Research Topics

Insights in public mental health 2022

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Wulf Rössler

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Insights in public mental health: 2022

Topic editor

Wulf Rössler – Charité University Medicine Berlin, Germany

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S. M. Yasir Arafat,
Biomedical Research Foundation, Bangladesh

*CORRESPONDENCE
Wulf Rössler
✉ wulf.roessler@uzh.ch

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Editorial: Insights in public mental health: 2022

Wulf Rössler*

Department of Psychiatry and Psychotherapy, Charité University Medicine Berlin, Berlin, Germany

KEYWORDS

public mental health, epidemiology, services research, intervention, stigma, traditional healing

Editorial on the Research Topic
Insights in public mental health: 2022

In the continuation of our previous successful Research Topic, "*Insights in Public Mental Health*," we now delve into the developments of the year 2022. Public Mental Health research has achieved notable progress in recent years. Our current focus revolves around novel perspectives and promising prospects within the Public Mental Health field. This Research Topic of articles aims to inform and inspire researchers in this domain.

At the forefront of Public Mental Health research lies the fundamental question of the ultimate goal of public healthcare. In a perspective article by Jackson et al., the "wellbeing epidemic" takes center stage. The authors explore the controversial concept of wellbeing and its implications for future health policies. Considering the historical context and the influence of Neoliberalism, they present a research agenda to scrutinize this concept.

Traditionally, the inquiry into individuals developing mental problems has mainly focused on vulnerability. However, recent Public Mental Health research has introduced another perspective: resilience. In their study, Lui and Duan demonstrate that individuals perceiving themselves as self-efficient, particularly against the backdrop of perceived social resources, play a crucial role in resilience. The study emphasizes the importance of instilling hope, a long-standing element in psychiatric rehabilitation.

Diagnostic issues remain a key interest in Public Mental Health, influencing how we conceptualize mental disorders and structure our healthcare systems. Mewes addresses the recent developments in psychological factors related to medically unexplained symptoms. These symptoms, often evolving into chronic conditions under the diagnosis of somatoform disorders, present challenges in treatment, leading to high healthcare costs.

The foundation of any treatment lies in a diagnosis, followed by the selection of the most appropriate treatment approach. However, not all patients within the same diagnostic class respond equally to treatments, and non-diagnostic factors further influence therapeutic settings. Thege et al. argue for more systematic research on trans-diagnostic factors influencing psychotherapeutic treatment outcomes, promoting a transition toward more patient-centered care.

Exploring the intersection of Occupational Psychology and Public Mental Health, issues related to shift work emerge as a significant concern. Heywon et al. identify pathways from depression, sleep, and cognition to work performance in shift and non-shift workers. Given that 10% to 40% of the working population worldwide is involved in shift work, addressing mental health problems arising from this practice is imperative.

The interface between society and Public Mental Health brings attention to "Intimate Partner Violence," associated with multiple adverse health outcomes. Ortega-Ceballos et al. assess the association between Intimate Partner Violence and psychological distress mediated by substance use in a representative population sample. Their findings contribute valuable insights for designing public health policies addressing the prevention of Intimate Partner Violence and its mental health consequences.

For years, Public Mental Health research focused on evaluating service organization and structures within national contexts. However, generalizability to an international context became a priority. This article collection showcases interventions applicable in international environments.

Hill et al. describe an outreach intervention approach for those bereaved by suicide, emphasizing practical support in addition to psychological interventions. Fabel et al. investigate the implementation of Soteria-elements in psychiatric hospital acute wards, demonstrating positive outcomes. de Smet et al. analyze falls in psychiatric hospitals, particularly affecting older adult patients.

Standardized measures are crucial for international comparisons in Public Mental Health. Austria-Corrales et al. evaluates the validity and psychometric properties of a Spanish-language online version of the Columbia-Suicide Severity Rating Scale in a Mexican sample. This validation contributes to introducing the instrument in Latin American countries.

Psychiatric epidemiology plays a vital role in Public Mental Health research. Two publications from Germany address mental health and COVID-19-related epidemiological questions. Mauz et al. analyze representative data demonstrating the detrimental impact of COVID-19 on the mental health of the general population. Baldovski et al. assess attitudes and vaccination intentions among German University students and the general population.

Finally, to address the underrepresentation of the Global South in published Public Mental Health research, a narrative review by Ogunwale et al. examines the cultural framework for indigenous mental healthcare in Nigeria. The review discusses stigmatization and human rights abuses within the context of public mental health.

This Research Topic comprises 13 articles that exemplify significant contributions to Public Mental Health research. These articles not only benefit their respective healthcare settings but also provide insights applicable to a broader context. They are theoretically intriguing and uphold a high methodological standard, guiding the direction for future Public Mental Health research.

Author contributions

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EDITED BY
Wulf Rössler,
Charité Universitätsmedizin
Berlin, Germany

REVIEWED BY
Meg E. Morris,
La Trobe University, Australia
Walid Kamal Abdelbasset,
Prince Sattam Bin Abdulaziz University,
Saudi Arabia

*CORRESPONDENCE
Lynn de Smet
lynn.desmet@upckuleuven.be

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Prevalence and characteristics of registered falls in a Belgian University Psychiatric Hospital

Lynn de Smet[1]*, Arnout Carpels[1,2], Lotte Creten[3], Louise De Pauw[3], Laura Van Eldere[1], Franciska Desplenter[1,3] and Marc De Hert[1,4,5]

[1]University Psychiatric Center, KU Leuven, Leuven, Belgium, [2]Public Psychiatric Care Center Rekem, Rekem, Belgium, [3]Clinical Pharmacology and Pharmacotherapy, Department of Pharmaceutical and Pharmacological Sciences, KU Leuven, Leuven, Belgium, [4]Center for Clinical Psychiatry, Department of Biomedical Sciences, KU Leuven, Leuven, Belgium, [5]Antwerp Health Law and Ethics Chair, Universiteit Antwerpen, Antwerp, Belgium

Objectives: Falls in elderly patients treated in general hospitals have already been the focus of several studies. Research within psychiatric settings, however, remains limited, despite the fact that this population has a number of characteristics that could increase the fall risk. The aim of this retrospective study was to estimate the prevalence of falling in patients with a psychiatric hospital setting.

Methods: A retrospective descriptive chart review of falls registered in the period July 1, 2013 until June 30, 2019 in a Belgian University Psychiatric Hospital was conducted. Data were collected from the "patient related incident report and management system" (PiMS) of the hospital. All registered falls of all hospitalized patients were included in the study.

Results: During the 6-year study period an incidence of 4.4 falls per 1,000 patient days was found. Only 0.5% of the falls resulted in severe injury and none of these falls were fatal. Eighty percent of falls involved a patient over the age of 65. Only 25.0% of the elderly patients suffered physical consequences, while injuries were present in 31.4% of adults and 68.2% of young patients. The two most common causes of a fall were the health status (63.3%) and the behavior (55.1%) of the patient.

Conclusion: The estimated prevalence of falls in our study was generally in line with the rates found in literature on falls in psychiatric settings. Falls in psychiatric settings occur both in younger and older patients, suggesting that all age categories deserve sufficient attention in fall prevention policies. However, more research is necessary to improve fall prevention policies.

KEYWORDS

falls, fall risk, fall prevention, psychiatric setting, descriptive statistics

Introduction

Falling remains an important issue in health care. According to the World Health Organization, 684,000 people each year die because of a fall, making it the most common cause of death by non-incidental injuries other than traffic incidents (1). Worldwide, every second a person over the age of 65 falls and every 19 min a person over the age of 65 dies because of the consequences of a fall (2). In these individuals falls are the leading cause of fatal and non-fatal unintentional injuries and are therefore a major burden on the healthcare network (3).

In-hospital falls are associated with extended length of stay, higher health costs and a higher proportion of transfers to nursing home facilities on the long term (4). Besides financial consequences, in-hospital falls can have a negative psychological (fear of falling, reduced confidence in one's own mobility) and social (isolation) impact (5).

The majority of falls have a multifactorial etiology, with intrinsic as well as extrinsic factors increasing the risk of falling. Intrinsic risk factors include a history of falls, acute or chronic illness, pain, frailty, age and insomnia. Extrinsic risk factors can be environmental (bad lighting, slippery floors, loose wires, untied shoe laces, loose carpets, lack of handrails, …) or medication related. Certain medications, both psychotropic and somatic, have been consistently associated with increased fall risks in population-based studies (6, 7). Medication use can result in side effects that may increase the fall risk, but can also reflect on the patient's health status which in turn can increase the fall risk (8). More and more this risk is not only attributed to polypharmacy [intake of at least 5 different drugs (9)], but mainly to the intake of the so-called Fall Risk Increasing Drugs (FRID: antidepressants, antipsychotics, antihypertensive drugs, narcotic analgesics, antiparkinson medication, hypnotics, benzodiazepines, antidiabetics, antiepileptics) (10, 11). Poorly educated caregivers and the absence of a fall prevention policy are also considered as extrinsic risk factors (12).

A recent study showed that working age adults using mental health services had almost four times the incidence of hospitalized falls compared to a general population (13). Stubbs et al. (14) found that people with schizophrenia have a 50–100% increased risk of fracture compared to people without mental illness. Chu et al. (15) found a significantly higher risk for hip and vertebral fractures in people with schizophrenia compared to controls. Zhu et al. (16) recently showed that elevated depressive symptoms in Chinese people are associated with an increased risk for falls and hip fractures. A recent Swedish study showed that the risk of injurious falls is increased in both women and men with eating disorders (17). The higher incidence of falls in this psychiatric population can partially be explained by the high use of psychotropic medication. These drugs, as mentioned above, can have side effects such as dizziness, orthostatic hypotension, decreased alertness and sedation, which can increase the fall-risk (18, 19). In addition, hospitalized psychiatric patients are generally more mobile than patients in a general hospital and also more likely to be restless, agitated and disoriented, which can also increase the risk of falls (20, 21). Chan et al. identified severe extrapyramidal symptoms, more severe psychotic symptoms, higher doses of benzodiazepines and adjusting medication in the 24 h time interval before the fall as risk factors in an inpatient psychiatric population (without any specific age category). Recurrent falling was associated with symptoms of parkinsonism, psychiatric comorbidities and lower extremity movement restrictions (18). A recent study in Thailand showed that an acute psychotic condition, polypharmacy with more than four types of medicines and taking atypical psychiatric drugs are associated with increased inpatient falls (22).

Regarding the prevalence of inpatient falls, the existing literature focused mainly on falls in elderly (23–29) and patients in general hospitals (5, 11, 30–34). Fall ratio's (expressed as falls per 1,000 patient days) between 1.70 and 3.56 were found, with a lower incidence on surgical than non-surgical wards (30–33, 35). A recent study on fall prevalence in Veterans Health Administration hospitals in the USA showed a fall ratio of 4.80 falls per 1,000 bed days. (36). A recent systematic review and meta-analysis on the prevalence of falls in psychiatric inpatients in China showed a prevalence of 3% of falls in adult and 7.3% of falls in older adult inpatients (37). A study conducted in 2017 in Brazil showed a fall ratio of 3.7 on the psychiatric ward of a university hospital, being twice as high than the ratios of the other wards of this hospital combined (surgical, non-surgical, emergency) (30). The mean age of psychiatric patients with a fall (56.3 years) was lower than the mean age of medical-surgical patients (65–83 years) (20, 38). There's a lack of qualitative research that focuses on falls (and patient safety in general) in psychiatric patients (30, 39–41).

