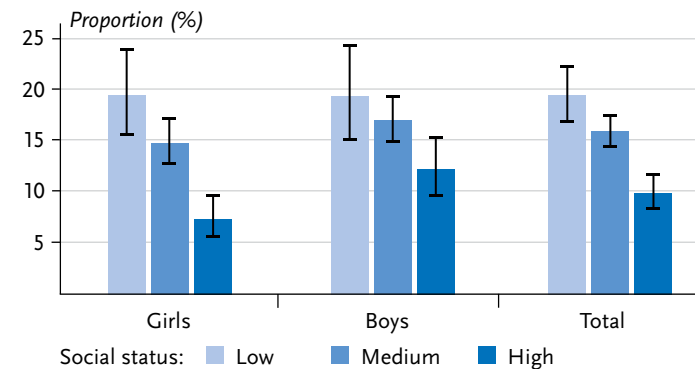
3. Results

Based on the KiGGS Wave 2 data, 15.6% of 11- to 17-year-olds in Germany present mental health issues. Thereby, clear differences can be observed with regard to social status. Overall, 19.4% of 11 to 17-year-olds from the low status group present mental health issues compared to 15.9% from the medium and 9.9% from the high-status group. The

According to KiGGS Wave 2 around 16% of 11- to 17-year olds in Germany are affected by mental health issues.

social gradient is clearly evident for all genders, but is somewhat more pronounced in girls than in boys (Figure 1).

Figure 2, Figure 3 and Figure 4 show the distribution of psychosocial resources among 11- to 17-year-old girls and boys in the different social status groups.

The results indicate that children and adolescents from the low-status group (27.3%) have few personal resources more frequently than their peers from the medium and high-status groups (18.4% and 13.3% respectively). When segregated by gender, the high proportion of girls from the low status group who have few personal resources (36.3%) is particularly striking. In the medium and high-status groups, this proportion is only about half as high. For boys, the differences are less pronounced, but still clear, at least when comparing the low to the high-status group (Figure 2).

Slightly smaller differences are observed for family resources. 42.0% of children and adolescents from the low status group have few family resources compared to 38.5% from the medium and 31.0% from the high-status group. When segregated by gender, the analyses show a somewhat more pronounced social gradient for girls than for boys. In addition, regarding the share of those with few family
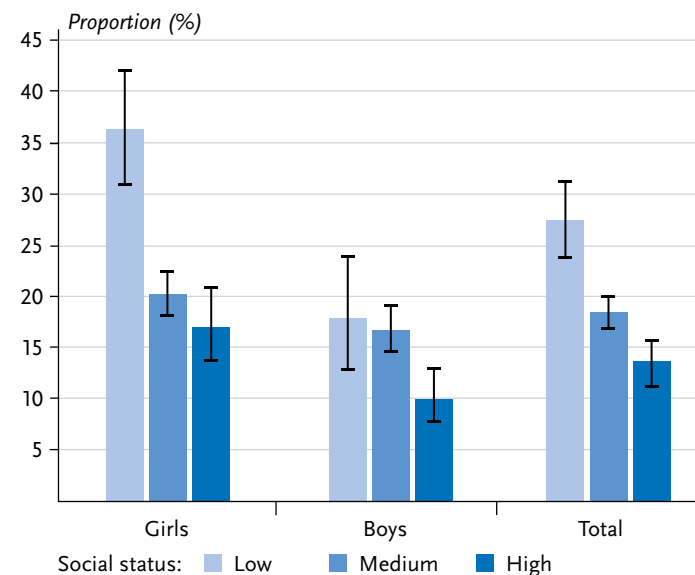
Figure 4
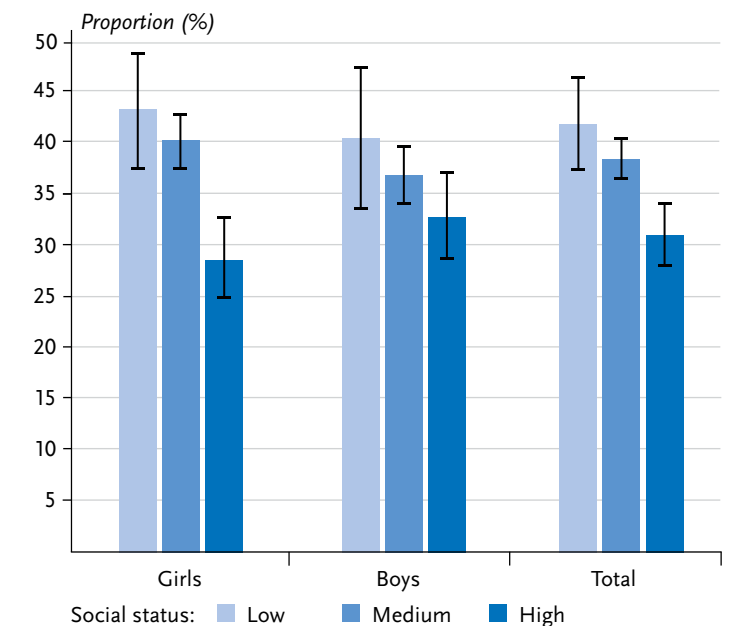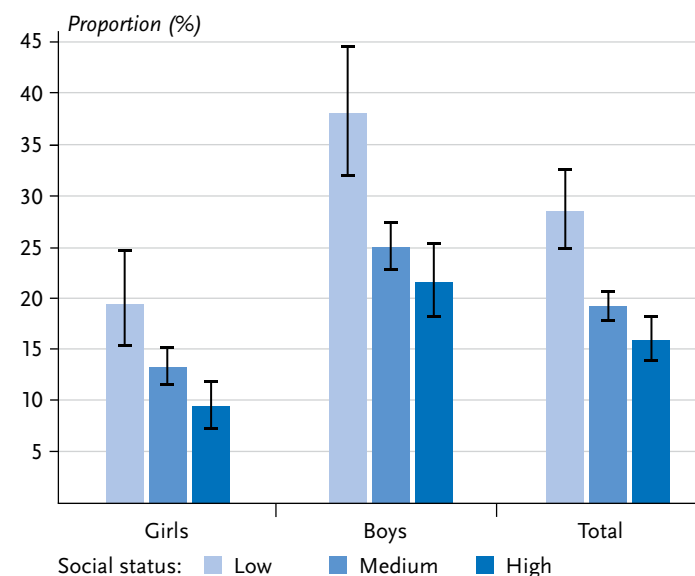Lack of social resources among 11- to 17-year-old girls and boys by socioeconomic status
Source: KiGGS Wave 2 (2014–2017)

Proportion (%)

Social status: Low | Medium | High

Access to psychosocial resources in society is clearly skewed, i.e. girls from the low social status group have fewer personal resources.

gradient is evident for both girls and boys. Unlike for personal resources, boys score lower in social resources than girls and more often have less resources (Figure 4).

To examine the influence of psychosocial resources on mental health issues, we will first look at mental health issues in relation to the availability of resources among 11- to 17-year-old girls and boys. KiGGS Wave 2 data indicate that children and adolescents show lower levels of mental health issues overall if they have more resources at their disposal. This effect is most pronounced regarding personal resources. Here, 31.7% of the children and adolescents who have few resources evidence issues with mental health, but only 11.7% of their peers with medium/many resources. The corresponding differences in social and family resources are somewhat smaller. Of those with few social resources, 26.8% present mental health issues; of those with medium/many resources the figure is 12.6%. 21.8% of children and adolescents with few family resources have mental health issues, compared to 11.6% of those with medium/many family resources.

resources, the differences by gender are minimal and this applies to all status groups (Figure 3).

The gradient for the distribution of social resources among 11- to 17-year-olds is somewhat more pronounced (28.5% in the low-status group compared to 19.2% in the medium and 15.9% in the high-status group). This social

Table 1
Mental health issues in 11- to 17-year-old girls and boys by resources (Odds Ratios calculated using binary logistic regressions)
Source: KiGGS Wave 2 (2014–2017)

		Girls					Boys					Total	
	%	(95% CI)	OR	(95% CI)	%	(95% CI)	OR	(95% CI)	%	(95% CI)	OR	(95% CI)
Personal Resources												
Little	26.7	(22.4–31.6)	3.2	(2.4–4.3)	38.7	(32.8–45.0)	4.2	(3.1–5.7)	31.7	(28.2–35.4)	3.7	(3.0–4.6)
Medium/Many	10.6	(8.9–12.7)		Ref.	12.7	(11.1–14.6)		Ref.	11.7	(10.6–13.0)		Ref.
Family Resources												
Little	20.3	(17.4–23.6)	2.2	(1.6–2.9)	23.2	(19.7–27.2)	2.1	(1.6–2.8)	21.8	(19.6–24.1)	2.4	(2.0–3.0)
Medium/Many	10.6	(8.6–13.0)		Ref.	12.5	(10.8–14.4)		Ref.	11.6	(10.2–13.1)		Ref.
Social Resources												
Little	28.5	(23.2–34.5)	2.9	(2.1–4.0)	26.0	(21.1–31.6)	2.3	(1.7–3.0)	26.8	(23.4–30.6)	2.6	(2.1–3.2)
Medium/Many	12.2	(10.5–14.2)		Ref.	13.4	(11.8–15.2)		Ref.	12.8	(11.6–14.1)		Ref.

OR = Odds Ratio, CI = Confidence Interval, Ref. = Reference

Table 2

Effects of personal, family and social resources on mental health issues in 11- to 17-year-olds by social status (Odds Ratios adjusted for age and gender)

Source: KiGGS Wave 2 (2014–2017)

	Social status: Low				Social status: Medium				Social status: High			
	%	(95% CI)	OR	(95% CI)	%	(95% CI)	OR	(95% CI)	%	(95% CI)	OR	(95% CI)
Personal Resources												
Little	37.0	(29.4–45.5)	4.19	(2.6–6.8)	31.7	(27.1–36.6)	3.46	(2.7–4.5)	18.2	(13.1–24.7)	2.7	(1.7–4.3)
Medium/Many	13.8	(10.5–17.8)		Ref.	12.0	(10.7–13.6)		Ref.	8.6	(6.8–10.9)		Ref.
Family Resources												
Little	27.2	(22.1–33.3)	2.41	(1.5–3.8)	22.1	(19.3–25.1)	2.51	(2.0–3.2)	11.8	(8.5–16.1)	1.8	(1.1–2.8)
Medium/Many	14.4	(10.9–18.8)		Ref.	11.7	(10.0–13.7)		Ref.	8.1	(6.3–10.4)		Ref.
Social Resources												
Little	34.1	(26.6–42.4)	3.17	(2.0–5.0)	25.1	(21.1–29.6)	2.20	(1.7–2.9)	18.8	(13.6–25.4)	2.5	(1.5–4.0)
Medium/Many	14.6	(11.6–18.3)		Ref.	13.5	(11.9–15.3)		Ref.	8.1	(6.4–10.3)		Ref.

OR = Odds Ratio, CI = Confidence Interval, Ref. = Reference

The results highlight the protective function of personal, family and social resources, which calls attention to fields of action for health promotion and prevention.

An analysis by gender shows that the connection between the availability of resources and mental health issues is evident as much for girls as also for boys. For personal resources, the connection is somewhat stronger for boys than for girls. For social resources, the figure for girls are somewhat greater than for boys. For family resources, the relationship is similar for girls and boys (Table 1).

Table 2 shows the relationship between psychosocial resources and mental health issues in 11- to 17-year-olds by social status. For all three resources, children and adolescents with medium/many resources are significantly less likely to present mental health issues than those with few resources. This can be observed across all three social status groups. When controlling for age and gender, children and adolescents in the low-social status group with low levels of personal resources have a 4.2-fold increased risk of presenting mental health issues compared to those with medium/many resources.