The aim of this retrospective descriptive study was to map the prevalence of falls in our hospital and to perform a descriptive analysis of the registered falls in order to identify factors that were frequently associated with falling, repeated falling and falling resulting in injury.

Materials and methods

Study design and setting

A retrospective descriptive chart review of falls, registered in the period July 1, 2013 up to and including June 30, 2019 in the University Psychiatric Hospital KU Leuven (UPC KU Leuven) (Belgium), was conducted.

The UPC KU Leuven is a Belgian University Psychiatric Hospital consisting of two hospital sites, Kortenberg (KB) and Leuven (LV), both with respectively 446 and 115 beds. Both campuses are located in the same province in Belgium (Vlaams-Brabant).

Approval by the Ethical Research Committee of UZ/KU Leuven was obtained (reference MP011646).

Collection of data

In the hospital a "patient related incident report and management system" (PiMS) is used to register multiple types of incidents such as falls, medication incidents or aggression (42). Per type of incident a specific electronic registration form is available to document the circumstances and consequences of the incident. Caregivers need to complete the registration form as soon as possible after they encounter an incident. Consequently, these PiMS reports give a complete overview of information regarding patient-related incidents, including falls.

Data of the PiMS reports on falls were provided anonymously by the hospital's quality coordinator. All PiMS reports on fall incidents of all hospitalized patients (both full-time and day admissions) completed during the study period were included. PiMS reports on near incidents were excluded from this analysis.

Data on the number of patient days and the number of admissions were obtained using the hospital's medical registration system. This information was provided anonymously by the hospital's management information report service.

Outcome

The primary outcome was the prevalence of falls, expressed as falls per number of admissions and falls per 1,000 patient days.

The secondary outcome was the prevalence of falls resulting in injury. Physical injuries were defined as none (incident without injury), mild (intervention required to rule out injury), moderate (incident resulting in temporary injury requiring intervention and/or prolonged hospitalization), severe (incident resulting in permanent injury and, if necessary, requiring intervention to manage a life-threatening situation), and fatal (incident resulting in patient death).

The third outcome was the investigation of the factors (cause and location of the fall, sex and age of the patient) associated with falls and falls resulting in injury. Data on cause and location of the fall were available in the datasets of both campuses, data on age and sex of the patient were only available in the dataset of campus Kortenberg. Age groups were defined as follows: young people (<18 years), adults (18–65 years), youngest elderly (65–74 years), middle elderly (75–84 years), and oldest elderly (>85 years).

The fourth outcome was the prevalence of repeated falls and the factors associated with it. It was also examined how the chance of recurrence was estimated, by looking at the answers in de PiMS form of the previous incident. As mentioned above we could only perform these analyses on the subsample of campus Kortenberg.

Data analysis

PiMS on registered falls were extracted anonymously and exported to a Microsoft Excel (Seattle, WA, VS) by the hospital's quality coordinator. The two datasets, one for each campus, were merged (Supplementary Figure 1 shows a detailed overview of data handling and processing).

Coding and statistical analysis were done using Microsoft Excel 2010 and SSPS statistical analysis software, respectively. Descriptive statistics were performed to calculate frequencies: percentages and ratios for nominal variables, means and standard deviations for continuous variables.

The prevalence of falls was determined on the basis of the information obtained about the number of falls and the number of patients with a fall and the number of hospitalization days and admissions. For each patient the time between 2 registered falls was calculated. If this period did not exceed 12 months falls were considered as repeated falls.

Due to a more anonymized way of data storage (patient number not available), the data of campus Leuven didn't allow to identify the age and sex of the patient nor the proportion of patients with repeated falls. The analyses regarding age, sex and repeated falls were only performed on the subsample of campus Kortenberg.

Results

Prevalence of registered falls

An overview of the data regarding prevalence is shown in Table 1.

A total of 4,324 falls (3,251 for campus Kortenberg and 1,073 for campus Leuven), 23,630 admissions and 990,904 patient days were registered during the study period. This makes a total of 0.2 falls/admission and 4.4 falls/1,000 patient days.

Prevalence of falls resulting in injury

The majority of falls had no (64%) or mild (24%) physical consequences. Five percent had moderate consequences and required investigation. Only 0.5% of the incidents were considered as severe. None of the incidents were fatal. For 5.7% of the incidents, the severity rate was not reported in the PiMS

TABLE 1 Data on the prevalence of registered falls.

	Jul–Dec 2013	2014	2015	2016	2017	2018	Jan–Jun 2019	Total
Falls	410	705	635	665	774	733	403	4,324
Admissions	2,043	3,928	4,092	3,961	3,841	3,903	1,862	23,630
Patient days	82,452	164,261	169,638	166,118	162,525	165,537	80,373	990,904
Falls/admission	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Falls/1.000 patient days	4.9	4.3	3.7	4.0	4.8	4.4	5.0	4.4

TABLE 2 Data on the frequencies of possible causes.

	Number of falls	Number of falls within this group/total number of falls ($n =$ 4.324)
Health status	2,248	51.9%
Behavior	1,946	45.0%
Environment	553	12.8%
Medication	288	6.7%
Intoxication	17	0.4%
Other factors	396	9.2%
Unknown	38	0.9%
No data	792	18.3%

Multiple options could be indicated per incident.

form. Supplementary Table 1 shows an overview of the data regarding the prevalence of falls resulting in injury.

Factors associated with falls

Cause

An overview of the frequencies of possible causes is shown in Table 2. The health status of the patient (51.9%) and the behavior of the patient (45.0%) were reported as the two most common causes of the fall. In 6.7% of registered falls the fall was considered medication-related. Note that multiple options could be indicated on the report form.

Location of fall

More than half of the patients (51.5%) fell in their own room. The other half fell mainly in the shared living area of the hospital ward (18.6%), in the corridor of the ward (15.7%) or somewhere else in the ward (5.7%). A small percentage of patients (5.4%) fell in the bathroom or on the toilet. The other patients (3.1%) fell somewhere outside of the ward.

Sex

In 57.5% of registered falls (n = 1,859) the patient was female. Figure 1 shows that the man/women ratio was more or less consistent when looking at gender in relation to age. For example, in the group of the *middle elderly* and the *oldest elderly* respectively 58.6 and 58.7% of these patients were female. For the group of young people this was only 54.4%, in the adult group 63.3%.

Age

Eighty-six percent of falls took place in a hospital ward for elder patients, 13% in a ward for adults and 1% in the children's department. Data regarding age are shown in Table 3. Mean age of the patients with a registered fall was 72.2 years (SD 15, 5). The youngest patient was 13 years old, the oldest 100 years. Eighty percent of the falls involved a patient over the age of 65. Within this group, most incidents occurred in the *middle elderly* (32.9%), followed by the *youngest elderly* (26.0%) and the *oldest elderly* (20.9%). Only 25.0% of elderly patients suffered physical consequences because of a fall, as opposed to 31.4% of adults and 68.2% of young people. In the group of elderly patients, most physical injuries were observed in the group of oldest elderly. Nearly 10% of all patients admitted during the study period fell at least one time during their stay and with increasing age proportionally more falls were registered.

Prevalence of repeated falls and associated factors

Almost half of the patients (47.3%) were identified as repeated fallers.

Thirty-six percent of the repeated fallers fell twice during the 12 months study period. Twenty percent fell three times and 13.3% four times (with a maximum of 12 months between two consecutive falls). Sixteen patients (3.3%) fell twenty times or more during their stay.

The probability of recurrence was estimated by the health care professional who reported the incident: 41.3% was reported as almost certain to be repeated, 34.2% as probably and only 1.1% as unlikely.

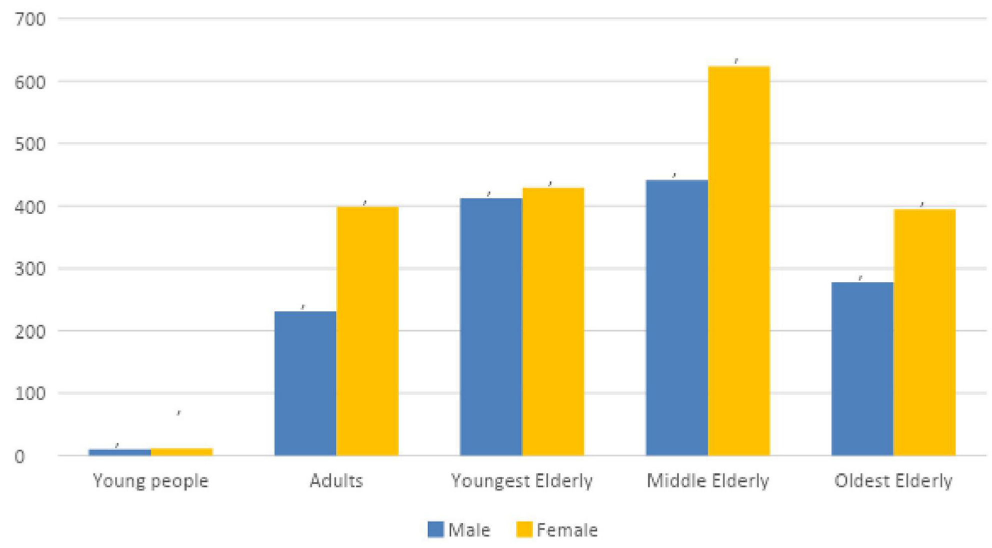

FIGURE 1
Distribution of age and sex of reported falls (campus Kortenberg). Representation of the distribution of gender and age. Incidents where age and/or gender were unknown were excluded.

TABLE 3 Data on the number of falls, number of falls resulting in physical injury, number of patients with a fall and number of admissions, expressed in relation to age.

	Number of falls	Number of falls/total number of falls	Number of falls resulting in physical injury	Number of falls resulting in physical injury/number of falls within this group	Number of patients with at least one fall	Number of unique patients with at least one admission	Number of patients with at least one fall/number of unique patients
Young people (<18)	22	0.7%	15	68.2%	19	677	2.8%
Adults (18–64)	632	19.5%	196	31.0%	269	7,091	3.8%
Youngest elderly (65–74)	841	26.0%	176	20.9%	171	919	18.6%
Middle elderly (75–84)	1,066	32.9%	277	26.0%	322	1,231	26.2%
Oldest elderly (>85)	679	20.9%	194	28.6%	251	834	30.1%
Total	3,240*	100%	858	26.5%	1,032	10,570	9.8%

*A total of 3,251 falls was registered on this campus during the study period, however in 11 incidents the age of the patient was not available (unknown reason).
This table only includes data of the subsample of campus Kortenberg.