For family and social resources, too, children and adolescents with few resources more often present mental health issues than those with medium/many resources.

The differences between the status groups in this regard are somewhat less pronounced than for personal resources.

When segregated by gender, a clear connection between resources and mental health issues is found for girls and boys across all status groups. Some specific aspects however do stand out. For girls, the connection between social resources and mental health issues is strongest in the high-status group. Among boys, the connection between personal resources and mental health issues is even more pronounced in the medium status group than in the low or high status group.

4. Discussion

For 11- to 17-year-old girls and boys, the KiGGS Wave 2 results indicate that the availability of psychosocial resources reduces the risk of mental health issues. This protective effect was visible in the analyses of personal, family and also social resources and for children and adolescents from all social status groups. At the same time, the results highlight that children and adolescents from families with low

social status have fewer resources at their disposal than their peers from higher status groups and more frequently suffer mental health issues. Furthermore, a number of gender-related differences are apparent. For girls, the tie between social resources and mental health issues is somewhat stronger than for boys. On the other hand, the connection between personal resources and mental health issues is somewhat more pronounced in boys than it is in girls. However, the key finding that the psychosocial resources of children and adolescents of all status groups are associated to a reduced risk for mental health issues, applies to both girls and boys.

The results presented here are largely in line with previous research. This applies, on the one hand, to the finding of a protective effect of resources on mental health and, on the other hand, to the status-specific differences with regard to available resources and the risk of suffering mental health issues [25]. Particular reference should be made to the results of the mental health module of the KiGGS survey [26], the BELLA study (**BE**fragung zum see**L**ischen Woh**L**befinden und Verh**A**lten), which shows that children and adolescents from families with low social status more often face mental health issues and have fewer psychosocial resources at their disposal. In addition, the BELLA study showed that making use of resources reduces the risk of suffering mental health issues. Whether this applies equally to children and adolescents from all social status groups, however, has, to our knowledge, not been demonstrated in detail, neither by the BELLA study nor by other German studies [26].

In addition, international literature contains numerous studies on the links between negative experiences in child-

hood and adolescence, such as growing up in unstable family relationships, and impacts on health later in life. Hughes et al. [27] published a systematic review on this question, whereby 11,621 references were compiled to examine the effects of negative childhood experiences on adult health. A total of 37 studies were identified that described risk factors for 23 outcomes, such as obesity, smoking, substance abuse or mental illness. Negative childhood experiences can be a risk factor for various health outcomes later in life. Against this backdrop, the authors emphasise the importance of resilience-building and preventing negative experiences.

In their review study, Egle et al. [28] evaluate the international body of studies on the perpetuation of childhood stress experiences as well as the neurobiological and developmental psychological mechanisms that mediate these long-term consequences. They emphatically advocate for family-related prevention measures that protect parents, children and adolescents from stress and enable experiences of self-efficacy.

A number of American studies from the 1970s and 1990s are also worth referencing. In the Rochester Longitudinal Study, Sameroff et al. [29] accompanied psychologically stressed women and their children as well as an unstressed control group up to 12th grade. The Adverse Childhood Experience (ACE) study [30] was conducted by the Centres for Disease Control and Prevention towards the end of the 1990s. In two survey waves, children were examined with regard to health risks later in life as a result of negative psychological experiences in childhood. The results yielded clear evidence for a strong connection between such experiences and lifelong health consequences

with effects on well-being. Compared to individuals who did not suffer adverse childhood experiences, those who suffered multiple childhood adversities (four or more ACEs) had a twice as high risk of coronary heart disease, an 1.9 times higher risk of any type of cancer, a 2.4 times higher risk of stroke, a 3.9 times higher risk of chronic lung disease and an 1.6 times higher risk of diabetes [30].

In 2019, the results of the 'AWO-ISS Study on the long-term life course consequences of poverty' were presented. The study focussed on the material, personal, family and social resources of children growing up in poverty in Germany. There were three survey waves with a total of 20 years of follow-up. For Germany, too, the study proves a high correlation between low social status and a limited availability of resources in childhood and adolescence with depression symptoms, low life satisfaction and need for support with drug and alcohol abuse among the now 25-year-old young adults [31]. Settings-based preventive approaches that address the overall conditions in which children grow up are listed as protective factors, for example through settings-based approaches in day-care centres and schools that aim to reduce stressors (such as bullying or situations that produce stress and pressure), strengthening resources and promoting healthier relationships between people within a respective setting. Overarching strategies to combat the consequences of poverty are identified as measures that promote health, especially in the transition between institutions and stages of socialisation (transitions), for example through municipal prevention chains [31, 32].

Various limitations must be pointed out regarding the underlying data basis and the analyses carried out. The KiGGS study uses the Strengths and Difficulties Questionnaire (SDQ) to record mental health issues. However, SDQ is only a screening procedure and not a psycho-diagnostic instrument. The set age range of 11 to 17 years is large and does not take into account age group specific psychosocial health differences and the importance of personal, family and social resources. It should also be noted that the analyses were conducted based on the cross-sectional data from KiGGS Wave 2. Cross-sectionally collected data only allow statements on the relationships between the variables examined, however, not on causal relationships. Thus, for example, the question of whether the availability of resources actually reduces the risk of mental health issues, as assumed in the paper, or conversely, whether it is mental health issues that impact a person's resources, cannot be answered conclusively. In a next step, the longitudinal data from KiGGS, which are now available, could possibly be used to answer this question [33]. It should also be pointed out that the KiGGS study uses a multidimensional index to record social status. Although this index includes data on parental levels of education and occupational status as well as on household income, other important aspects of the living situation of adolescents and their families, such as parent employment status or household composition, are not taken into account. Finally, quantitative surveys have fundamental limitations in terms of the depth of their explanations, because – unlike qualitative studies – they do not allow for a deeper understanding of individual constellations of status-related stress factors, existing resources and mental health issues.

Despite the limitations mentioned, the results point to the importance of strengthening resources as a fundamental aspect of prevention and health promotion. The results

in this paper show that all children and adolescents can benefit from psychosocial resources. If resources are available, then they have a protective effect regardless of social status. However, the availability of resources is not distributed evenly across all social status groups. For this reason, measures should be identified that contribute to both reducing stress and strengthening resources in children and adolescents of all social status groups. Nonetheless, assurances would have to be made that those from socially disadvantaged families are also reached, as they will still have fewer resources. The focus should be on preventive interventions to reduce socially unequal health opportunities, for example by combating poverty, improving educational opportunities and ensuring needs-based, low-threshold counselling and support services for families under stress. In the sense of the 'Health in All Policies' approach, the framework conditions for children, adolescents and families could therefore be more strongly orientated towards promoting health [34, 35].

As children grow older, the importance of institutions of tertiary socialisation such as recreational child and youth facilities, sports clubs and street or school social work grows. Particularly for socially stressed young people, they offer many opportunities to strengthen resources, for example through participation, conflict resolution or other methods to promote self-efficacy. However, there are often only limited human and financial resources available for tertiary socialisation programmes. In many cases, the programmes have little conceptual, structural and financial support; accordingly, they often find it hard to retain young people [36]. In addition, in the context of the COVID-19 pandemic, maintaining such services became increasingly difficult [37].

Overall, there has been a clear increase in mental health issues, especially among young people [38]. In particular in times of crisis, however, youth outreach structures should be secured and further developed.

Preventive measures are also of great importance for example during transitions between institutions such as switching from one school to another or when people leave school (transitions), as they can counteract a spiral of resource losses and use these stations along the life course to build up psychosocial resources [36].

Overall, the relevance of personal, family and social resources described here indicates that youth outreach is an important setting for health promotion and prevention, which should be used and expanded especially to reduce socially conditioned and gender-related inequalities in health opportunities.

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Data protection and ethics

The KiGGS Wave 2 is subject to strict compliance with the data protection provisions set out in the EU General Data Protection Regulation (GDPR) and the Federal Data Protection Act (BDSG). Hannover Medical School's ethics committee assessed KiGGS Wave 2 (No. 2275-2014) and provided its approval. Participation in the study was voluntary. The participants and/or their parents/legal guardians were also informed about the aims and contents of the study, and about data protection. Informed consent was obtained in writing.

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Conflicts of interest

The authors declared no conflicts of interest.

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Establishing a Mental Health Surveillance in Germany: Development of a framework concept and indicator set

Abstract

In the course of the recognition of mental health as an essential component of population health, the Robert Koch Institute has begun developing a Mental Health Surveillance (MHS) system for Germany. MHS aims to continuously report data for relevant mental health indicators, thus creating a basis for evidence-based planning and evaluation of public health measures. In order to develop a set of indicators for the adult population, potential indicators were identified through a systematic literature review and selected in a consensus process by international and national experts and stakeholders. The final set comprises 60 indicators which, together, represent a multidimensional public health framework for mental health across four fields of action. For the fifth field of action 'Mental health promotion and prevention' indicators still need to be developed. The methodology piloted proved to be practicable. Strengths and limitations will be discussed regarding the search and definition of indicators, the scope of the indicator set as well as the participatory decision-making process. Next steps in setting up the MHS will be the operationalisation of the single indicators and their extension to also cover children and adolescents. Given assured data availability, the MHS will contribute to broadening our knowledge on population mental health, supporting a targeted promotion of mental health and reducing the disease burden in persons with mental disorders.

🏷 **PUBLIC HEALTH · SURVEILLANCE · MENTAL HEALTH · MENTAL DISORDERS · INDICATOR**

1. Introduction

In recent years, the international public health agenda in the field of non-communicable diseases (NCDs) has undergone significant change. While the focus has long been on physical diseases such as cancer, diabetes, cardiovascular diseases and chronic respiratory diseases, since 2018 the World Health Organization (WHO) has also attached the highest importance to mental disorders and well-being for population health [1]. In 2015, the United Nations declared the promotion of mental health and well-being and the strengthening of approaches to prevent and treat substance abuse as explicit policy goals for sustainable development [2]. However, many countries still lack the necessary reporting systems for a robust data-based assessment of health developments in the comparatively emergent field of public mental health. Accordingly, the WHO Mental Health Action Plan (2013–2020, which has been extended until 2030) emphasises the need to establish national information systems for mental health indicators as one of its four objectives [3].

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[25] Federal Centre for Health Education

Public Health is defined as 'the art and science of preventing disease, prolonging life and promoting health through the organized efforts of society' [4, as cited in 5]. Public Mental Health applies the concept of public health to mental health and disorders [6]. Surveillance in the field of public health refers to the ongoing and systematic collection, collation, analysis, interpretation and timely dissemination of data on health and well-being and their determinants [7]. Surveillance thus serves as a basis for planning, implementing and evaluating measures to protect and promote health in the population. The approach is centred around a defined set of meaningful and reliably measurable indicators (Info box 1). These are populated with data which is collected and reported continuously and can be compared over time to identify changes as well as specific needs for different population groups (stratified by age, gender, education, etc.).