Mean age of the patients with a repeated fall was 73.5 years (SD 13, 7). The youngest patients was 16 years old, the oldest 100 years. Table 4 shows that repeated falls mainly occurred in people over the age of 65. When the number of repeated falls was compared with the total number of falls on this campus, it was found that the youngest elderly fell most frequently.

Low numbers of serious incidents were observed in this repeated falls group, compared to the full dataset of this campus (see Table 5).

Discussion

This study showed a fall ratio of 4.4 falls per 1,000 patient days. This result is in line with some previous studies (43, 44) showing ratios ranging from 3.7 to 4.6. In contrast, Turner et al. (45) found a higher ratio of 8.6. Rao et al., in their systematic review on the incidence of falls in psychiatric inpatients in China, observed a significantly lower incidence. However, underreporting could not be excluded

TABLE 4 Data on the age distribution in the ‘repeated falls’ group (campus Kortenberg).

	Number of falls	Number of repeated falls	Number of patients with a repeated fall	Number of repeated falls/number of falls	Number of falls/total falls
Young people (<18)	22	5	2	22.7%	0.7%
Adults (18–64)	632	434	78	68.7%	19.5%
Youngest elderly (65–74)	841	765	102	91.0%	26.0%
Middle elderly (75–84)	1,066	914	179	85.7%	32.9%
Oldest elderly (>85)	679	552	128	81.3%	21.0%
Total	3,240*	2,670	489	82.4%	100%

*A total of 3,251 falls was registered on this campus during the study period, however in 11 incidents the age of the patient was not available (unknown reason).
This table only includes data of the subsample of campus Kortenberg.

TABLE 5 Data on the physical consequences in the ‘repeated falls’ group (campus Kortenberg).

	Number of falls	Number of repeated falls	Number of repeated falls/number of falls	Number of falls/total falls
None	2,274	1,966	86.5%	69.9%
Mild	707	522	73.8%	21.8%
Moderate	147	111	75.5%	4.5%
Severe	15	3	20.0%	0.5%
Not reported	108	68	63.0%	3.3%
Total	3,251	2,670	82.1%	100%

This table only includes data of the subsample of campus Kortenberg.

because in some Chinese hospitals falls were considered as minor accidents (37).

No incident was fatal and only 0.5% of falls resulted in severe injury. Age and gender of these falls were often unknown (respectively 19 and 17 of the 23 falls), making it impossible to define risk groups.

In contrast to the results of Tay et al. (38) and Poster et al. (44), where respectively 14 and 50% of the incidents had no physical consequences, in this study 65% of the falls were registered without any physical injury. Whether this could be a result of the fall prevention policy in our hospital, cannot be answered.

Evidence suggests that patients often fall on their way to or in the bathroom (33, 44, 45). In this study, more than half of the registered falls took place in the patient’s room or in the bathroom/on the toilet (respectively 52 and 5%). A similar observation was made by Poster et al., finding percentages of respectively 42 and 10%. This also applies to patients in non-psychiatric hospitals (19, 44).

Looking at the number of patients with a fall and the number of admissions in relation to age, proportionally more falls were registered with increasing age. This shouldn’t be surprising as several studies have already pointed out that older age is an important risk factor for falling (43, 44, 46).

Nearly 50% of patients (47%) fell at least twice within the next 12 months. A history of falling is an important risk factor for falls, especially for those resulting in physical injury (18, 19, 47). In order to minimize the chance of recurrence, it is important to map out the situation and circumstances of previous falls as accurately as possible (48).

Strengths and limitations

The relatively large sample size was a strength of this study. A total of 4,324 falls was studied, without any exclusion for age or diagnosis. Moreover, the elderly group was divided by age in different subgroups (youngest, middle and oldest elderly), providing additional insights, namely that the middle elderly fell more, but the oldest elderly suffered more physical consequences.

A number of limitations must also be taken into account when interpreting the results. A first limitation is the lack of a control group. A second limitation is the fact that the study was only performed in one hospital of this specific region. The third limitation are the characteristics of and differences between the report forms, which were not primarily designed for use in a study context. Due to the fact that this study made use of voluntary reporting forms, underreporting of the number of incidents cannot be excluded (38). In addition, non-mandatory fields were often not filled in, resulting in the fact that the analysis of certain elements was limited to files with incomplete data. The last limitation is that the severity level of physical consequences was not always known at the time of the registration of the fall, which could lead to an underestimation of the severity of injuries.

Further research should include patient diagnosis and length of hospital stay, as depression has been identified as an independent risk factor (apart from the intake of psychotropic medication) (19, 38, 49, 50) and the first week of admission has been shown to be a specific high-risk period that requires extra vigilance (43). On the other hand, with increasing length of hospital stay, other risk factors that were initially not relevant can arise and caregivers can become less attentive in comparison to the start of the admission (44, 51).

Although this study was purely descriptive, our data provide a good basis to measure post-intervention changes in the future, as it was recently shown that mainly patient and staff education and personalized falls prevention strategies can reduce hospital falls (52, 53), it would be interesting to see if such interventions would reduce fall incidents in our hospital.

Conclusion

In summary, our results generally were in line with the ratios found in the existing literature on fall prevalence in psychiatric hospitals. Certain links with age were observed. Nearly 80% of falls involved a patient over the age of 65. On the other hand, young people showed more physical consequences from a fall compared to adults and elderly, suggesting that all age categories deserve sufficient attention in fall prevention policies.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by Ethical Research Committee UZ Leuven - KU Leuven. Written informed consent from the participants' legal guardian/next of kin was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2022.1020975/full#supplementary-material

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EDITED BY
Wulf Rössler,
Charité Universitätsmedizin
Berlin, Germany

REVIEWED BY
Paul Hüsing,
University Medical Center
Hamburg-Eppendorf, Germany

*CORRESPONDENCE
Ricarda Mewes
ricarda.nater-mewes@univie.ac.at

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Recent developments on psychological factors in medically unexplained symptoms and somatoform disorders

Ricarda Mewes*

Faculty of Psychology, University of Vienna, Vienna, Austria

Somatic symptoms which are not fully explained by a medical condition (medically unexplained symptoms) have a high relevance for the public health. They are very common both in the general population and in patients in health care, and may develop into chronic impairing conditions such as somatoform disorders. In recent years, the relevance of specific negative psychological factors for the diagnosis and the stability of somatoform disorders and for the impairment by medically unexplained symptoms gained more and more attention. This resulted—among others- in core changes in the diagnostic classification criteria of somatoform disorders. Against this background, the present "Perspective" will outline recent developments and findings in the area of medically unexplained somatic symptoms and somatoform disorders. Moreover, it will lay a special focus on evidence on specific negative psychological factors that may influence the course of unexplained somatic symptoms and disorders and the impairment caused by these symptoms.

KEYWORDS

psychological factors, medically unexplained symptoms, somatoform disorders, somatic symptom disorder, depression

Introduction

Pain, gastrointestinal, cardiovascular, or other somatic symptoms which are not fully explained by a medical condition (medically unexplained symptoms), are very common both in the general population and in patients in health care (1–4). While most medically unexplained somatic symptoms are transient or do not cause impairment, in some cases they develop into chronic disabling complaints or full-blown somatoform disorders, which are associated with high health care utilization and severe impairment (5–8). In addition to the key role of impairing medically unexplained symptoms in somatoform disorders, there is evidence that persons with other mental disorders, such as depressive disorders, frequently suffer from medically unexplained symptoms and that medically unexplained symptoms may even negatively influence their course (9–15).

This “Perspective” will outline recent developments in the area of medically unexplained somatic symptoms and somatoform disorders from the perspective of the Author, with a special focus on psychological factors that may influence their course and the impairment caused by these symptoms.

Somatoform disorders in the DSM and the ICD

Somatoform disorders are among the most frequent mental disorders, with prevalence rates estimated to be 5–6% in the general population (16). They were introduced as a diagnostic entity in the third version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III) (17) and were retained in the fourth version of the manual (DSM-IV) (18). In the DSM-IV, the prototype of somatoform disorders was *somatization disorder*, which was defined by at least eight medically unexplained somatic symptoms in four different organic systems persisting over several years and beginning before the age of 30 years. Similarly, the International Classification of Diseases, tenth version (ICD-10) (19), contained the diagnosis of *somatization disorder*, which was defined by at least six medically unexplained somatic symptoms in two different organic systems persisting over 2 years. However, prevalence rates for the somatization disorder were very low, i.e., ~0.4% in the general population and 0.5–6.0% in primary or secondary care (20–22). Moreover, the conceptualization was criticized with regard to utility and validity, since, among other things, evidence showed that many persons with multiple medically unexplained symptoms did not fulfill the strict criteria for somatization disorder despite their high impairment (23–25). In addition, somatization disorder was found to be associated with a strong recollection bias regarding symptoms (26). In general, the required dichotomization of bodily complaints into either “medically explained” or “medically unexplained” proved to be difficult even for specialists and brought about low interrater reliability {(27–29); but see (30) for an opposing perspective}. Occasionally, a transition of considering a symptom to be medically explained or not has occurred over time in both directions (4, 27, 31). The process of diagnosing was further complicated by patients whose complaints are related to a medical disease, but whose impairment exceeded the “expected” extent (32). Therefore, it was proposed that the dualistic distinction between “unexplained” and “medically explained symptoms” should be abandoned (33–36). This proposition was supported by a study in the general population, showing that most medically unexplained symptoms and medically explained symptoms resulted in comparable impairment and showed similar stability (37). The findings suggested that research should focus on the formulation and exploration of additional significant non-somatic classification criteria and factors that influence the impairment by medically unexplained symptoms, i.e., specifically on psychological factors. This should avoid shortcomings in diagnostic classification systems for somatoform disorders and consequently enable adequate management of impairing medically unexplained symptoms within the health care system. Taking into account the criticism outlined above, the DSM 5th edition (DSM-5) (38) and the ICD 11th edition (ICD-11) revised the former sections of somatoform disorders. In the DSM-5, some of the former somatoform disorders were replaced with the new diagnosis of *somatic symptom disorder* (300.82). For this diagnosis, the former differentiation between medically unexplained and explained somatic symptoms was abandoned, such that medically explained symptoms also counted for the core classification criterion of impairing symptoms. In addition, psychological classification criteria (criterion B) were included (see section 3 below). Similarly, the ICD-11 (39) introduced the new classification *bodily distress disorder* which is characterized by persistent and distressing somatic symptoms (including medically explained symptoms) which draw excessive attention.

Psychological factors in medically unexplained symptoms and somatoform disorders

Since persistent medically unexplained somatic symptoms and somatoform disorders bring about high costs for health care systems and are among the leading causes of disability (8), it is highly relevant to investigate psychological factors that characterize and influence these symptoms and disorders. The intensity of and impairment by medically unexplained symptoms, i.e., their interference with daily life, as well as health care utilization, are seen as core outcome criteria in the treatment of persons suffering from somatoform disorders (40). Therefore, the investigation of psychological factors that influence these criteria is of major importance in order to improve the diagnosis and treatment of affected persons. Furthermore, the investigation of mechanisms underlying the associations between medically unexplained symptoms and their perceived intensity and impairment is of high interest for the provision of appropriate and timely intervention strategies.

Evidence suggested that in addition to more unspecific factors such as early childhood trauma or insecure attachment (41), specific *negative psychological factors* such as catastrophizing, negative affectivity, rumination, avoidance, health anxiety, or a negative physical self-concept have a substantial influence on the transition from unproblematic medically unexplained somatic symptoms to severely impairing complaints and somatoform disorders. Individuals may differ in the extent to which negative psychological factors occur. Evidence suggested that persons with chronic and disabling medically unexplained symptoms and somatoform disorders show more negative psychological factors than do persons without such symptoms, and that negative psychological factors strongly influence the impairment and illness behavior of persons with chronic medically unexplained symptoms as well as the stability of these symptoms (42–44). Individuals with more negative psychological factors may perceive medically unexplained symptoms as more threatening and may consequently show a higher cognitive, emotional, and behavioral awareness of these symptoms. For instance, a recent study in the general population by Toussaint et al. (45) found that persons who suffered from somatic symptoms and a high degree of psychological symptoms related to the somatic symptoms (i.e., persons who fulfilled the criteria for a somatic symptom disorder) reported to spend eight times more time a day dedicated to their somatic symptoms (4 h/day) in comparison to persons with less somatic symptoms and way lower psychological symptoms (half an hour/day). This process may, in turn, lead to increased negative bodily sensations, resulting in a higher intensity of and impairment by medically unexplained symptoms (43, 46–49). Indeed, Toussaint et al. (45) found that the psychological symptoms were the strongest (cross-sectional statistical) predictor for the self-rated health status in their general population sample.

The topic of psychological factors also bears relevance with regard to the classification of impairing medically unexplained symptoms and somatoform disorders. To justify the classification of somatoform disorders as a DSM or ICD section F/mental disorders diagnosis (18, 19, 38), positive psychological classification criteria were required (25). A study in the general population evaluated specific negative psychological factors that could be used as classification criteria for impairing somatic/somatoform syndromes requiring health care {e.g. (42, 44)}. Specifically, it aimed to determine the relevance of these negative psychological factors with regard to impairment by (medically unexplained) somatic symptoms and health care utilization due to these symptoms. These criteria should help to identify those people who need health care, as compared to people who are able to cope with their symptoms themselves, without health care. Moreover, the criteria should identify those patients who are seriously impaired by the symptoms, in contrast to those who have some symptoms but do not feel impaired. The study authors found several negative psychological factors that might influence whether persons with somatic symptoms require health care and/or feel impaired by their symptoms: (1) ruminations about somatic complaints and worrying about health and illness; (2) catastrophizing of bodily sensations; (3) somatic illness attributions despite contradictory medical information; (4) a self-concept of bodily weakness; (5) low symptom tolerance and immediate need for medical help when symptoms occur; (6) avoidance of physical activity that could cause sweating or heart rate acceleration; (7) disuse of body parts because of complaints; (8) feelings of desperation because of symptoms and negative affectivity. Further, longitudinal analyses showed that persons fulfilling the negative psychological factors reassurance seeking, body checking, catastrophizing of physical sensations, avoidance of physical activities, a self-concept of bodily weakness„ and negative affectivity had a two to ten higher odds ratio for suffering from a somatoform disorder 1–4 years later, with up to 90% correct predictions for the overall model (42). Other studies used the comparison between different alternative classification proposals {e.g., bodily distress disorder introduced by Fink et al. (50), polysymptomatic disorder introduced by Rief et al. (51)} to determine the possible value of specific psychological classification criteria (51, 52). They found that the inclusion of psychological and behavioral criteria increased the concurrent validity of the proposals and partly also the predictive validity.

Based on the evidence outlined above, the DSM-5 (38) and the ICD-11 (39) revised their former sections of somatoform disorders, and included specific psychological criteria, i.e., health anxiety, catastrophizing, or high time or energy devoted to the preoccupation with somatic symptoms in the DSM-5, and excessive attention that can not be alleviated by clinical examinations and reassurance of innocuousness in the ICD-11. Nevertheless, the described findings suggested that, although the validity of the diagnoses was improved by the inclusion of psychological classification criteria {for a recent scoping review on evidence on somatic symptom disorder please see (41)}, there were some shortcomings with regard to the limited number of considered negative psychological factors. For instance, it would be advisable to widen somatic symptom disorder's psychological criterion (criterion B) through the inclusion of a self-concept of bodily weakness and negative affectivity, and also to specify the existing criteria with regard to rumination and avoidance (42, 44). Similarly, the bodily distress disorder may benefit from including a broader range of psychological criteria and/or further specification of "excessive attention" (i.e., with regard to behavioral, emotional, and cognitive indications). In this regard, the study of Toussaint et al. mentioned above (45) took an important first step in shedding light on the "excessiveness" in terms of daily time dedicated to somatic symptoms. Further refinement of the diagnostic criteria may help to even better meet the requirements regarding validity and consequently the needs of patients with mainly medically unexplained symptoms, their treating clinicians, and researchers.

Psychological factors in the daily lives of persons suffering from medically unexplained symptoms

Despite the dynamic trajectories and volatility of medically unexplained symptoms (4, 37, 53–56), most studies investigating medically unexplained symptoms and negative psychological factors used rather static data, i.e., questionnaires or data from only one time point, or assessed persons in the laboratory, i.e., in a rather artificial setting far removed from their daily life. While these studies provided valuable insights into how to establish the differential relationships between medically unexplained symptoms, negative psychological factors, and impairment, they were unable to capture dynamic associations and mechanisms, and their results may not be generalizable to individuals' daily life. To elucidate the dynamic associations between negative psychological factors and the intensity of and impairment by medically unexplained symptoms, a micro-longitudinal design using ecological momentary assessment (EMA) may represent the best choice. An EMA approach has the potential to provide insight into the occurrence of negative psychological factors and specific reactions as they actually occur in everyday life (57–61). Moreover, such an approach avoids the limitations of cross-sectional or longer-term longitudinal designs {such as the inability to test causal relationships, low temporal resolution, memory biases, and losses to follow-up assessments (55)}, and of experimental approaches (such as the lack of generalizability of observed relationships).

Only a handful of studies have investigated associations between single negative psychological factors or stress and impairment by somatic symptoms using ambulatory assessment designs (48, 53, 56, 62–65). The respective findings suggest negative influences of negative psychological factors and stress on daily somatic symptoms in healthy students or persons suffering from functional somatic syndromes/medically unexplained symptoms. However, these studies were limited both in generalizability and ecological validity, as they mainly investigated small groups, focused on pain and single psychological factors, had very short assessment periods, or included a low number of assessments per day. Two studies investigated the relevance of several specific negative psychological factors in the daily life of women suffering from medically unexplained symptoms using an EMA design with several assessments per day over a period of 14 days (66, 67). They focused exclusively on women due to the female preponderance regarding somatoform disorders/somatic symptom disorder and depressive disorders (8, 68) and given the sex-specific differences in biological responses to stress (69–71).

The first study investigated the everyday life occurrence of negative psychological factors in women suffering from chronic medically unexplained symptoms in the form of widespread pain (fibromyalgia syndrome) (66). In addition, the predictive value of negative psychological factors concerning the intensity of and impairment by the pain was investigated. In this study, ambulatory data were assessed over 14 consecutive days with six daily assessments via an iPod. Twenty-eight women suffering from chronic widespread pain estimated the strength of three negative psychological factors (somatic illness beliefs, health anxiety, time/energy devoted to pain or health concerns) and the intensity of momentary pain. The results showed that, on average, negative psychological factors occurred three to four times per day and had a mild to moderate severity. Interestingly, they were both concurrently and prospectively associated with momentary pain intensity and subjective impairment by pain. Negative psychological factors and pain medication explained 20% of the variance in pain intensity and 28% of the variance in subjective impairment.

The second study also included biological measures, as a major aspect of the negative consequences of negative psychological factors is their potential to elicit biological stress responses (67, 72, 73). These responses are coordinated by a complex system encompassing the hypothalamic-pituitary-adrenal (HPA) axis and the autonomic nervous system (74–78), and may in turn also influence the intensity of and impairment by medically unexplained symptoms (65). Previous studies showed that the activity of these systems was differentially affected in persons with somatic symptom disorder and persons with depressive disorders. While the activity of the HPA axis is assumed to be reduced in individuals with impairing medically unexplained symptoms (79–81), HPA axis hyperactivity is apparent in persons with depressive disorders (82, 83). A recent meta-analysis even found that the higher the cortisol levels in persons with depressive disorders at the start of psychological therapy, the worse the outcome at the end of treatment (84). In the EMA study, 29 women with somatic symptom disorder (based on medically unexplained somatic symptoms) and 29 women with depressive disorders participated. In this study, intensity of and impairment by somatic symptoms, negative psychological factors, and stress biomarkers (cortisol and alpha-amylase) were assessed five times per day over 14 consecutive days using an electronic device and saliva samples. The results showed that the more negative psychological factors were present, the higher were the concurrent and time-lagged intensity of and impairment by somatic symptoms in women with somatic symptom disorder and with depressive disorders. In women with depressive disorders, negative psychological factors were associated with higher levels of salivary cortisol. In contrast, they were associated with lower levels in women with somatic symptom disorder. In women with somatic symptom disorder, lower cortisol levels were associated with higher intensity at the next measurement time point, i.e., 3–4 h later, emphasizing the utility of stress-reducing interventions in this group (67).

The two EMA studies impressively demonstrated the strong immediate and delayed impact of specific negative psychological factors on the intensity of and impairment by somatic symptoms in the daily life of affected persons with different disorders. Thus, negative psychological factors may be considered as transdiagnostic factors in the development and treatment of impairing (medically unexplained) somatic symptoms. With the unique combination of subjective and biological measures the second study found support for the possible mediating role of the HPA axis in the association between negative psychological factors and the suffering from somatic symptoms. These results are highly relevant, as they can inform the development of new treatment strategies which use ecological momentary intervention approaches focusing on negative psychological factors in persons suffering from impairing somatic symptoms (85). Since the two EMA studies only included women without any medical condition that may affect endocrine or autonomic functioning (because of the investigated biological markers), the generalizability of the findings to persons with such a medical condition remains unclear. Since studies showed that specific negative psychological factors may aggravate somatic complaints accompanying medical illnesses to an extent that cannot be fully explained by the underlying illness (86–89), the findings of the EMA studies may bear some relevance for persons suffering from a medical condition. However, the inclusion of medical conditions may have changed the characteristics of the investigated group and the strength of the presented psychological factors, since a study suggested that the diagnosis of somatic symptom disorder becomes less strict when medically explained somatic symptoms are included (90). With the lack of clear criteria for the fulfillment of the B criteria for somatic symptom disorder in the presence of medical conditions, the diagnosis may become less reliable and may lose validity. Future studies should shed light on this important issue.