In contrast with physical non-communicable as well as infectious diseases, Mental Health Surveillance (MHS) as a continuous and indicator-based reporting of mental health poses specific challenges: (1) mental health is a broad concept and as such encompasses more than merely the absence of mental disorders [9]. The dual-factor model separates mental health into two interrelated, but distinct dimensions of positive mental health (well-being) and psychopathology (symptoms and disorders) [10, 11]. In terms of their epidemiology, development, course and disease burden, the group of mental health conditions includes a highly diverse set of disorders. Moreover, despite suffering from psychopathology, people can experience their mental health as positive [11] because mental health describes 'a state of wellbeing, in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community' [12]. Such an approach to mapping mental health in its entirety therefore resembles the attempt to develop a set of indicators to describe 'physical health' (instead of 'physical illnesses'). For physical NCDs, this is not yet commonly done, as there are usually separate surveillance subsystems for each respective disease and its risk factors that do not include salutogenetic (health-related) determinants and outcomes [13]. In addition, the interaction of risk and protective factors with mental health and the outcomes of mental disorders is extremely complex [14]. For many topics, there are age- and culture-specific constructs. Accordingly, public health-oriented reviews of potential MHS indicators produce broad results [15, 16] with a respective requirement for selection and prioritisation. (2) Unlike the laboratory parameters in the case of physical illnesses, the indicators for mental health are rarely directly observable or discretely measurable. Thus, a population-based, valid and reliable measurement of mental health poses high demands on data collection [17, 18]. Many constructs lack a gold standard for their recording in health surveys. At the same time, partly due to advancements in research, the classification of mental disorders changes , i.e. regarding their definition and the classification of specific clinical pictures, their diagnostic criteria and threshold values [19]. This complicates the establishment of standards for surveillance and can, in some cases, require a dynamic adjustment of disorder categories. Determining the prevalence of mental disorders in the population requires in-depth and hence resource-intensive clinical interviews. In addition, different data sources (survey vs

routine data) may provide different estimates for one construct and then require triangulation (i.e. a comparative discussion) [20]. (3) Furthermore, in the case of mental disorders, social stigma constitutes a special source of bias that influences data collection in self-report and observer rating and can also lead to misclassifications in health care settings [17].

Systems of Mental Health Surveillance developed to date have adopted different approaches to deal with these requirements. As the following international examples illustrate, they differ considerably in terms of content focus and degree of implementation. In some cases (e.g. Switzerland [21, 22] and Australia [23]), selected indicators of mental health are recorded and communicated in various reporting formats (health reports, interactive websites or dashboards, reports for the evaluation of political objectives, etc.) yet without explicitly setting up a systematic surveillance system. In Canada, three independent subsystems within a comprehensive system of public health surveillance regularly provide information on positive mental health (well-being) [24] and on suicidality [25], taking the respective risk and protective factors into account, as well as on mental disorders diagnosed in health care settings (Canadian Chronic Disease Indicators) [26]. In the US, a set of indicators focuses on mental disorder prevalence and care, with particular emphasis on substance abuse and this is currently being tested by several states [27]. The Scottish indicator set on well-being and mental health has only once reported results on indicators of positive mental health (well-being), psychopathology and their determinants [28] notwithstanding additional quality assurance indicators developed for the care sector [29]. Such systematic quality

monitoring systems focussed on the provision of care for people with mental disorders on the basis of routine data has been implemented or is currently being introduced by several countries [30, 31], meaning that these systems are currently more developed than monitoring with an epidemiological or public health focus. Additionally to the aforementioned differences in individual countries' surveillance systems, different methods were used to develop and select indicators. For instance, either clearly operationalised measures [29, 32] or theoretical constructs without a definition of numerator and denominator [15, 24, 33] included as indicators in the development process. Research and selection of indicators may be limited to those with available data [32, 34] or may also include constructs that can be captured in principle but for which no data are currently available [16, 23, 24, 33]. Key decisions in indicator system set-up can be made either by health monitoring professionals [29, 34] or through the involvement of various stakeholders [16, 24, 32, 33]. All methodologies have their specific advantages and disadvantages for the resulting surveillance system with regard to e.g. feasibility and acceptance as well as their capacity to deal with data gaps.

In addition to meeting a country's information needs, an MHS system should ideally also serve the country's international reporting obligations. These include, for example, the WHO Mental Health Atlas [35] regularly requests cross-national data to assess the achievement of the Mental Health Action Plan [3]. International comparability is also the focus of the Organisation for Economic Co-operation and Development's (OECD [36]) Mental Health Performance Benchmark, for which indicators and reporting formats are currently being developed. At EU

level, after initial preliminary work to develop a cross-national indicator set on mental health [15, 16], only a few parameters have been bindingly included in the 88 European Health Indicators to date, and databases have not yet been generated for most of them [37]. In principle, the realisation of international comparative reporting by a national MHS will also depend on the extent to which these indicators are also meaningful at country level.

1.1 Public Mental Health reporting in Germany

A concise overview of central developments of public mental health in Germany is only possible to a limited extent and contains gaps. Although large amounts of data on the mental health of the population are available from both studies and health care, the diversity of its contents, collection purposes and data holders provides an overall fragmented data situation. Furthermore, health policy measures for the care and prevention of mental disorders in Germany are characterised by the country's federal structure and the responsibility of numerous ministries and actors, in addition to which such measures are generally organised across several professional groups, sectors and cost bearers [38]. Thus, it is hard to provide findings on overaching developments.

Consequently, reviews of the population's mental health and mental disorders usually come with an array of indicators and this heterogeneity thwarts a consistent summary interpretation and discussion [39–46]. The data sources included are multiple kinds of raw data in different reporting formats, such as psychiatry reports and studies conducted by the federal states [e.g. 47, 48, 49] focus

reports by individual health insurers [50–53] and other service providers and support systems [54, 55], expert reports from various research institutions [56, 57] as well as results from the nationwide health monitoring at the Robert Koch Institute (RKI) [e.g. 58] and other population studies [59]. Indicators differ in terms of case definition, operationalisation, the underlying sample or reference population as well as survey design and mode. Incongruent observation periods and a lack of longitudinal studies make it particularly difficult to assess trends and interactions of developments in morbidity and health care cannot be mapped validly. Another factor contributing to this situation is that, for most studies, only a few measurement points are available, e.g. to determine the prevalence of mental disorders in the general population by a standardised diagnostic interview for example (last recorded with the survey period 2009–2012 [60]).

Furthermore, reporting concerning some aspects of public mental health presents gaps that are owed as much to a lack of research and indicator development on individual topics, as to the lack of population-based data sources in various areas.

Moreover, the data situation can be expected to improve for indicators on mental health quality of care. However, since a cross-sectoral and cross-disorder quality assurance procedure (QA procedure) could not be implemented [61], even after the implementation of the indicator-based QA procedures currently being developed for schizophrenia, schizotypal and delusional disorders [62] and for outpatient psychotherapy [63], information will only be available on diagnosis- or therapy-specific subgroups of patients. In addition, eight quality indicators on the provision of care

to people with unipolar depression are integrated in the Federal Joint Committee's Disease Management Programme (DMP) Depression [53]. Following implementation of the DMP in care across Germany a nationwide uniform recording of these indicators will become available. Consequently, a MHS should also provide indicators of quality of care, and these, depending on the development stage of QA procedures and DMP implementation, could also be included in the selection of indicators.

It is worth noting that, from the point of view of quality monitoring, there is an explicit demand for its parameters to be evaluated in conjunction with epidemiological measures continuously being collected, as the public health impact can only be recognised in this way as an overall effect of the health care system on population health [31] and developments in care provision thus can be interpreted against the background of changing needs [64].

In summary, a consensus on key public mental health parameters and a systematic and continuous data provision still need to be established. Otherwise it is difficult to assess the extent to which health policy goals are being met and whether health care and public health measures are having an effective impact on population health. In 2009, while evaluating the health goal depression, a clear but unmet need to generate and develop meaningful data sources [65] was recognised.This criticism that there was still no or only insufficient information available on key aspects was voiced again in 2018 [66].

1.2 Setting up Mental Health Surveillance at the Robert Koch Institute

For a long time, in Germany too, the surveillance approach has been limited to infectious diseases and cancer. A concept for NCD surveillance is currently being developed at the RKI and has already been successfully introduced for diabetes since 2016 [67]. Following this example, the Federal Ministry of Health commissioned the RKI to start developing a Mental Health Surveillance (MHS) for Germany in 2019. The current pilot phase is focused on designing and testing the systematic development of a set of public mental health indicators. This phase should yield findings on the current state of research as well as research needs for individual indicators and therefore lay the ground for their future integration into the planned NCD surveillance. The project is initially limited to parameters for the adult population. This article describes and discusses the systematic development of a set of indicators as part of the piloting of an MHS for Germany.

2. Methodology

In order to facilitate a later integration into a superordinate NCD surveillance based on uniform procedures, the conception of the MHS indicator set used the tried and tested method of the Diabetes Surveillance at the Robert Koch Institute as a blueprint [67]. WHO's recommendations for the establishment of a mental health information system were taken into account [68]. Figure 1 provides an overview of the steps in this process and is the reference for the ordinals (1) – (12) used below.

Figure 1
Process of development:
Indicator set and framework concept
Source: Own figure
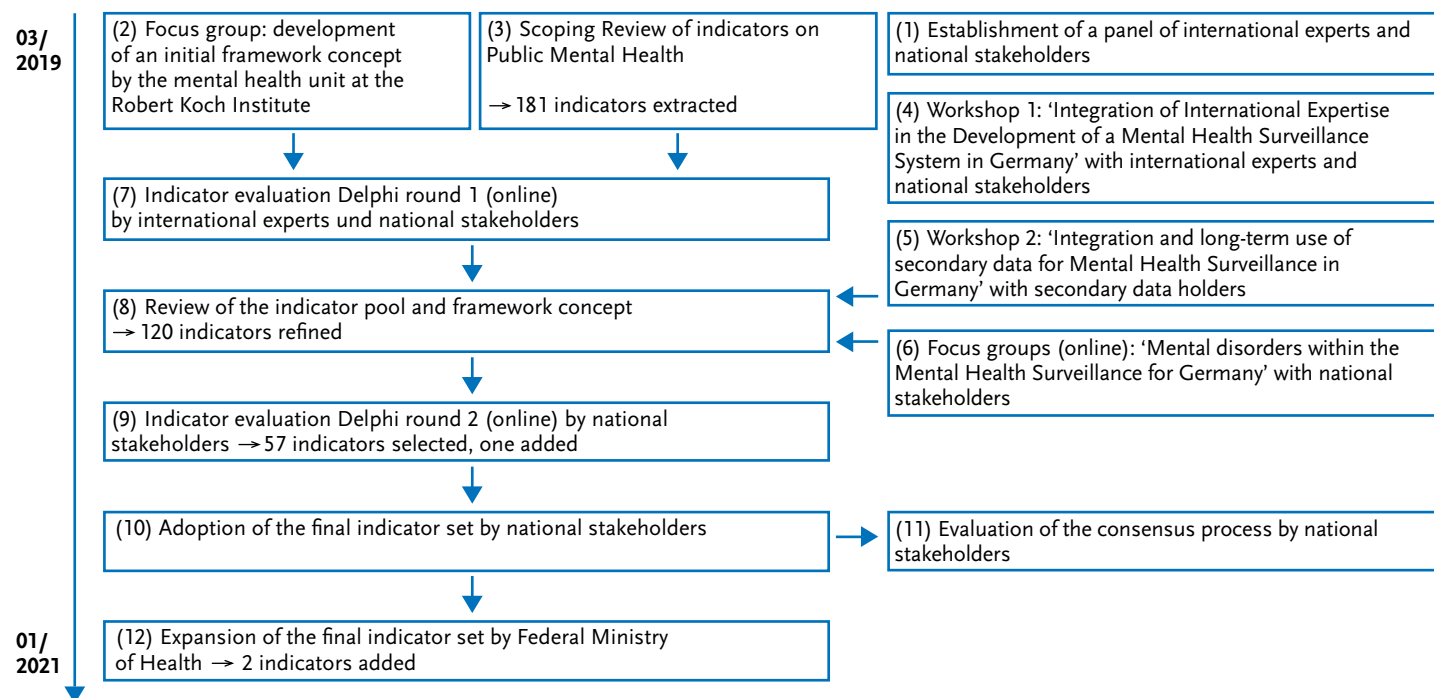
One key methodological decision needs to be pointed out in advance: The term indicator was limited to the indexed theoretical construct without a specific operationalisation for its quantification with defined numerator and denominator [8]. Since each construct to be agreed upon contains various options for operationalisation depending on precise definition, measurement and data basis, this pragmatic simplification should facilitate the summarised presentation and comparative evaluation of the extraordinarily large number of potential indicators in the course of the selection process. In addition, the further process of setting up the MHS can benefit from high flexibility when clarifying hitherto not specified data access.