Discussion

The presented evidence showed the relevance of specific negative psychological factors for the conceptualization, the diagnosis, and the treatment of medically (un)explained symptoms and various diagnostic entities in which these symptoms are pathognomonic, and showed recent developments in this regard.

The findings underlined the importance to consider negative psychological factors in the context of medically unexplained symptoms, as these factors may have the potential to explain why medically unexplained somatic symptoms cause so much impairment without a (known) underlying medical disease. Indeed, the evidence outlined confirmed the high relevance of specific negative psychological factors for the concurrent and predictive intensity of and impairment by medically unexplained symptoms in the general population. It showed that specific negative psychological factors contributed to the maintenance of multiple impairing medically unexplained symptoms over several years, as well as to the direct impairment by somatic symptoms in the daily lives of affected persons. A recent EMA study even suggested that these specific negative psychological factors were transdiagnostic, since they were equally relevant for the impairment by somatic symptoms in women with depressive disorders as they were in women with somatic symptom disorder.

Moreover, the presented findings suggest that for persons suffering from medially unexplained somatic symptoms, the current classification criteria for somatic symptom disorder and bodily distress disorder might be further improved by including additional psychological classification criteria (e.g., reassurance seeking, body checking, a self-concept of bodily weakness, avoidance behavior, and negative affectivity) or by the use of these criteria/factors to specify the current psychological criteria. This could improve the early detection and timely treatment of persons at risk for a chronic course of somatoform disorders/somatic symptom disorder/bodily distress disorder. However, it is important to note that while the suggestions for additional psychological classification criteria is based on a broad evidence [see above and (41)], there is no consensus on the exact set of psychological criteria that may be relevant for a diagnosis in the field of somatoform disorders. Moreover, the relevance of specific criteria may vary between cultures [e.g., (90, 91)].

Despite the intriguing relevance of psychological classification criteria, there may also be cases where psychological classification criteria should not be mandatory for a diagnosis. As Burton et al. (92) suggest in their proposition of the category *functional somatic disorders*, there may be need for a diagnosis that captures persons suffering from persistent impairing functional somatic symptoms or syndromes (e.g., fibromyalgia or irritable bowel syndrome), who may or may not fulfill additional psychological criteria {for a recent review on functional somatic syndromes also see (93)}.

The findings of the studies using an EMA design provided further scientific groundwork for treatments of persons suffering from chronic medically unexplained symptoms. They supported the rationale of treatment approaches focusing on cognitive-behavioral factors in general (94), as well as approaches considering negative affectivity and emotion regulation (95, 96) and avoidance (97) in particular. Furthermore, they can inform the development of new treatment strategies which use ecological momentary intervention approaches to reduce negative psychological factors in persons suffering from impairing somatic symptoms (85). Future studies should follow this promising avenue.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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EDITED BY
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The University of Sheffield,
United Kingdom
Ranjit Kumar Dehury,
University of Hyderabad, India

*CORRESPONDENCE
Steven J. Jackson
steve.jackson@otago.ac.nz

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The wellbeing pandemic: Outline of a contested terrain and a proposed research agenda

Steven J. Jackson[1]*, Michael P. Sam[1], Marcelle C. Dawson[2,3] and Daniel Porter[1]

[1]School of Physical Education, Sport and Exercise Sciences, University of Otago, Dunedin, New Zealand, [2]Department of Sociology, Gender Studies and Criminology, University of Otago, Dunedin, New Zealand, [3]Centre for Social Change, University of Johannesburg, Johannesburg, South Africa

Wellbeing has emerged as a central, if not defining, feature of contemporary social life. Yet, despite its global significance spanning the political, social and economic spectrum, there is a remarkable lack of agreement regarding the conceptualization, definition or operationalisation of wellbeing nor any clear evidence of its success as an instrument of policy. This essay explores the contested terrain of wellbeing by examining the concept in relation to emerging politics, complexities and contradictions. More specifically, the essay: (1) briefly describes the historical origins and development of wellbeing; (2) discusses how it has been reconceptualised within the context of neoliberalism; and, (3) outlines a research agenda offering three ways to investigate wellbeing including: (a) as a wicked problem; (b) as part of the process of "wellbeing washing" within state and other institutional structures and policies; and, (c) in relation to alternative futures, which might encourage us to reimagine or jettison the term altogether.

KEYWORDS

wellbeing, pandemic, contested terrain, wicked problem, wellbeing washing, alternative futures

Introduction

Although its origins can be traced to antiquity, wellbeing has emerged as a central, if not defining, feature of contemporary social life. In response to rising global social inequalities, new conceptualisations of wellbeing have emerged that have shifted the focus from primarily economic measures, such as Gross Domestic Product (GDP) and standard of living, to allegedly more holistic and progressive measures associated with quality of life. Arguably, the accelerated, overwhelmingly positive, and largely unquestioned, trajectory of wellbeing has been so strong that it exhibits elements of a halo effect. Viewed positively, wellbeing has come to be regarded as a panacea for many societal ills spanning health, inequality and even the environment. However, viewed through a more critical lens there are increasing concerns that the politicization, commodification and exploitation of wellbeing has led to it becoming a casualty of modernity (Carlisle et al., 2009), contributing to widespread cultural anxiety (White, 2017) and impacting on individual and collective health and happiness. In this perspectives essay, we assert that if wellbeing were a disease, its global transmission combined with its complex mutations of meaning, usage, and appropriation might jocularly be said to constitute a *pandemic.* The social and geographic footprint of the concept is staggering and manifests within popular discourse and myriad institutions, ranging from the World Health Organization (WHO), United Nations (UN), World Bank, Organization for Economic Co-operation and Development (OECD), national governments and their various state sectors, workplaces, and consumer lifestyle products and services (Cederström and Spicer, 2015). Yet, despite its global significance spanning the political, social and economic spectrum, there is a remarkable lack of agreement regarding the definition, conceptualization, or operationalisation of wellbeing, nor any clear, longitudinal evidence of its success as an instrument of policy.

The challenge of defining and conceptualizing wellbeing

To begin, let us consider the challenge of defining and conceptualizing wellbeing. Pollard and Lee (2003, p. 60), for example, note that wellbeing is: "a complex, multi-faceted construct that has continued to elude researchers' attempts to define and measure." Likewise, Thomas (2009, p. 11) argues that wellbeing is, "intangible, difficult to define and even harder to measure". One key area of confusion is the conflation of "wellbeing" with concepts as diverse as happiness, quality of life, life satisfaction, flourishing, and wellness. As Forgeard et al. (2011, p. 81) suggest, "[t]he question of how wellbeing should be defined (or spelt) still remains largely unresolved, which, has given rise to blurred and overly broad definitions". Finally, White and Blackmore (2015, p. 4) advise that: "The ubiquity of references to wellbeing and the diffusion of meanings they bear means any attempt to summarize the field must inspire some trepidation". In short, for a concept that is at the center of contemporary social life, there is very little clarity about what it means and/or how it should be measured.

Ultimately, what we do know is that by virtue of its intersection with politics, economics, health, education, and consumer lifestyles–wellbeing is now a key concept within an ever-expanding network of discourses and policies linked to power, resources and responsibility. This essay explores the contested terrain of wellbeing by examining the concept in relation to emerging politics, complexities and contradictions. More specifically, the essay: (1) briefly describes the historical origins and development of wellbeing; (2) discusses how it has been reconceptualised within the context of neoliberalism and, thus, redefined as an individual responsibility; and, (3) outlines a proposed research agenda offering three ways to investigate wellbeing including: (a) as a wicked problem; (b) as part of the process of "wellbeing washing" within supranational, state and corporate institutional structures and policies; and, (c) in relation to alternative futures, which might encourage us to reimagine or jettison the term altogether.

A (very) brief history of wellbeing

Wellbeing has a long history and embodies diverse meanings ranging from quality of life, happiness, flourishing health, and extending to morality and mindfulness (Dodge et al., 2012; Seligman, 2012; Davies, 2015; Smith and Reid, 2017; Leary, 2019). The basic idea of wellbeing can be traced to Aristotle (Dalingwater et al., 2019) but its dominant contemporary conceptualisations are rooted in Western logic and philosophy. For example, in 1776, America's Declaration of Independence cited "the pursuit of happiness" as an "unalienable right" of citizens. In that same year, Jeremy Bentham identified happiness as a social measure to promote "utility" or the "greatest happiness of the greatest number" (Bentham, 1776). Like Bentham, English philosopher, political economist and Member of Parliament, John Stuart Mill (1806–1873) sought to use utilitarian principles to inform both law and social policy. However, he held different views with respect to how happiness and wellbeing should be cultivated and promoted. Mill's liberalism suggested that "the free development of individuality is one of the leading essentials of wellbeing" (Mill, 1859). This articulation of utilitarianism with liberalism facilitated the emergence of *homo economicus*, a model of human behavior with significant implications for social structure (see discussion of "neoliberalism" below).

Today, most conceptualisations of wellbeing are framed along two main lines. The first—subjective wellbeing—emphasizes a comprehensive, multidimensional measure of an individual's mental, physical and spiritual health (Diener et al., 2018). This perspective is perhaps best reflected in the World Health Organization's Well-being Index (World Health Organization, 1998). In 1998, the World Health Organization developed the WHO-5 Index to measure the subjective (affective and hedonistic) wellbeing of people aged 9 years or older. The index contains five statements covering states of cheerfulness, calmness, vigor, restfulness and fulfillment.[1] The WHO-5 Index is amongst the most utilized questionnaires for assessing subjective psychological wellbeing, has been translated into more than 30 languages, and has been widely used in research studies all over the world. Moreover, according to a systematic review of literature "The scale has adequate validity both as a screening tool for depression and as an outcome measure in clinical trials and has been applied successfully as a generic scale for well-being across a wide range of study fields" (Topp et al., 2015; p. 174). However, the WHO-5 Index is not without its

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[1] The five statements include: (1) 'I have felt cheerful and in good spirits', (2) 'I have felt calm and relaxed', (3) 'I have felt active and vigorous', (4) 'I woke up feeling fresh and rested' and (5) 'My daily life has been filled with things that interest me'. With respect to determining a person's wellbeing, the total raw score, ranging from 0 to 25, is multiplied by 4 to give the final score, with 0 representing the worst imaginable wellbeing and 100 representing the best imaginable well-being.

critics. Kusier and Folker (2020), note that the index "exhibits a range of psychometric compromises in the translation of philosophical theory into practice" (p. 338). For example, the WHO-5 index focuses on the frequency of the positive aspects of emotions but has a blind spot with respect to negative emotions and the intensity and duration of these emotions (Kusier and Folker, 2020). In addition, we assert that attempting to distill the complexity of the concept into five basic questions in order to quantify and operationalise it is overly simplistic. Furthermore, it highlights the entrenched individualization of wellbeing, that is, the tendency to rationalize, measure, and articulate wellbeing predominantly in relation to the psychological state of individuals. The overall influence of the WHO-5 index should not be underestimated given that governments, corporations, health organizations, schools, universities and a range of other sectors have not only embraced but implemented it. Such is the current hegemony of the wellbeing agenda (Harvey, 2005) that individuals daring to question its validity are often marginalized and branded as malcontents or labeled as persons suffering from ill-being (Cederström and Spicer, 2015).