2.1 Involvement of international expertise and national stakeholders

Participation by experts and stakeholders (1)
For a surveillance system to effectively protect and promote public health, it must serve the specific information needs of citizens, decision-makers and researchers. Quality, a successful implementation also on the long-term, as well as acceptance and use of the system benefit from the participation of relevant actors with their respective expertise and interests. For this reason, a diverse panel of public mental health stakeholders was invited to participate (Annex Table 1). 29 representatives of national stakeholders from science, service providers, patient organisations,

federal and state politics as well as federal departmental research institutions took part. In order to strengthen international comparability and to learn from experiences made in other countries, experts from the WHO Mental Health Atlas and the OECD Mental Health Performance Benchmark as well as from two public health institutes with systematic mental health reporting (Swiss Health Observatory, Public Health Agency Canada) could be won over for the project.

Workshops (4, 5) and focus groups (6)

A two-day workshop served as a kickoff to the process of opinion-forming by national stakeholders and the integration of international expertise in MHS development for Germany [69]. At a one-day workshop, representatives from various holders of routine data (Central Institute for Statutory Health Insurance Physicians in Germany, German Institute for Medical Documentation and Information, Scientific Institute of the AOK, Research Data Centre of the German Pension Insurance) as well as a representative of the Epidemiological Survey of Substance Abuse (Institute for Therapy Research) presented the potential the respective data bases have for quantifying public mental health indicators. The findings were incorporated into the description of potential indicators in Delphi round 2 (9).

Due to the COVID-19 pandemic, the third face-to-face workshop was changed to a set of four online focus groups [70]. Topics of discussion with national stakeholders included the methodologies for selecting those mental disorders with the highest public health relevance and the evaluation of their assessment in surveys and routine data. The discussion results were used to refine Delphi Round 2 (9).

Quantitative surveys (7, 9)

Two online surveys were conducted as part of the Delphi process (7, 9). The technical implementation was carried out based on the VOXCO software, the evaluation of the data was carried out using MS Excel 2019. The surveys were subject to data protection regulations under the Federal Data Protection Act and they were vetted and approved from a data protection perspective.

2.2 Development of potential indicators and framework concept

Focus group to develop an initial framework concept (2)

A framework concept aims at the classification of indicators according to content within an overarching, coherent, scientifically based model and can guide action [71]. To ensure compatibility with the preliminary work on NCD surveillance, the framework concept of Diabetes Surveillance at the RKI was used as a starting point [67] and further developed for the field of Public Mental Health by a focus group of researchers at the RKI's Mental Health Unit (Department of Epidemiology and Health Monitoring).

Scoping review to identify potential indicators (3)

An extensive literature review of relevant public mental health indicators was conducted in the form of a scoping review [72, 73] to identify potential indicators for MHS. Over and above determining indicators which had already been established, the aim was also to identify new indicators not yet established in reporting systems in terms of content or methodology. To gain an as complete picture as possible and to include various sources of information,

a systematic MEDLINE search via PubMed (limited to German and English language publications) was supplemented by additional searches on the websites of health care actors in Germany, public health institutes of all OECD (Organisation for Economic Co-operation and Development) member states, as well as major international organisations (WHO, OECD, EU). A detailed description of the research process can be found elsewhere [74].

2.3 Consensus on the final indicator set and framework concept

Indicator evaluation Delphi round 1 (online) (7)
The panel of international experts and national stakeholders subsequently evaluated the identified indicators via a two-stage Delphi process (Info box 2). Both Delphi rounds were conducted as online surveys. For Delphi round 1, the indicators that were identified in the scoping review were illustrated through examples of their operationalisation based on the researched sources. Each indicator was individually assessed regarding its relevance based on a nine-point scale. Relevance was defined in line with the criteria below [24] which have also been used in the development of other public and mental health indicator systems [15, 23, 75, 76]:

▸ Significant: the indicator has the potential to improve the protection and promotion of population mental health
▸ Actionable: the indicator provides information to update, influence or change policy and public health practice and can itself be influenced by policy and public health practice

A comment field was used to request comments on the individual indicators (e.g. reasons for the assessment made, alternative operationalisations, notes on options to merge the indicator with other indicators or splitting of the indicators into various sub-indicators).

To evaluate the survey, the indicators were then split into four groups based on the respondents' assessment of their relevance [cf. 67].

▸ highly relevant: ≥75% of the ratings with 7 to 9 points
▸ relevant: ≥50%–74% of the ratings with 7 to 9 points
▸ medium relevant: ≥50% of the ratings with 1 to 6 points
▸ low relevant: ≥50% of the ratings with 1 to 3 points

The quantitative result of Delphi round 1 was fed back to the respondents.

Review of the framework concept and indicators (8)
Based on the qualitative feedback provided via the comment fields in the survey, adjustments were made to the framework concept (renaming of fields of action and definition of topics) as well as to the indicators (mergers, deletions and additions). Additional literature reviews were conducted on selected topics (e.g. mental health promotion and prevention) and thematically focused discussions with additional experts were carried out.

Indicator evaluation Delphi round 2 (online) (9)
During Delphi round 2, indicators were selected for given topics within each field of action to achieve a balanced indicator set in terms of content [cf. 76]. It was determined, that each topic had to have at least two indicators assigned

to it in order for it to be adequately represented [cf. 76]. In addition, in order to reduce the number of indicators, a survey format was used that required respondents to prioritise between indicators [cf. 24]. The respondents were asked to rank how aptly an indicator represented the respective topic compared to the others (Annex Table 2). Information on (possible) operationalisations and data sources for indicators was provided.

To prioritise how compatible the final indicator set was with the information needs and data availability in Germany only the German stakeholders could take part in the online survey. The survey was divided into two parts in order to reduce the amount of time required for each survey.

The aim of the evaluation, which was communicated in advance, was to reduce the number of indicators by at least 50% in favour of a more manageable set [cf. 24] and to consider a measure of agreement among respondents [78]. Accordingly, two criteria were defined for assessing the relevance of indicators:

▸ Ranking (cumulated): an indicator is relevant if it belongs to the indicators with a ranking above the 50% mark across all made assessments
▸ Consensus: an indicator is relevant if more than 50% of the respondents ranked it above the 50% mark

The indicators were classified according to these criteria as follows:

▸ Highly relevant: both criteria (rank and consensus) met
▸ Relevant: only one of the criteria (rank or consensus) met
▸ Not relevant: neither of the criteria met

Both highly relevant and relevant indicators were included in the final MHS indicator set.

Adoption of the indicator set (10)

To capture stakeholders' approval of the voting result of Delphi round 2 (Annex Table 2) as well as the resulting indicator set, both were sent to them by e-mail with the request to adopt or reject it as the final project result.

Evaluation of the consensus process (11)

To evaluate the consensus-finding process, national stakeholders were asked for a standardised assessment as part of another anonymous online survey (regarding participation, agreement with the final project result, transparency of the procedure, workload, and personal willingness for further participation).

Expansion of the final indicator set (12)

Public health surveillance must be orientated towards health policy information needs so it can fulfil its role in the governance of measures according to the definition of surveillance. The Federal Ministry of Health (German: Bundesministerium für Gesundheit, BMG), as the commissioner and promoter of the development of MHS, did not participate in Delphi rounds 1 and 2, as the evaluation of indicators was to remain in the hands of national and international experts and stakeholders. The BMG reserved the right to review and, if necessary, expand (but not reduce) the approved set of indicators to add relevant indicators for health policy not reflected in the set agreed upon by the experts if necessary. In this way, the participation and positioning of the BMG could be communicated transparently.

Increasingly, mental health is being recognised as a fundamental aspect of population health.

In summary, the tasks were distributed as follows among the parties involved: the MHS working group at the RKI searched indicators (Scoping Review, 3) and, together with other mental health experts at the RKI, developed an initial system to structure them (initial framework, 2); invited international experts and national stakeholders to participate in the panel (1); organised and moderated a dialogue among experts in the form of workshops and focus groups (4, 5, 6); conducted three survey studies on indicator assessment (7, 9) and evaluation (11), evaluated these based on own methodology and reported results back to the participants; revised the indicator set and framework concept on the basis of the results (8) and obtained votes on the adoption of the indicator set (10) and its expansion (12). The experts and stakeholders involved consequently contributed their expertise at the joint events (4, 6), evaluated the indicators in the two Delphi surveys (7, 9), adopted the indicator set (10) and assessed the work process during the course of the evaluation (11).

3. Results

3.1 Development of potential indicators and framework concept

Development of an initial framework concept (2)

The focus group at the RKI identified 13 central topics in the field of public mental health and subsequently assigned them to five superordinate fields of action following the framework concept of the Diabetes Surveillance [67, 74]. They consisted of (1) Promoting mental well-being of the population: mental health promotion and prevention, mental health resources, positive mental health (well-being);

(2) Reducing the risks of mental disorders: risk factors, psychopathology, self-harm and suicidality; (3) Improving mental health care: supply and utilisation, needs, unmet needs and barriers, quality of care; (4) Reducing the burden of disease and improving participation: costs, burden of disease, participation; (5) Strengthening knowledge and acceptance: mental health literacy. In addition, sociodemographic influencing characteristics were included as an individual field.

Scoping review to identify potential indicators (2)

13,811 publications were identified using various research strategies. 373 of them were used to extract a total of 1,505 relevant indicators. These were categorised accordingly, deduped and assessed for compatibility (how they adapt to the care structures in Germany, indicators for adult age, etc.). In total, 181 indicators of Public Mental Health could be identified, of which 47 (26%) were not included in any national and international indicator system. An additional eleven socio-demographic characteristics affecting mental health were not assigned to any field of action, but were included as potential stratification variables to identify particularly burdened population groups in a MHS context. Details of data extraction and processing (overview of the identified indicators) are presented elsewhere [74]. The number of indicators identified per topic and field of action was not equally distributed (Table 1), meaning that the topic area 'mental health promotion and prevention' was underrepresented compared to the topic area 'supply and utilisation' for example. Eight indicators were combined because their constructs overlapped; thus, Delphi round 1 started with 173 indicators and 11 stratification characteristics.

Table 1
Results of indicator evaluation according to field of action and relevance in Delphi round 1
Source: Own table

Evaluation	Indicator total		Field of action 1: Promoting mental well-being of the population		Field of action 2: Reducing the risks of mental disorders		Field of action 3: Improving mental health care		Field of action 4: Reducing the burden of disease and improving participation		Field of action 5: Strengthening knowledge and acceptance		Indicators Socio-demographic stratification characteristics	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Highly relevant	61	35.3	1	3.1	17	33.3	21	38.9	15	62.5	7	58.3	8	72.7
Relevant	83	48.0	11	34.4	28	54.9	31	57.4	9	37.5	4	33.3	3	27.3
Medium relevant	27	15.6	18	56.3	6	11.8	2	3.7	0	0.0	1	8.3	0	0.0
Low relevant	2	1.2	2	6.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	**173**		**32**		**51**		**54**		**24**		**12**		**11**	

There is a lack of systematically selected and continuously available data for mental health surveillance in Germany.

3.2 Consensus on the final indicator set and framework concept

Indicator evaluation Delphi round 1 (online) (7)

A total of 22 fully completed data sets were included in the evaluation (response rate: 91.7%). Of the 173 indicators, 35.3% were assessed as highly relevant, 48.0% as relevant, 15.6% as medium relevant and 1.2% as low relevant (Table 1). Of the stratification characteristics, 72.7% were assessed as highly relevant and 27.3% as relevant.

A majority of the indicators in fields of action 2 to 5 as well as the socio-demographic stratification characteristics were rated as highly relevant and relevant. Only in field of action 1 were the ratings across relevance classes more balanced. As the survey format did not allow for a selection of indicators based on the quantitative results, the qualitative feedback (free comment fields for each indicator) was used to revise the indicator pool and the framework concept.

Revision of the framework concept and indicators (8)

Based on the qualitative feedback from Delphi round 1 the framework concept was revised and additionally more closely aligned with a multidimensional approach to mental health. For this purpose, mental health status was integrated into a 'staging approach' [14] with the two dimensions of positive mental health (well-being) and psychopathology [10]. This approach interprets psychopathology not as a categorical but as a dimensional construct, ranging from preclinical symptoms up to manifest mental disorders in varying degrees of severity (called 'stages'). The staging approach opens up several approaches to strengthening mental health at different levels (promotion: positive mental health, prevention: mental distress, remission: mental disorders, recovery: psychosocial impairment), each related to specific public health measures (health promotion and prevention as well as treatment and rehabilitation).

In order to reflect these conceptual decisions, fields of action were renamed, topics partially differentiated and redistributed (Figure 2): (1) 'positive mental health', 'psy-

In order to set up a Mental Health Surveillance, the search, definition and selection of indicators for the broad spectrum of mental health was piloted.

chopathology' and 'self-harm and suicidality' were included as characteristics of mental health status in the shared field of action 3 'Improving mental health status'. For the gradual mapping of manifestations (staging approach) of mental health problems, the topic of psychopathology was divided into the three topics (1) 'preclinical symptomatology'; (2) 'mental disorders'; and (3) 'comorbidities'. Field of action 5 'Reducing the burden of disease and strengthening participation', which indicates the severity of mental impairments and its consequences, was supplemented by 'mortality'. (2) 'Risk factors of mental disorders' and 'mental health resources", which had previously been assigned to two fields of action as they can influence both positive mental health (well-being) and psychopathology, were combined into field of action 2 'Addressing determinants of mental health' and supplemented by 'mental health literacy' (formerly the separate field of action 5). (3) In order to reflect the spectrum of public health measures, field of action 1 'Improving mental health promotion and prevention' was added to complement the unchanged field of action 4 'Improving mental health care'.

The additional in-depth and Germany-centric research into publications on mental health promotion and prevention made it possible to add twelve further indicators to the indicator pool. However, as these only insufficiently represent the first field of action, they were placed outside the Delphi round 2 evaluation matrix and defined as an area for future development. A first assessment of the relevance of these indicators in Delphi round 2 was conducted to identify possible settings with high relevance for mental health promotion and prevention measures (Annex Table 2).

The socio-demographic characteristics considered potential stratification variables were revised with the help of additional experts at the RKI. 'Education' was included as an indicator of social resources. 'Unemployment' and 'poverty' were classified as indicators of both social risk factors and consequences of disease. In order to homogenise future NCD surveillance, the stratification characteristics of age, gender, social situation, education and region (depending on the respective data availability) [67], on which consensus was previously achieved in the context of Diabetes Surveillance, were adopted.

In the focus groups (6), criteria of public health relevance were discussed with 18 representatives from national stakeholders, which could be used to select specific mental disorders for the MHS in Delphi round 2, including, for example, their incidence, prevalence, disease burden, treatability or also preventability, as well as methodological criteria such as their epidemiological measurability in population-based health studies (e.g. psychometric quality, sparseness of assessment). A proposal for the mental disorders to be selected in Delphi round 2 (Annex Table 2) was accepted by the respondents and slightly modified by splitting the general category 'stress disorders' into 'adjustment disorders' and 'post-traumatic stress disorders'.

Indicator evaluation Delphi round 2 (online) (9)
In total, 80% (n=16) of the invited stakeholders participated in the first sub-survey, 65% (n=13) in the second sub-survey.

Based on the results, 57 of the 96 indicators from fields of action 2 to 5 were extracted for the final set of indicators (Annex Table 2). A total of 36 indicators were classified as highly relevant and 17 as relevant. Four indicators were

Figure 2
Final framework concept and indicator set
of the Mental Health Surveillance
Source: Own figure

The final set comprises
60 indicators across
four fields of action.

Mental health promotion (positive mental health)		Prevention (psychological distress)	Remission (mental disorders)	Recovery (psychosocial disability)
Improving mental health promotion and prevention	**Addressing determinants of mental health**	**Improving mental health status**	**Improving mental health care**	**Reducing the burden of disease and strengthening participation**
Action field in development	**Psychological resources** 1. Optimism 2. Resilience 3. Self-worth **Social resources** 1. Social support 2. Education **Individual risks** 1. Trauma/violence 2. Chronic stress 3. Unhealthy lifestyle **Social risks** 1. Loneliness 2. Existential Fears 3. Unemployment 4. Poverty/material Deprivation 5. Inequality in income or wealth distribution **Mental health literacy** 1. Help-seeking efficacy for mental health problems 2. Attitudes and stigma related to mental disorders 3. Knowledge about mental health and mental disorders	**Positive mental health** 1. Subjective mental health status 2. Well-being **Preclinical symptoms** 1. Psychological distress 2. Burnout symptoms **Mental disorders** 1. Depressive disorders 2. Anxiety disorders 3. Post-traumatic stress disorders (PTSD) 4. Psychotic disorders 5. Alcohol and substance dependence*** 6. Mental disorders (total) **Comorbidity** 1. Comorbidity of mental disorders 2. Comorbidity with chronic physical disease **Self-harm/suicidality** 1. Self-harming behavior 2. Suicide attempts	**Supply and utilisation** 1. Outpatient assisted living/ residential homes 2. Self-help 3. Online services 4. Contact-, meeting- and daycare-centres 5. Psychiatric home care 6. Specialist outpatient treatment 7. Rehabilitation** 8. Services outside the standard care of statutory health insurance 9. General practitioner treatment 10. Inpatient treatment **Quality** 1. Physician/Psychotherapist treatment rate 2. Utilisation rate 3. Inpatient readmissions 4. Psycho-/pharmacatherapeutic treatment rate 5. Coercive measures*** **Patient-centering** 1. Unmet need 2. Treatment latency 3. Access barriers to mental health care 4. Waiting times **Costs** 1. Direct medical costs	**Burden of disease** 1. Sickness compensation* 2. Reduced earning capacity pension* 3. Experienced stigmatisation and discrimination* 4. Health-related quality of life* 5. Functional impairments* **Participation** 1. Poverty* 2. Unemployment* **Mortalität** 1. Years of life lost (YLL)* 2. Suicides 3. Excess mortality*

Characteristics used for stratification of population based data analyses: age, sex, social status, education and region (depending on data availability)

* due to/in mental disorders
** Indicators were added to the indicator set to depict the realm of „Recovery" within the framework, though both of the relevance criteria were not fulfilled
*** Indicator was added in consultation with the Federal Ministry of Health because of specific relevance for health politics
GKV = Statutory health insurance

included to ensure that, as per definition, each topic should be represented by at least two indicators. Despite its low ranking, the indicator 'rehabilitation' was subsequently included within the topic 'service provision and service use' in order to also reflect the area of 'recovery' [79], which is anchored in the framework concept.

Adoption of the indicator set (10)

The final indicator set was recognised and adopted by the majority of national stakeholders with an approval rate of 85% (response rate: 95%, n=19). One abstention was justified due to the lack of opportunity for a detailed discussion of individual indicators. One rejection was justified by the exclusion of the indicator 'coercive measures' as well as criticism of the indicator 'psycho-pharmacotherapeutic treatment rate'.

Expansion of the indicator set (12)

In consultation with the Federal Ministry of Health, two key health policy indicators were added: 'alcohol and substance dependence' as a relevant group of mental disorders and 'coercive measures' for the area of quality of care. The final set thus contains 60 indicators (Figure 2).

Evaluation of the consensus process (11)

Seventeen of the national stakeholders contributed to the evaluation of the consensus process (response rate: 85%) (Annex Table 3). The majority was satisfied with the opportunities to contribute their own opinion (88.2%), found their opinion adequately reflected in the outcomes (82.4%) and rated the procedure as sufficiently transparent (94.1%). In total, 88.2% of respondents felt that the effort required

to participate was fit for purpose, 11.6% would have become even more involved if necessary. All respondents would be willing to participate in the further development of MHS in the future.

4.   Discussion

Following international examples, the RKI has begun to develop a MHS for Germany. The steps taken highlight the increasingly recognised importance of mental health as an aspect of population health and responds to the high demand for an up-to-date and sustainable evidence base for the design of public mental health measures. The MHS aims for more comprehensive and reliable assessments of the mental health of the population by continuously providing data for an indicator set on which consensus has been achieved. The piloting of a German MHS presented in this paper yielded the following results: a structured consensus process condensed the extensive pool of indicators identified by means of a systematic literature search to 60 indicators. These indicators represent a multidimensional framework for public mental health. A broad consensus for the selected set of indicators could be achieved among the involved stakeholders. In order to critically discuss the applied procedure, it will be reflected on the focus of the final indicator set and the strengths and limitations of methodological decisions and next steps to developing the surveillance system will be presented.

Final indicator set

The final set of indicators is indicative of the different focuses of the stakeholders involved in terms of content. Field of

Corresponding indicators for the field of action 'Mental health promotion and prevention' remain to be developed.

action 1 'Improving mental health promotion and prevention', highlights indicators on settings and measures representing the entire life span. In addition, information on anti-stigma and awareness campaigns was rated as relevant.

Field of action 2, 'Addressing determinants of mental health' looked at personal resources prioritising personality constructs such as optimism, resilience and self-esteem over competencies (communicative, social, and coping-related). Stressors (traumatisation and violence, chronic stress) and health behaviour were rated as central risk factors. Structural factors (poverty and unemployment) were prioritised alongside loneliness as social risk factors. Correspondingly, comparable social resources (education and social support) were selected. For the topic of mental health literacy, which has to date hardly been studied at the population level, none of the three proposed indicators was prioritised.

The special focus in field of action 3 'Improving mental health status' was the prioritisation of mental disorders in the MHS. These disorders include depressive and anxiety disorders representing particularly common diagnostic groups and psychotic disorders as usually severe disorders in terms of course and consequences. In addition, post-traumatic stress disorders were selected, which is closely related to the high prioritisation of traumatisation and violence among the risk factors.

In field of action 4 'Improving mental health care', the entire spectrum of the care landscape received high ratings; community psychiatric services were also included as essential for surveillance. With regard to the issue of quality and patient-centred care, priority was given to indicators that address the entire group of persons with mental disorders requiring treatment (e.g. service use and treatment rates,

need for and access to care). Therefore, some indicators with special significance for the specific situation of people with chronic or severe mental disorders (e.g. physical health care and coercive measures) as well as indicators of perceived treatment success and satisfaction from the patients' point of view were not selected (although the coercive measures indicator was subsequently added, see above).

In field of action 5 'Reducing the burden of disease and strengthening participation', the direct determination of differentiated indicators regarding the individual and societal burden of disease was given preference over summary measures of the burden of disease model or the estimated economic costs. Poverty and unemployment were selected as indicators of participation, which is consistent with the prioritisation of social risk factors in field of action 2. To monitor mortality, overarching indicators of (excess) mortality were given preference over disorder-specific and care-associated measures.