The second conceptualization—objective wellbeing—captures the aggregate dimensions of the concept and is understood as an alternative to Gross Domestic Product (GDP) and a measure (ranking) of a nation's overall prosperity (Western and Tomaszewski, 2016). Consider, the OECD Framework for Measuring Well-Being and Progress which was developed on the basis of the recommendations of the 2009 Commission on the Measurement of Economic Performance and Social Progress (to which the OECD contributed significantly). This framework is built around three distinct components: current well-being, inequalities in well-being outcomes, and resources for future well-being (www.oecd.org). Like the WHO-5 index, the OECD Well-being Framework has informed a wide range of scholarly analyses across a range of academic disciplines and has been used as the basis of policy development internationally in relation to many social sectors including the economy, health and education. However, like the WHO-5 index, the OECD Well-being Framework also exhibits a range of limitations, including a lack of consensus regarding validity and the components and determinants of wellbeing (Cavalletti and Corsi, 2018). Beyond this, both the WHO-5 and OECD approaches to wellbeing have been scrutinized because (1) both operate from the basic assumption that we can objectively measure wellbeing (Alexandrova, 2018) and, furthermore, that the compulsive drive to achieve international conceptual coherence and consensus is leading, perhaps unintentionally, to the obfuscation of critical differences (Auld and Morris, 2019); (2) related to the previous point is the fact both the WHO and OECD conceptualisations and measurements of wellbeing are largely based on Western traditions thus marginalizing alternative, perspectives including, for example, Asian, Indigenous and other cultural orientations (Tiberius, 2004; Tov and Diener, 2009; Jorm and Ryan, 2014; Rappleye et al., 2020); and, (3) both operate within a wider set of power relations linked to nation-states, the United Nations, World Bank, IMF and a range of other political-economic actors that influence international affairs.

Although these two frameworks of wellbeing appear distinct, they are interrelated at least to the extent that they remain rooted within both positivist and neoliberal paradigms. On one hand, the introduction of wellbeing as a new and purportedly more progressive measure of national economic and social outcomes signals societal change, optimism and hope. On the other hand, the translation of state level policies and associated performance measures, tends to focus on *individual* wellbeing. Consequently, being "well" is defined as one who is: healthy, productive, efficient, resilient, obedient and loyal—characteristics that ensure compliance, reduce costs and increase economic growth (Cederström and Spicer, 2015). Thus, contemporary wellbeing remains embedded within a context underscored by a combination of utilitarianism and neoliberalism (Vallelly, 2021) and continues to operate within the logic of the new spirit of capitalism, a rejuvenated system of accumulation reframed in terms of liberation, security and fairness (Boltanski and Chiapello, 2005, 2007). Next, we elaborate on the emergence of wellbeing as an instrument of neoliberalism and its implications for society before proposing ideas for a new research agenda.

Neoliberalism and wellbeing

According to the Global Wellness Institute[2], the "wellness economy" was estimated at $US4.9 trillion in 2019 with a prediction that it could reach $US7 trillion by 2025 (Global Wellness Institute, 2021). These trends are arguably part of a wider process of market liberalization that has operated, albeit in varying manifestations and degrees, as a dominant socio-economic paradigm since the 1980s. Inasmuch as the neoliberal agenda has become endemic (Giroux, 2008; Chapman, 2016; Springer et al., 2016), wellbeing now carries a "(neo)liberal inflection" (Rappleye and Komatsu, 2020) with an emphasis on the articulation of state and individual interests (Harvey, 2005). Capturing the tension between state (objective) and individual (subjective) frameworks of wellbeing, White and Blackmore (2015) observe that:

> Politically, wellbeing gives voice to desires for an alternative, a new moral economy, a counterweight to the excesses of capitalism…Its claim to put people's own perspectives at the heart of policy-making promises

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[2] Global Wellness Institute is a non-profit organization with a mission to empower wellness worldwide by educating the public and private sectors about preventative health and wellness https://globalwellnessinstitute.org/.

> more democratic processes, or even empowerment (pp. 4-5)….But it may also intensify self-monitoring, with greater pressure to produce and perform happiness or [subjective] wellbeing as a marker of personal or collective value. To recognise this dilemma is to recognise wellbeing as a field of power (p. 38).

A key juncture in the trajectory of neoliberalism was the 2008 Global Financial Crisis (GFC). In response, then-French President, Nicolas Sarkozy commissioned a report on the effectiveness of using Gross Domestic Product (GDP) as a measure of a country's economic performance and social progress (Stiglitz et al., 2009). The report highlighted the limitations of GDP as a valid, reliable predictor of an economy and the health of those living and working within it. Amongst the recommendations were the inclusion of additional indicators beyond GDP with an emphasis on shifting the current measurement system "from measuring economic production to measuring people's wellbeing" (Stiglitz et al., 2009, p. 12). Subsequently, the visibility of wellbeing has grown significantly as states and non-governmental organizations, including the WHO and OECD, adopt new models and frameworks to re-balance economic and social priorities.

Notably, there are a number of states that have introduced national wellbeing frameworks including: Bhutan's Happiness index, the Welsh Wellbeing of Future Generations Act, Sweden's New Measures for Prosperity, and New Zealand's Living Standards Framework which includes a "wellbeing budget". At this point we briefly focus on New Zealand as it is not only one of the world's first "neoliberal nations", it has also been one of the most explicit and comprehensive in adopting wellbeing into its state architecture. Consistent with international approaches, the New Zealand wellbeing model is based on aggregated individual dashboard indicators, underpinned by capital investment in areas that are designed to secure future wellbeing (Treasury, 2018). Driven by subsequent "wellbeing budgets" (2019–2023), such measures are now ubiquitous in the strategies and programmes of all state agencies. Yet, for all its purported and perceived benefits the wellbeing budget has done little to address wealth inequality, homelessness, employment insecurity and labor exploitation. Nor has it improved levels of individual and collective health and wellbeing. On the contrary, by any standard quantitative or qualitative measure, society's overall economic, health and social wellbeing has declined (McClure, 2021). Moreover, underscoring the entire discourse of wellbeing is the highly contested axiom that any state and institutional problems can be redefined and reassigned as individual challenges and responsibilities (Rose, 1999). According to Sointu (2005, p. 255–256): "Whereas wellbeing appears to have been an issue pertaining to the "body politic" in the mid-1980s, it now appears to have become a question almost solely related to the context of the "body personal"."

Consider the status of wellbeing in the workplace. Following the trend within the public sector, the private sector's concern for "how to look after one's self for work" has resulted in an industry of consultants/coaches/specialists that provide wellbeing services (Cederström and Spicer, 2015). As a result, we are witnessing the emergence of "high performance workplace programs" where "wellbeing champions" act as healthy role models for others to follow. The rationale behind these programmes is that staff who are actively managing their wellbeing are more productive, take less sick leave and therefore reduce the burden on their employer. Conversely, the employer is credited with looking after individual employees through funding wellbeing programmes and adding them to their business continuity plans to counter any unforeseen turbulence. This neoliberal transformation of wellbeing has had at least two major and interrelated effects. First, wellbeing now serves as a "policy paradigm by which mind and body can be assessed as economic resources" (Davies, 2011, p. 65). Second, like health, wellbeing has become such a firmly established ideology in society that "failure to conform becomes a stigma" (Cederström and Spicer, 2015, p. 4).

The discussion thus far offers a fairly stern critique of the limits of scholarly conceptualisations of wellbeing and its strategic utilization by state, corporate and other entities. Given the rising global crisis regarding health, there are increasing questions about the theoretical and practical value of instruments such as the WHO-5 index, and the OECD and other frameworks are coming under increasing scrutiny with some authors going so far as to question whether the concept of wellbeing itself is actually counterproductive or even dangerous (Whitaker, 2010; Gruber et al., 2011; Timimi, 2020). Given the complex and contradictory nature of wellbeing along with its enduring, yet precarious, position within policies and programmes, we assert that it may be time to question and disrupt the current hegemony of the concept. Our concerns echo those raised by Cederström and Spicer (2015, p. 11) in relation to wellness:

> the pervasive visibility of wellness as a societal mission is having two dominant effects: one, "wellness" has become an ideological normativity which pathologizes those who do not conform to the ideal of wellness or partake of a lifestyle that merits such a label, and two, the relentless pressure to perform wellness might be self-defeating and work against itself in a sense that it could lead to a more alienated, and an unwell society.

In sum, there are numerous limitations associated with current conceptualisations of wellbeing and there may be potential risks associated with its ascendancy as a neoliberal policy instrument that may actually threaten rather than enhance individual and collective health. As such, we propose a potential new research agenda.

Wellbeing: A proposed research agenda

As a starting point, we propose three broad areas for future research which include wellbeing: (a) as a wicked problem; (b) as part of the process of "wellbeing washing"; and, (c) in relation to alternative futures. We acknowledge that this multi-faceted agenda is not exhaustive, but in combination, these broad lines of research may provide valuable insights in several ways. First, they may help us understand how and why wellbeing is so vexing to define and operationalise within both research and policy. Second, they may alert us to the limits and risks associated with corporate and state (mis)uses of wellbeing as both a commodity and an instrument to monitor and regulate citizens. And, finally, an alternative futures perspective may offer entirely new ways of thinking about health and wellbeing by disrupting existing ontologies and epistemologies.

Wellbeing as a wicked problem

One established approach to elucidate the contested terrain of wellbeing is to examine it as a "wicked problem" (Rittel and Webber, 1973; Head, 2019). Generally, wicked problems are "vicious" or "tricky"; that is, they are not easily remedied because of disagreements over how they should be defined and because attempts to "solve" them result in new issues/uncertainties (Sam, 2009; Peters, 2017). In this vein, a wellbeing "deficit" is wicked, owing to the problem's ambiguity, multi-causality and the difficulties in assessing and measuring it (Blackman et al., 2006; Bache and Reardon, 2016; Bache et al., 2016). More fundamentally, *ill-being* raises persistent questions around who should "own" the problem (government, employers, labor unions) and/or why we would expect success/failure from one group or the other. That policies around wellbeing will invariably "fail" thus introduces additional wickedness for planners in the form of political risk (cf. Rittel and Webber, 1973; Lynn et al., 1986). Indeed, what makes wellbeing "tricky" is that any attempt to address it will likely change the problem and create new/unintended ones along the way. As policy initiatives grow for instance, they are likely to spur new "audit regimes" with ever more indicators and benchmarks (that "hit the mark" but "miss the point")? Will deliberations among field/discipline experts and monitoring units (to establish validity and "good" performance), result in even *more* rigid monitoring around wellbeing? That such neoliberal performance management/measurement tools may well undermine the capacity of non-state actors to deliver wellbeing services, is a paradox unlikely to be resolved any time soon.