Lessons learned

Compared to other internationally developed systems, the decision to create a public health-orientated framework has allowed the development of a comparatively comprehensive set of indicators. The framework covers both positive mental health (well-being) as well as a dimensional perspective of psychopathology; it therefore illustrates approaches for public health measures (health promotion, prevention, treatment and rehabilitation) at different levels. Thus, for the future integration of MHS into a superordinate surveillance of non-communicable diseases, consented indicators for many issues are already available. These

also cover the association of mental and physical health in terms of common protective and risk factors, reciprocal influencing factors as well as co-morbidity and multi-morbidity. A comprehensive surveillance system focused on public health is more capable of reflecting the complexity of health and disease than separate disease- or disorder-focused subsystems. However, this result was only achieved by following the approach taken by the Public Health Agency Canada [24, 76], namely a strict structuring of indicator selection in Delphi round 2 [24, 76] which had already anchored essential elements of the framework concept in the final indicator set. However, the procedure proved to be legitimate, as the stakeholders involved indicated a high level of agreement with the final indicator set despite these specifications.

Selecting indicators based on a systematic search of potential indicators has provided a set of indicators that also contains indicators for which no data suitable for surveillance is available (yet). Unlike data-driven forms of indicator selection [e.g. 27], the process has revealed urgent data needs and research gaps for core areas of public mental health [cf. 23, 24, 80]. The majority of the indicators that were extracted during the extensive literature search came from indicator systems which were already established. In conclusion, a stronger orientation towards existing indicator sets in combination with targeted follow-up research on underrepresented topics or special country needs can be recommended as efficient methods for developing a public mental health surveillance. At the same time, the approach we chose has allowed us to integrate constructs and topics (e.g. mental health literacy) not yet included in established surveillance systems into the structure of a MHS, which reflect more recent developments in monitoring population mental health or that take specific concerns held in Germany into account.

Restricting the indicator search and selection to constructs as opposed to precisely defined operationalisations at numerator and denominator level has also proven to be feasible in other such processes [24, 27, 28] and was indispensable for the feasibility of the consensus-building process. Only this pragmatic simplification has allowed those involved in the selection process to summarise and compare the extraordinarily large number of potential indicators. The development of clear and long-term metadata (title and definition) for the indicators, as well as the choice of their measurement and data basis, only takes place in a second step. This has the advantage, that the current and, as in the context of the COVID-19 pandemic, sometimes rapidly changing landscape of available data can be explored and included in detail. At the same time, research needs can be identified and the use of new inventories or survey methods tested. However, in the course of operationalisation, important decisions regarding content must be made and the methodological quality of the indicators needs to be ensured [8, 81].

The participatory development of an indicator set by a committee of experts and stakeholders is an established procedure [24, 32, 75], but not without alternatives [24, 27, 28, 32, 75]. In this case, a broad acceptance of the result could be ensured, which, in turn, is a prerequisite for the effective use of the surveillance system. It must be recognized, however, that any outcome of collective decision-making processes naturally always depends on the composition of the body involved. For example, differing inter-

ests on the committee can lead to the selection or deselection of individual indicators. Although the aim was to win representatives of all relevant stakeholder groups, their respective representation (e.g. of mental health promotion and prevention actors versus service providers of outpatient or inpatient care) can be viewed critically. In the case of the three indicators subsequently added (rehabilitation, coercive measures, alcohol and substance dependence), there is no consensus in the group involved. In the course of the advancement of the MHS in Germany, it seems important not to prioritise these three indicators in the further scientific processing at the expense of those indicators that were determined by consensus.

Main criticisms from the experts and stakeholders involved were doubts about the significance of the 'psychopharmacotherapeutic treatment rate' indicator and the demand to include coercive measures. Due to overlaps in content and the difficulty of comparing constructs, the evaluation of indicators was considered difficult. The lack of indicators with reference to occupational health and work and for community psychiatric networking was criticised. In addition, the limited opportunities for an intensive discussion about individual indicators due to the restrictions imposed by the COVID-19 pandemic were deemed regrettable but accepted.

Outlook

The development of an indicator set represents a first step in the establishment of a MHS in Germany. To establish a sustainable surveillance system for the selected topics, however, the following further work is necessary:

(1) Determining of the data basis available for each indicator: Currently and prospectively available population-based data sources for the quantification of indicators must be explored and evaluated. Concepts to close data gaps must be developed for those indicators that cannot be mapped at present. This includes both the not yet (routine) use of already available data sources as well as the development of new data sources from scratch. For indicators with a considerable need for development, a transitional use of interim indicators should be considered [cf. 23].

(2) Precise definition and operationalisation of indicators: Survey formats or psychometric instruments must be selected, developed and tested for indicators for which data will need to be collected in surveys. To facilitate the use of MHS data as reference values for population norms, preference should be given to open access instruments. In addition, the use of mobile-based digital survey methods for estimating mental health indicators at overall population level should be explored. For indicators based on routine data, appropriate definitions of cases or services to be considered need to be established and suitable data bodies selected. Meanwhile, international comparability must be ensured by giving preference to internationally established measures. At the same time, the operationalisation of indicators must allow for the greatest possible use of routine data and regular primary data collection beyond the RKI's population studies. Only by doing so a continuous surveillance for the large number of indicators of the MHS can realistically be feasible. If possible, the selected data sources should allow for the defined stratification. Due to the high significance of small-scale results for the

planning of measures the factor region plays a particularly important role.

(3) Encouraging continuous data availability: In order to provide close-meshed and continuous data, the regular collection of survey data and use of routine data must be ensured. International experience has shown [82] that this requires a constant influence on the planning of data collections and evaluations in order to place the selected MHS indicators on their agenda.

(4) Dissemination of results: In future, established and innovative formats of health reporting, such as those currently being tested for the Diabetes Surveillance [83], can be used for timely and appropriate MHS reporting. In order to promote their use by the addressees, suitable formats of direct exchange with the relevant actors must be developed.

(5) Integration into NCD surveillance: A prudent selection of the MHS indicators identified here will be integrated into an overarching NCD surveillance. In the long term, a reporting system will be established, which depicts the relevance of mental health for physical health [84], too.

(6) Necessary extensions: Expansion potentials of the MHS indicator set proposed here lie a) in the addition of indicators for the age groups of children and adolescents as well as the elderly in order to map aspects of mental health across the lifespan, and b) in the elaboration of field of action 1 on the basis of the expected progress of prevention reporting [85].

Conclusion

The piloted development of the present MHS indicator set has proven to be practicable overall. Through the framework concept, a broad public mental health approach could be firmly established and existing gaps in indicator-based reporting in the field of mental health promotion and prevention could be identified. The final set of indicators was selected on the basis of a differentiated assessment by the stakeholders involved. By this means, an essential contribution to the usefulness and acceptance of the system has been made with regard to the quality criteria of a surveillance system for mental health [17]. On this basis the development of the MHS in Germany can be continued. If the next steps are implemented according to plan, the MHS can become a helpful tool to make developments in public mental health in Germany visible in a timely manner, identify needs for interventions and burdened population groups and so contribute to an evidence-based planning and evaluation of public health measures aimed at promoting mental health and reducing the burden of disease of mental disorders.

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Annex Table 1
Participating international experts
and national stakeholders
Source: Own table

The listed persons participated in the development of the indicator set and framework concept (workshop 1, focus groups on the selection of mental disorders, Delphi round 1 or/and Delphi round 2).

Nr.	Name	Institution
1	Dr Marion Aichberger	Department of Psychiatry and Psychotherapy at the Charité Campus Mitte, Charité – Universitätsmedizin Berlin
2	Prof Dr Harald Baumeister	Department of Clinical Psychology and Psychotherapy, Institute of Psychology and Education, University of Ulm
3	Prof Dr Anke Bramesfeld	Ministry for Social Affairs, Health and Equal Opportunities of Lower Saxony; Institute for Epidemiology, Social Medicine and Health System Research, Hannover Medical School (MHH)
4	Dr Daniel Hugh Chisholm	World Health Organization, Regional Office for Europe
5	Jurand Daszkowski	Federal Association of Psychiatry Experienced (BPE)
6	Prof Dr Freia de Bock	Federal Centre for Health Education (BZgA)
7	Dr Julian Dilling	National Association of Statutory Health Insurance Funds
8	Dr Theresa Eichhorn	Federal Chamber of Psychotherapists in Germany (BPtK)
9	Prof Dr Wolfgang Gaebel	WHO Collaborating Centre DEU-131; Rhineland Regional Council (LVR) – Klinikum Düsseldorf, Kliniken der Heinrich-Heine-Universität Düsseldorf
10	Prof Dr Dr Martin Härter	University Medical Center Hamburg-Eppendorf, Center for Psychosocial Medicine, Department of Medical Psychology; German Network Health Services Research (DNVF)
11	Prof Dr Dr Andreas Heinz	Department of Psychiatry and Psychotherapy at the Charité Campus Mitte, Charité – Universitätsmedizin Berlin
12	Emily Hewlett	Organization for Economic Cooperation and Development (OECD)
13	Prof Dr Frank Jacobi	Department of Clinical Psychology and Psychotherapy, Psychologische Hochschule Berlin
14	Dr Alessa Jansen	Federal Chamber of Psychotherapists in Germany (BPtK)
15	Dr Joseph Kuhn	Bavarian Health and Food Safety Authority (LGL)
16	Prof Dr Jutta Lindert	University of Applied Sciences Emden/Leer; European Public Health Association, Section Public Mental Health
17	Prof Dr Jürgen Margraf	Mental Health Research and Treatment Center, Ruhr-University Bochum
18	Alexandra Matzke	German Depression League e.V.
19	Dr Hanne Melchior	National Association of Statutory Health Insurance Physicians (KBV)
20	Prof Dr Andreas Meyer-Lindenberg	Central Institute of Mental Health, Medical Faculty Mannheim, Universität Heidelberg; German Association for Psychiatry, Psychotherapy and Psychosomatics e.V. (DGPPN)
21	Dr Dietrich Munz	Federal Chamber of Psychotherapists in Germany (BPtK)
22	Dr Angelika Nebe	Federation of German Pension Insurance Institutions (DRV Bund)
23	Dr Heather Orpana	Public Health Agency Canada (PHAC)
24	Dr Judith Peth	University Medical Center Hamburg-Eppendorf, Center for Psychosocial Medicine, Department of Medical Psychology
25	Prof Dr Ulrich Reininghaus	Department of Public Mental Health, Central Institute of Mental Health, Medical Faculty Mannheim, Universität Heidelberg

GKV = Statutory health insurance, WHO = World Health Organization

Annex Table 1 *Continued*
Participating international experts and national stakeholders
Source: Own table

Nr.	Name	Institution
26	Prof Dr Steffi Riedel-Heller	Institute of Social Medicine, Occupational Health and Public Health (ISAP), Faculty of Medicine, University of Leipzig; German Association for Psychiatry, Psychotherapy and Psychosomatics e.V.
27	Dr Uwe Rose	Federal Institute for Occupational Safety and Health (BAuA)
28	Dr Ursula von Rüden	Federal Centre for Health Education (BZgA)
29	Prof Dr Georg Schomerus	Department of Psychiatry and Psychotherapy, University of Leipzig Medical Center (ULMC), Medical Faculty, University of Leipzig
30	Daniela Schuler	Swiss Health Observatory (Obsan)
31	Prof Dr Martin Schütte	Federal Institute for Occupational Safety and Health (BAuA)
32	Dr Thomas Stracke	Federal Ministry of Health (BMG)
33	Thomas Voigt	German Depression League e.V.

GKV = Statutory health insurance, WHO = World Health Organization

Notes to Annex Table 2:
Blue bold = highly relevant indicator (criteria rank AND consensus met), included in final indicator set
Black font = relevant indicator (criteria rank OR consensus met), included in final indicator set
Light grey font = not relevant indicator (no relevance criterion met), not included in the final indicator set
Blue background = indicator ranked in the top 50% of the indicators of a topic (odd number rounded down)
Grey shaded = indicator that more than 50% of the respondents ranked in the top 50% of the indicators of a thematic field = number of ratings given by the participating stakeholders
[1] Ranking (cumulative) = sum of the ranks of an indicator within a topic
[2] Consensus = Percentage of participating stakeholders who placed the indicator in the top 50% of indicators for a topic (rounded down if odd number)
* Indicator was included in the indicator set in order to depict the area of 'recovery' within the framework model, although neither of the two relevance criteria was met.
** Indicator was subsequently included in the indicator set in consultation with the Federal Ministry of Health due to its relevance to health policy.
*** Indicator was included in the indicator set without voting because it was the only one representing the topic.
GKV = Statutory health insurance, ASHIP = National Association of Statutory Health Insurance Physicians, DALY = Disability-adjusted life years,
YLD = Years lived with disability, YLL = Years of life lost, SHI = statutory health insurance

Annex Table 2
Results of indicator assessment in Delphi Round 2
Source: Own table

	n	Ranking (cumulative)[1]	Consensus[2]
Field of action 1: Improving mental health promotion and prevention (under development; assessment outside Delphi process for initial assessment of the field of action)			
Topic: Settings for possible indicators			
Work environment/company	13	38	85%
Unemployment	13	43	62%
Kindergarten/daycare centre (KiTa)	13	44	77%
Family	13	59	46%
Nursing/care facility (senior citizens, people with disabilities)	13	66	54%
Municipality/community/district	13	67	38%
University/college/training company/vocational school	13	69	38%
School	13	82	0%

Continued on next page

Annex Table 2 *Continued*
Results of indicator assessment in Delphi Round 2
Source: Own table

	n	Ranking (cumulative)[1]	Consensus[2]
Field of action 1: Improving mental health promotion and prevention (under development; assessment outside Delphi process for initial assessment of the field of action)			
Topic: Indicators with currently available data			
Anti-stigma and awareness raising	13	66	69%
SHI-supported measures in daycare centres for promotion and prevention in the field of mental health	13	71	77%
SHI-supported measures in schools for promotion and prevention in the field of mental health	13	74	77%
Relaxation or stress management offers by the employer	13	75	46%
Early help	13	82	62%
Health promotion measures at the workplace	13	85	38%
Stress management measures at the workplace	13	88	31%
Certified prevention services in the field of mental health	13	88	46%
Employer´s measures to prevent psychosocial risk factors in the workplace	13	92	31%
Risk assessment of mental health at the workplace	13	96	46%
Measures to deal with psychosocial risk factors at the workplace	13	98	46%
Measures to strengthen psychosocial health in care facilities	13	99	31%
Topic: Indicators for the self-report			
Use	13	28	54%
Offer	13	29	69%
Demand	13	31	46%
Quality	13	42	31%
Field of action 2: Addressing determinants of mental health			
Topic: Psychological resources			
Optimism	16	44	75%
Resilience	16	46	69%
Self-worth	16	59	44%
Self-efficacy	16	63	44%
Coping skills	16	64	31%
Social/communicative competences	16	65	31%
Spirituality	16	107	6%
Topic: Social resources			
Social support	16	37	56%
Education	16	38	63%
Life Domain Balance/work Life Balance	16	47	44%
Social and political participation	16	56	19%
Access to recreational and leisure opportunities	16	62	19%

Continued on next page

Annex Table 2 *Continued*
Results of indicator assessment
in Delphi Round 2
Source: Own table

	n	Ranking (cumulative)[1]	Consensus[2]
Field of action 2: Addressing determinants of mental health			
Topic: Individual risks			
Trauma/violence	16	42	69%
Chronic stress	16	55	50%
Unhealthy lifestyle	16	63	44%
Burden of chronic illness and/or chronic pain	16	64	44%
Experience of discrimination	16	67	31%
Stressful childhood experiences	16	69	38%
Exposure to family members with mental health problems	16	88	25%
Topic: Social risks			
Loneliness	16	69	56%
Existential fears	16	70	56%
Unemployment	16	72	44%
Poverty/material deprivation	16	74	63%
Inequality in income or wealth distribution	16	78	56%
Homelessness	16	84	38%
Precarious housing conditions	16	87	38%
Stressful living environment	16	93	25%
Stressful working conditions	16	93	25%
Topic: Mental health literacy (Gesundheitskompetenz)			
Help-seeking efficacy for mental health problems	13	24	77%
Attitudes and stigma related to mental disorders	13	26	69%
Knowledge about mental health and mental disorders	13	28	54%
Field of action 3: Improving mental health status			
Topic: Positive mental health			
Subjective mental health status	15	22	53%
Well-being	15	23	47%
Topic: Preclinical symptoms			
Psychological distress	15	18	80%
Burnout symptoms	15	27	20%

Annex Table 2 *Continued*
Results of indicator assessment
in Delphi Round 2
Source: Own table

	n	Ranking (cumulative)[1]	Consensus[2]
Field of action 3: Improving mental health status			
Topic: Mental disorders			
Depressive disorders	14	47	79%
Anxiety disorders	14	58	71%
Post-traumatic stress disorders (PTSD)	14	60	64%
Psychotic disorders	14	67	36%
Personality disorders	14	68	50%
Severe mental disorders	14	73	36%
Alcohol and substance dependence**	14	85	21%
Somatoform disorders	14	86	14%
Adjustment disorders	14	86	29%
Topic: Comorbidity			
Comorbidity of mental disorders	14	20	57%
Comorbidity with chronic physical diseases	14	22	43%
Topic: Self-harm/suicidality			
Self-harming behaviour	14	23	93%
Suicide attempts	14	25	79%
Suicidal thoughts and/or plans	14	36	29%
Field of action 4: Improving mental health care			
Topic: Supply and utilisation			
Outpatient assisted living/ residential homes	13	53	77%
Self-help	13	75	46%
Online services (self-help, counselling, therapy)	13	77	54%
Contact-, meeting- and daycare-centres	13	79	54%
Psychiatric home care	13	79	54%
Specialist outpatient treatment	13	85	62%
Rehabilitation*	13	86	38%
Services outside the standard care of statutory health insurance	13	88	54%
General practitioner treatment (primary psychosomatic health care)	13	94	54%
Social psychiatric care	13	95	31%
Inpatient treatment	13	97	54%
Crisis services and counselling centres	13	106	23%

Annex Table 2 *Continued*
Results of indicator assessment
in Delphi Round 2
Source: Own table

	n	Ranking (cumulative)[1]	Consensus[2]
Field of action 4: Improving mental health care			
Topic: Quality			
Physician/psychotherapist treatment rate (among patients with documented diagnosis of mental disorders)	13	50	77%
Utilisation rate (in population with mental disorders)	13	50	69%
Inpatient readmissions	13	51	62%
Psycho-/pharmacotherapeutic treatment rate (among patients with documented diagnosis of mental disorders)	13	53	62%
Treatment continuity after inpatient stay	13	59	46%
Psychiatric emergencies	13	66	38%
Somatic health care for people with mental disorders	13	78	31%
Quality target achievement in the Disease Management Programme (DMP) Depression	13	87	8%
Coercive measures**	13	91	8%
Topic: Patient-centering			
Unmet need	13	37	54%
Treatment latency	13	41	54%
Access barriers to mental health care	13	46	46%
Waiting times	13	47	54%
Perceived treatment success (patient-reported outcome)	13	50	46%
Perceived patient orientation (patient-reported experience)	13	52	46%
Topic: Costs			
Direct medical costs*** (not voted upon)			

	n	Ranking (cumulative)[1]	Consensus[2]
Field of action 5: Reducing the burden of disease and strengthening participation			
Topic: Burden of disease			
Sickness compensation due to mental disorders	14	51	57%
Reduced earning capacity pension due to mental disorders	14	53	64%
Experienced stigmatisation and discrimination due to mental disorders	14	58	57%
Health-related quality of life in mental disorders	14	59	57%
Functional impairments due to mental health reasons	14	62	57%
Disability to work due to mental disorders	14	64	50%
Measures of the Burden of Disease Model for disease burden (DALY, YLD)	14	70	36%
Economic costs due to mental disorders	14	87	21%

Continued on next page

Annex Table 2 *Continued*
Results of indicator assessment
in Delphi Round 2
Source: Own table

	n	Ranking (cumulative)[1]	Consensus[2]
Field of action 5: Reducing the burden of disease and strengthening participation			
Topic: Participation			
Poverty among people with mental disorders	14	33	57%
Unemployment among people with mental disorders	14	35	57%
Reintegration into labour market of people with mental disorders	14	39	50%
Social and political participation of people with mental disorders	14	47	21%
Homelessness of people with mental disorders	14	56	14%
Topic: Mortality			
Measure of the Burden of Disease Model for mortality (YLL)	14	33	71%
Suicides	14	36	79%
Excess mortality of mental disorders	14	48	50%
Alcohol related deaths	14	56	36%
Drug related deaths	14	58	36%
Suicides during or after inpatient psychiatric treatment	14	63	29%

Annex Table 3
Results of the evaluation
of the consensus process
Source: Own table

	„Rather agree" or „Agree"		„Rather disagree" or „Disagree"	
	n	%	n	%
1. I had sufficient opportunity to express my opinion in the course of the consensus process on the development of an indicator set.	15	88.2	2	11.8
2. I find my opinion sufficiently reflected in the results.	14	82.4	3	17.6
3. I found the procedure for selecting the core indicators sufficiently transparent (e.g. regarding the steps of the consensus process, evaluation criteria, documentation of results).	16	94.1	1	5.9

	„I would have been more involved if needed."		„The effort was reasonable."		„The effort was too high."	
	n	%	n	%	n	%
4. How do you rate the effort required for your participation in the consensus process in relation to its purpose?	2	11.6	15	88.2	0	0

	„yes"		„no"			
	n	%	n	%		
5. Would you be willing to participate in the development of the Mental Health Surveillance in the future?	17	100	0	0		

n = Number of ratings given by the participating stakeholders, assessment of questions 1 to 3 on a four-point scale

Note
External contributions do not necessarily reflect the opinions of the
Robert Koch Institute.

The Robert Koch Institute is a Federal Institute within
the portfolio of the German Federal Ministry of Health

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Mental Health Surveillance at federal state level – Reporting on psychiatry in Bavaria

Abstract

In Germany, mental health reporting is organised at the federal, federal state and municipal level. At federal level, a number of concepts and approaches are implemented. In 2020 and 2021, in accordance with Article 4 of the Mental Health Assistance Act the first Bavarian Psychiatry Report was prepared. Important data bases include the billing and care data of Bavaria's Association of Statutory Health Insurance Physicians and the administrative data of the Bavarian districts. The aim is to enhance coordination between these federal state projects and Mental Health Surveillance at national level, in particular regarding the use of health care data.

MENTAL HEALTH · REPORTING ON PSYCHIATRY · HEALTH REPORTING · INDICATORS · BAVARIA

1. Introduction

Health reporting as a data-based form of describing population health is a fundamental public health task and part of the ten core areas of public health (Essential Public Health Operations, EPHO), as formulated by the World Health Organization's European Regional Office in 2012 [1, 2]. In a pluralistic health care system, health reporting as a basis for planning as well as for mediating cooperation and communication plays a decisive role. This is especially true for the field of mental health with its highly heterogeneous and segmented care structures [3].