A view of wicked problems offers a valuable vantage point because the framework abandons any linear/technocratic view of problem solving; as such it helps direct attention to organizational complexity, the interaction of opposing stakeholders, and the (political) limits of rational planning. In this way, it casts a broad analytical net for understanding the built-in constraints to addressing wellbeing, such as the power of Government Treasury departments to define wellbeing as inputs/outputs, or the capacity for organizations to cooperate on a goal that may be secondary to their core purposes. Secondly, and owing to the issue of complexity, contemporary views on wicked problems tend to advance views on how they should be dealt with e.g., through collaborative networks, partnerships and public participation (Head and Alford, 2015). When applied to wellbeing, these processes merit further analysis for the simple reason that they are likely to be a key site and "contested terrain" for the problem's continual reformulation.

Wellbeing washing

"Wellbeing washing" derives from similar concepts such as greenwashing, rainbow washing and sportswashing. Each of these concepts represent a strategic attempt to use language and visual imagery as part of an organization's branding and promotional culture to connote something positive, or to minimize and manage reputational risk. Moreover, beyond signifying positive sentiments, concepts like "green", "rainbow" and "wellbeing" enable organizations to appear virtuous given that the meanings of the words are broad and all-encompassing; flexible with respect to interpretation, manipulation and implementation; and applicable to both individuals and institutions. Arguably, the real power and influence lies primarily in the positive meaning associated with each concept, which results in a halo effect. Thus, even though there is nothing inherently, naturally or essentially good about "wellbeing", anything associated with it tends to inherit its positive qualities thereby making it a powerful and strategic, albeit mythical, concept and tool that can be used by a range of social actors. Here we can draw a parallel with Coakley's (2015) concept of the "Great Sport Myth" (GSM), which assumes that (1) sport is good and pure; (2) sport's purity and goodness are automatically transferred to those who participate in and/or consume it; and, (3) sport always contributes to individual and community development. Similarly, we might refer to the Great Wellbeing Myth (GWM), whereby the assumed inherent positive attributes linked to wellbeing are inevitably transferred to those individuals, groups, institutions and even states that embrace and implement them. Thus, we should not be surprised that supranational agencies (UN, WHO etc.), corporations and myriad organizations use wellbeing as a virtue-signaling term to launder or "wash" the real effects of some of their objectives and practices. This is often achieved through the use of carefully crafted narratives and images via their public relations agencies and wider promotional culture (Wernick, 1991).

Here, we call for a major line of research that explores the phenomenon of "wellbeing washing" within supranational, nation-state and corporate sectors. Key research questions could include:

- How do supranational, state and corporate actors engage in wellbeing washing, that is, what strategies and narratives are used in their public relations and social responsibility promotional campaigns?
- To what extent do discourses and policies of supranational, state and corporate actors advance a neoliberal agenda that ultimately shifts responsibility for collective problems to individuals?
- What are the effects and consequences (intended and/or unintended) of wellbeing washing promotional campaigns, policies and programs on the real lives of citizens?

Collectively, these types of studies have the potential to advance our understanding of the concept of wellbeing and how it is used (and exploited) by particular interests that, even when well-intentioned, may ultimately do more harm than good and leave unchanged a legacy of systemic social and health problems and inequities. In short, they enable us to envision wellbeing as a contested terrain but also as a field of power (White and Blackmore, 2015).

Alternative futures: Prospects for a "post-wellbeing world"

In response to attempts by states and corporations to cleanse the pernicious (unintended) consequences of their supposedly pure agendas, we offer the notion of "prosperous descent" (Alexander, 2015) as an alternative to rampant and unnecessary consumption (in this case of wellbeing products and services). At the heart of this concept lies the idea of "voluntary simplicity" (Alexander, 2011), or embracing living "low-impact lifestyles ... which are nevertheless rich in their nonmaterial dimensions" (Alexander, 2015, p. xii). An alternative research agenda on wellbeing would be guided by the critical assumption that wellbeing is *not* a tangible goal that individuals can achieve by modifying their behavior or consuming wellbeing products or services (e.g. workshops that inform us how to sleep, eat or breathe well). If wellbeing were conceived of as a nonmaterial aspect that cannot be broken down into measurable units, but rather a by-product of living simply and in concert—not conflict—with nature, the need for states, corporations and individuals to measure wellbeing would simply fall away. Conceived as an extension of our humanity—as opposed to a product of our labor—wellbeing becomes a (natural) outcome of who we *are*, rather than something that we must *do* and account for. An emphasis on being rather than doing is central to Indigenous wellbeing frameworks that foreground connectedness to community and country, the importance of land and landscape to identity, cultural expression, kinship, family and Indigenous ways of knowing (Bourke et al., 2018; McIntosh et al., 2021; Yamane and Helm, 2022).

Having conceived of the pursuit of wellbeing as a "wicked problem", we are all too aware of our complicity in perpetuating its discourse. Instead, relying on the notion of prefiguration, we advocate "building a new world in the shell of the old" (Shantz, 2005). For Boggs (1977, p. 100), prefigurative politics entailed "the embodiment, within the ongoing political practice of a movement, of those forms of social relations, decision-making, culture, and human experience that are the ultimate goal." More recently, scholars have distilled this aspect of prefigurative politics as "means-ends equivalence" (Maeckelbergh, 2011; Yates, 2015). A prefigurative approach to wellbeing would, therefore, reject the neoliberal idea that being well is a personal responsibility that can be met through additional labor or superfluous consumption. Instead, an alternative wellbeing research agenda would focus on opportunities to establish more meaningful connections with the communities (people) and environments (places) that we belong to, and less on commodities (things) or subjective states of being that supposedly ensure or indicate wellbeing.

According to White and Blackmore (2015, p. 5): "the diversity, volume and velocity in references to wellbeing suggest a cultural tide that sweeps together a range of different interests and agendas". This essay has outlined the contested terrain of wellbeing by locating it within the context of neoliberalism and the range of supranational, state and corporate interests that use the concept to advance particular interests. To this extent we assert that wellbeing constitutes a "field of power" (White and Blackmore, 2015) and, as such, it is essential that scholars, policy makers and citizens explore "what and whose values are represented, which accounts dominate, what is their impact and on whom" (Scott, 2012, p. 4). We hope our critical assessment, including the proposed agenda for future research, will inspire other scholars to explore.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Sleep disturbances, depressive symptoms, and cognitive efficiency as determinants of mistakes at work in shift and non-shift workers

Hyewon Yeo[1], Jooyoung Lee[1], Sehyun Jeon[1], Somi Lee[1], Yunjee Hwang[1,2], Jichul Kim[1] and Seog Ju Kim[1]*

[1]Department of Psychiatry, Samsung Medical Center, Sungkyunkwan University College of Medicine, Seoul, South Korea, [2]Department of Brain and Cognitive Engineering, Korea University, Seoul, South Korea

Introduction: Shift work is known to reduce productivity and safety at work. Previous studies have suggested that a variety of interrelated factors, such as mood, cognition, and sleep, can affect the performance of shift workers. This study aimed to identify potential pathways from depression, sleep, and cognition to work performance in shift and non-shift workers.

Material and methods: Online survey including the Center for Epidemiologic Studies Depression Scale (CES-D), Cognitive Failure Questionnaire (CFQ), and Pittsburgh Sleep Quality Index (PSQI), as well as two items representing work mistakes were administered to 4,561 shift workers and 2,093 non-shift workers. A multi-group structural equation model (SEM) was used to explore differences in the paths to work mistakes between shift and non-shift workers.

Results: Shift workers had higher PSQI, CES-D, and CFQ scores, and made more mistakes at work than non-shift workers. The SEM revealed that PSQI, CES-D, and CFQ scores were significantly related to mistakes at work, with the CFQ being a mediating variable. There were significant differences in the path coefficients of the PSQI and CES-D between shift and non-shift workers. The direct effects of sleep disturbances on mistakes at work were greater in shift workers, while direct effects of depressive symptoms were found only in non-shift workers.

Discussion: The present study found that shift workers made more mistakes at work than non-shift workers, probably because of depressed mood, poor sleep quality, and cognitive inefficiency. Sleep influences work performance in shift workers more directly compared to non-shift workers.

KEYWORDS

shift work, depression, sleep, cognition, performance, multi-group SEM

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Kyung-Hwa Choi,
Dankook University, South Korea

*CORRESPONDENCE
Seog Ju Kim
ksj7126@skku.edu

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Introduction

Shift work is typically referred to as an employment practice designed to provide all-day services (1). Globally, the number of people engaged in shift work has been rapidly increasing to meet the demand for 24-h service. Nowadays, shift work became common in most countries, with 10–40% of workers engaged in shift work (2).

With the increasing importance of shift work in the modern era, the high performance of shift workers is important for efficiency and safety at work. However, successive night shifts decrease safety and lead to mistakes at work (3). Night-shift work is associated with difficulties in performing routine tasks, poor performance, and increased rates of accidents and injuries (4).

Irregular sleep patterns of shift workers may reduce work efficiency. Shift workers are known to experience significant difficulty in initiating and maintaining sleep (5) because their work schedule conflicts with the natural biological clock (6). Disturbances in the circadian rhythm affect not only the sleep-wake cycle but also sleep quality and duration (7). Sleep problems, such as insomnia, and obstructive sleep apnea, impair productivity at work (8).

Cognitive deficits associated with shift work may reduce work efficiency. A laboratory study demonstrated that circadian misalignment in shift workers decreases subjective alertness and the ability to sustain attention, cognitive throughput, information processing, and visuomotor performance (9). As cognitive functions are required to concentrate on goals, plan strategies, and organize tasks, even subtle cognitive impairment can influence the performance of a broad range of tasks at work (10).

Depressed mood may also influence job performance in shift workers. Several studies have reported that shift workers experience a wide range of mental health problems. In particular, the risk of depression was found to be higher in shift workers (11). Impaired performance was not just limited to clinical depression patients but was also present in workers with subclinical depressive symptoms (12).

Previous studies have demonstrated a close relationship between sleep disturbances, cognitive efficiency, and depressive symptoms. Insomnia or hypersomnia and diminished ability to think or concentrate are core diagnostic criteria for major depressive disorder (13). Poor sleep quality and duration cause a broad range of cognitive impairments, including in attention, memory, and executive function (14). Sleep disturbances and depressive symptoms appear to influence each other (15, 16). Although the effect of each of these three variables on performance at work is well-established, the underlying mechanisms remain unclear.

This study aimed to investigate the potential effects of depression, sleep, and cognition on the performance of shift and non-shift workers. On the basis of previous studies, we formulated the following hypotheses. First, there would be a difference in depressive symptoms, sleep disturbances, cognitive efficiency, and mistakes at work between shift and non-shift workers. Second, there would be an indirect effect of depressive symptoms and sleep disturbance on mistakes at work through cognitive efficiency. Finally, the pathways from depressive symptoms, sleep disturbances, and cognitive efficiency to mistakes at work would be different between shift and non-shift workers.