In federal health reporting, data on mental health and the provision of mental healthcare is provided primarily by the Robert Koch Institute (RKI) in co-operation with the Federal Statistical Office, as well as by health insurance fund health reports. It is also based on specific modules of nationwide health surveys such as the additional mental health module of the German Health Interview and Examination Survey for Adults (DEGS1-MH) [4] and the survey on mental well-being and behaviour (BELLA), within the framework of the German Health Interview and Examination Survey for Children and Adolescents (KiGGS) [5]. An expansion is currently taking place through the establishment of the national Mental Health Surveillance at the RKI (see Focus article Establishment of a Mental Health Surveillance in Germany: Development of a framework concept and indicator set in this issue of the Journal of Health Monitoring).

Psychiatric care planning in Germany, as corresponding reporting is organised essentially at the specific federal state level. This includes the AOLG (AG Psychiatrie der Obersten Landesgesundheitsbehörden) reports, the most recent one being the 2017 report [6]. No standards for the

Healthcare routine data is an important element of mental health surveillance.

labelling of federal and municipal level reporting have been established. There are health reports covering mental health issues and psychiatric care plans, which are often standalone and prepared as specialised planning outside of health reporting, but to all intents and purposes they are in effect health reports, and, more recently, also occasionally psychiatry reports.

The choice of topics, data and formats is extremely heterogeneous. The range of topics spans from the description of the epidemiological situation and the number of involuntary admissions to the documentation of prevention and care services in individual service areas, such as medical care, addiction counselling or integration assistance in line with Germany's social code IX (SGB IX). In some cases, specific disease patterns are examined (e.g. depression [7, 8]) or the focus is on specific settings (e.g. the work environment [9]). In terms of content, these reports draw on data from nationwide RKI health surveys, international studies, official statistics, billing and health care data; in some cases, data from own surveys are presented (e.g. surveys by experts [10, 11]). They also differ in format. For example, in Saxony and Bavaria, the Mental Health Assistance Act (PsychKHG) contains legal provisions regarding reporting cycles. In view of the broad range of topics, data and reporting formats, it is as hard to talk about 'psychiatric reporting' in general terms as it is to talk about 'health reporting' [12]. This article presents the approach taken in Bavaria's first psychiatry report, and illustrates the importance of routine healthcare data, which has tended, so far, to play a more minor role in health reporting. This is intended to contribute to the discussion of the on-going design of mental health surveillance in

Germany in consideration of the interactions between the regional, federal state and federal levels.

2. Thematic focuses and data within Bavaria's psychiatry report

In 2018, the federal state parliament of Bavaria passed Bavaria's Mental Health Assistance Act (BayPsychKHG). Article 4 establishes comprehensive psychiatric reporting regarding epidemiology and care. This is the first time that a German federal state government has established regular (triennial) reporting to parliament on mental health in a federal state PsychKHG. The illustration of basic epidemiological data on mental health, disease-related protection and risk factors and available services is meant to further develop prevention and care. This also includes data on services uptake and costs relative to Bavaria's resident population. The dimensions of the RKI's federal Mental Health Surveillance format provided the basis to prioritise issues. In the run up to this, mental health was a recurrent topic in Bavarian health reporting [8, 13] – providing a basis psychiatry reporting.

The first report was prepared in 2020/2021. In addition to official statistics and social insurance fund data (pension insurance, health insurance fund reports, etc.), the billing and care data of Bavaria's Association of Statutory Health Insurance Physicians (KVB) and the Bavarian districts (as providers of supra-local social assistance) are a central data source for the report. KVB data show the diagnoses documented by physicians and psychotherapists in practices for patients covered by statutory health insurance in Bavaria. They allow statements on the diagnosed

The data complement findings from scientific surveys – not only regarding the provision of care, but also in epidemiology.

prevalence at district level and on treatment uptake. The Bavarian districts then provide important structural and process data from complementary care, such as on the availability and use of shared housing places or workshops for people who have mental disabilities. The facts behind an integrative and systematic approach speak for themselves. For example, integration assistance services, as well as basic social services have an impact on the medical-psychotherapeutic care system, insofar as they decisively influence the uptake of services. They do this, for example, by pointing out the available services to patients, encouraging uptake or making treatment needs visible in advance. A good example of this is the crisis services which are available across Bavaria. At the same time, transition rates, for example from specially protected work contexts to the general labour market, are a strong indicator of how well or poorly the system is capable of improving the social participation of people with a long-term mental health condition.

Although the routine data of the KVB have the advantage that they are not distorted by non-participation (as is the case with health surveys) and that they can be updated regularly without much effort, it is important to remember that the frequency of diagnoses is not the same as the frequency of an illness: those who are ill but do not seek medical care do not appear in health care system diagnostic data. Moreover, in many cases physicians are careful to immediately diagnose an illness from the group of mental disorders (International Statistical Classification of Diseases and Related Health Problems, 10th revision; ICD-10: F00–F99). To avoid unnecessary stigmatisation, diagnoses in suspected cases are deliberately assigned with caution

and restraint. In addition, the data of the Association of Statutory Health Insurance Physicians of Bavaria do not include the privately insured, who make up about ten per cent of the population.

Between the first quarter of 2019 right up to and including the fourth quarter of 2019, just over 2.8 million patients of all age groups covered by statutory health insurance in Bavaria were diagnosed with a mental disorder (ICD-10: F00–F99) in at least two quarters. In the under-18 age group, there was a total of slightly more than 285,000 children and adolescents. Extrapolated to all people covered by statutory health insurance (28.6% of adults, 16.0% of adolescents), these data correspond to the figures reported by the DEGS1-MH module or the BELLA study. Apart from the different timeframes used, it is important to highlight that the two data sets are not completely congruent. For example, a considerable proportion of people diagnosed with a mental disorder in the DEGS1-MH module (2009–2012) are not currently in treatment and, conversely, people with severe mental disorders are underrepresented in the health surveys [14].

These discrepancies are particularly evident when comparing age groups. For example, according to KiGGS (BELLA Wave 3, 2009–2012), the frequency of mental health symptoms or disorders in childhood and adolescence is highest among 11- to 13-year-olds compared to the other age groups [15]. However, the billing data of the Association of Statutory Health Insurance Physicians of Bavaria (Figure 1), just like Germany-wide data on health care provision [16], show that ICD-10 F-diagnoses are most frequent in the 5- to 10-year-old age group. This can be attributed to the developmental disorders detected with the start of

Figure 1
Number of patients with a mental disorder (outpatient diagnoses, ICD-10: F00–F99) per 100,000 patients in Bavaria 2019 by sex and age
Source: 2019 billing data form Bavaria's Association of Statutory Health Insurance Physicians

Number of patients

ICD-10=International Statistical Classification of Diseases and Related Health Problems, 10th Revision

In 2019, just over 2.8 million patients covered by statutory health insurance in Bavaria were diagnosed with mental health issues.
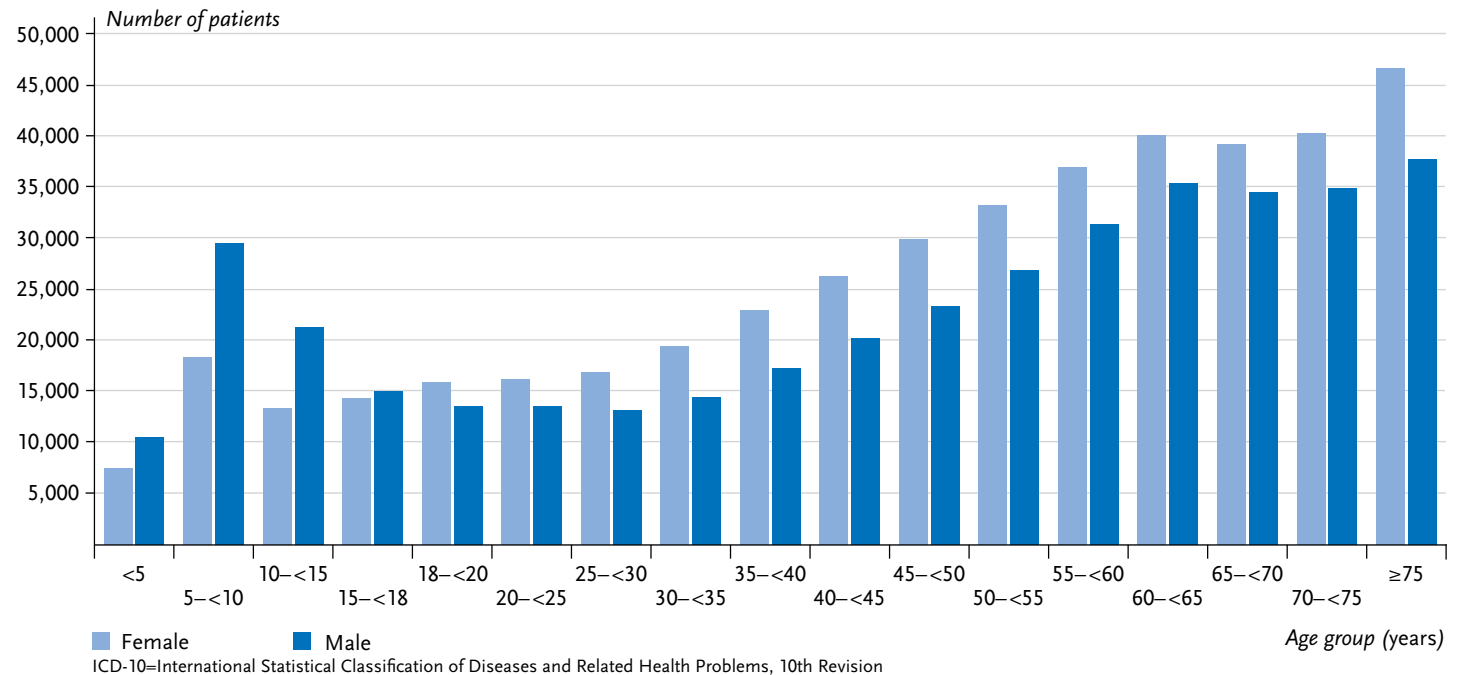
school, which are documented as F-diagnoses, but which are not actually mental disorders. The German Health Interview and Examination Survey for Children and Adolescents does not systematically record development disorders of speech and language or of the basic skills required for school [13].

The psychiatry report provides a synopsis of diverse sources of data. In terms of content, each of these data sources has its strengths and limitations. While routine data does not provide answers to all questions – as it depends on actual uptake of healthcare – it does show the degree to which mental disorders are represented in the health care system. Despite the fact that the incidence remains essentially stable, this figure has increased over

the last two decades. The level of care for people with a mental illness has therefore improved. However, health care provision data also show great differences, for example depending on age or region.

Overall, the data situation on mental health is still patchy in many areas; especially with regard to particularly difficult phases in life, the quality of life of people with mental illness and the economic and social situation of patients with chronic mental health issues. Data on the quality of services and on the forms of co-ordination and co-operation between actors is also limited. For specific care services, such as supported employment (specific support for patients to find work), occupational therapy and sociotherapy, no data are available at all. By expanding the reporting

systems at the federal state and federal levels these gaps in the data will need to be closed in the future.

Due to the COVID-19 pandemic, preparing the Bavarian psychiatry report has been considerably more difficult, with only a limited number of external experts taking part in the initial preparation of the report. For the next Bavarian psychiatry report (2024), more external expertise is to be consulted – especially with regard to the scope of data used. A co-operation with federal Mental Health Surveillance at the RKI is planned.

The prevalence of diagnoses from the group of mental disorders increases steadily in outpatient care from younger adulthood. Men are more affected during childhood and adolescence, whereas women are more affected during adolescence.

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The German version of the article is available at:
www.rki.de/journalhealthmonitoring

Conflicts of interest
The authors declared no conflicts of interest.

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