Materials and methods

Study participants

A total of 6,665 participants were recruited, of whom 11 were excluded because their work type was difficult to classify. The remaining 6,654 participants (4,561 shift workers and 2,093 non-shift workers) completed all assessments and were thus included in the final analysis. Initially, 1,254 participants (448 males and 806 females; 961 shift and 293 non-shift workers) were recruited *via* an online advertisement. The majority of the respondents to the online advertisement were young female shift workers; an online survey company (Macromill Embrain Co., Ltd., South Korea) was employed to recruit an additional 5,400 participants (2,693 males and 2,707 females; 3,600 shift workers and 1,800 non-shift workers), especially males, middle-aged workers, and non-shift workers.

Adult participants (aged $>$ 18 years) in full- or part-time employment were included, and only those who could not complete the online survey were excluded. All procedures were performed in accordance with the ethical standards of the relevant institutional committees on human experimentation and the Declaration of Helsinki (2013). The study protocol was approved by the Institutional Review Board of Samsung Medical Center (Protocol Code: 2019-04-095). Informed consent was obtained from all participants after an explanation of the survey.

Data collection

All data were collected *via* the online survey among the general population of the Republic of Korea, from 2019 to 2021. Depressive symptoms were assessed using the Korean version of the short-form of the Center for Epidemiologic Studies Depression Scale (CES-D) (17–19). The short-form K-CES-D is a self-reported questionnaire with scores ranging from 0 to 33; higher scores indicate more severe depressive symptoms. The cut-off score of the short-form K-CES-D is 16 for depression screening in the Korean population (20).

Sleep disturbance was assessed using the Korean version of the Pittsburgh Sleep Quality Index (K-PSQI) (21, 22). The K-PSQI is a self-reported questionnaire consisting of 19 items that assess seven dimensions of sleep over 1 month. These include subjective quality, latency, duration, efficiency, disturbance, use of sleep medication, and daytime dysfunction. The total PSQI score is calculated by summing the scores of all dimensions, and ranges from 0 to 21. A higher score indicates worse sleep quality. The cut-off score of K-PSQI is 8.5 to evaluate sleep disorders in the Korean population (22).

Cognitive efficiency was assessed using the Korean version of the Cognitive Failure Questionnaire (CFQ) (23, 24). The CFQ is a self-reported questionnaire that assesses failures of memory, action, and perception in everyday life. It consists of 25 self-rated items; scores range between 0 and 100, with higher scores indicating greater cognitive impairment.

Mistakes at work were assessed using two items evaluating the mistakes at work that respondents had ever made. One item pertained to actual mistakes, including minor ones, while the other was concerned with "near-mistakes". The frequency of mistakes and near-mistakes was graded from 1 (never) to 6 (>3 per month) for each item.

Statistical analysis

Differences of demographic characteristics between shift and non-shift workers were assessed using the *t*-test or chi-square test. Then, differences of clinical characteristics between the two groups using analysis of covariance (ANCOVA) after controlling for age and sex. Spearman correlation analyses of depressive symptoms, cognitive efficiency, sleep disturbance, and mistakes in performance were also performed. The strength of the Spearman correlation is interpreted with 0.00–0.29 as weak, 0.30–0.59 as moderate, and 0.60–1.00 as strong (25).

In accordance with the guidelines of Morrison et al. (26), a multi-group structural equation model (SEM) was constructed using IBM SPSS AMOS (version 26.0; IBM Corp.). We performed a confirmatory factor analysis (CFA) to examine a priori the interrelationships that are theorized to exist. In this step, the properties of the scales were assessed to determine whether the measurement model had an acceptable fit to the data. Regarding mistakes at work, an explanatory factor analysis was performed to derive a one-factor model. All models are described in Supplementary material.

Although the relationships among depression, sleep, and cognition in shift workers are well-known, a theoretical model for shift workers is not yet established. Our structural model was based on one of the theoretical, evidence-based models for the functioning of bipolar affective disorder (27). Our model included three latent variables, i.e., cognitive efficiency, sleep disturbances, and depressive symptoms, and one observed variable, i.e., the mean score of the two items on mistakes at work (Figure 1). The data fit of the individual models and overall (multi-group) model was computed separately as well as the overall multi-group model. We evaluated the model fit using the chi-squared statistic with normed chi-square (χ^2/df), root mean square error of approximation (RMSEA), and comparative fit index (CFI). To assess group differences in the magnitude of paths between shift and non-shift workers, the chi-square-difference test was performed to determine whether a given scale or test had equivalent measurement properties in groups. All data were analyzed using SPSS Statistics (version 27.0; IBM Corp., Armonk, NY, USA). All tests were two-sided, and a p-value < 0.05 was considered statistically significant.

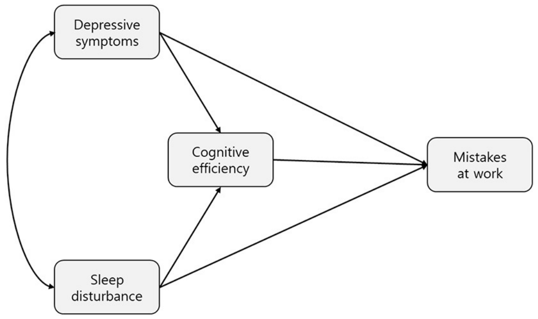

FIGURE 1
Hypothetical model of the effects of depressive symptoms, sleep disturbances, and cognitive efficiency on mistakes at work. The hypothetical model includes four variables: depressive symptoms, sleep disturbances (predictor variables), mistakes at work (response variable), and cognitive efficiency (mediator variable).

Results

Sample characteristics

A total of 6,654 participants, including 4,561 shift workers and 2,093 non-shift workers, were enrolled in this study. The mean age was 37.5 years and 47.2% (n = 3,141) were males. About half of the participants were married (52.2%). The mean working years and working hours per week were 11.4 years and 30.5 h, respectively.

Group differences in demographical and clinical characteristics

There were no group differences in age and sex. Shift workers had worked for fewer years ($p < 0.001$) and had longer working hours per week ($p < 0.001$) compared to non-shift workers.

TABLE 1 Demographic characteristics of the study participants ($N = 6,654$).

	Shift **($n = 4,651$)**	**Non-shift** **($n = 2,093$)**	***P*-value**
	M ± SD or *n* (%)	M ± SD or *n* (%)	
Age (years)	37.4 ± 28.2	37.8 ± 9.7	0.561
Sex			
Male	2,142 (47.0)	999 (47.7)	0.517
Marital status			0.035
Married	2,022 (44.3)	989 (47.3)	
Single	2,418 (53.0)	1,056 (50.5)	
Divorced/bereaved	121 (2.7)	48 (2.3)	
Employment			
Years of employment	11.1 ± 8.6	12.0 ± 8.6	<0.001
Hours of work per week	31.7 ± 20.8	28.2 ± 18.2	<0.001
Monthly income (thousand won)			<0.001
under 1,500	300 (6.6)	72 (3.4)	
1,500 ∼ 2,500	546 (12.0)	347 (16.6)	
2,500 ∼ 3,500	1,973 (43.3)	920 (44.0)	
3,500 ∼ 4,500	1,334 (29.2)	522 (24.9)	
over 4,500	408 (8.9)	232 (11.1)	

M, mean; SD, standard deviation.

The proportion of unmarried individuals was higher in the shift workers group ($p = 0.035$) (Table 1).

Compared to non-shift workers, shift workers had higher PSQI (7.1 ± 3.60 vs. 6.3 ± 3.23, $F = 35.699$, $p < 0.001$), CES-D (8.8 ± 6.24 vs. 7.1 ± 5.84, $F = 21.447$, $p < 0.001$), and CFQ (27.3 ± 18.7 vs. 24.7 ± 17.29, $F = 22.375$, $p < 0.001$) scores after adjusting for age and sex (Table 2). In addition, the score assessing mistakes at work was also higher for shift workers (3.5 ± 2.06) than non-shift workers (3.0 ± 1.83, $F = 54.733$, $p < 0.001$). 45.04% of shift workers had sleep disorders, compared with 33.20% of non-shift workers. Moderate to severe sleep disturbances were found in 44.16 and 30.86% of the shift and non-shift workers, respectively. On the short-form K-CES-D, 15.13 and 9.79% of the shift and non-shift workers were identified with clinical depression, respectively.

Relationships among depressive symptoms, sleep disturbance, cognitive efficiency, and mistakes at work

All of the variables were statistically significantly correlated with each other ($p < 0.01$). Mistakes at work was moderately associated with sleep disturbances ($r = 0.308$), cognitive efficiency ($r = 0.358$), and depressive symptoms ($r = 0.353$). Cognitive efficiency was strongly correlated with depressive symptoms ($r = 0.548$) and was moderately correlated with sleep disturbances ($r = 0.342$). Sleep disturbances and depressive symptoms were also strongly correlated ($r = 0.509$) (Supplementary Table S1).

Similar results were found in both groups ($p < 0.01$). For the shift-workers group, mistakes at work was moderately associated with sleep disturbances ($r = 0.308$), cognitive efficiency ($r = 0.370$), and depressive symptoms ($r = 0.347$). Cognitive efficiency was strongly associated with depressive symptoms ($r = 0.561$) and moderately associated with sleep disturbances ($r = 0.351$). Sleep disturbances and depressive symptoms were strongly correlated ($r = 0.517$). For the non-shift workers group, mistakes at work was moderately associated with cognitive efficiency ($r = 0.320$), and depressive symptoms ($r = 0.329$), but was weakly associated with sleep disturbances ($r = 0.260$). Cognitive efficiency was strongly associated with depressive symptoms ($r = 0.511$) and moderately associated with sleep disturbances ($r = 0.306$). Sleep disturbances and depressive symptoms were strongly correlated ($r = 0.457$).

Structural equation model of depressive symptoms, sleep disturbances, cognitive efficiency, and mistakes at work

The hypothesized structural model was tested, and the standardized path coefficients are presented in Supplementary Table S2. The overall multi-group model fit the data well [χ^2 (df = 114, $N = 6,665$) = 3,874.272, $p < 0.001$, CFI = 0.935, TLI = 0.912, RMSEA = 0.070, 95% CI

TABLE 2 Clinical characteristics of shift and non-shift workers.

	Shift workers	Non-shift workers	F-statistic	*P*-value
	M (SD)	*M* (SD)		
PSQI	7.1 (3.60)	6.3 (3.23)	35.699	<0.001
CES-D	8.8 (6.24)	7.1 (5.84)	21.447	<0.001
CFQ	27.3 (18.7)	24.7 (17.29)	22.375	<0.001
Mistakes at work	3.5 (2.06)	3.0 (1.83)	54.733	<0.001

Model adjusted for age and sex. The cut-off score of CES-D is 16 for depression. The cut-off score of PSQI is 8.5 for sleep disorders.
PSQI, Pittsburg Sleep Quality Index; CES-D, Center for Epidemiologic Studies Depression Scale; CFQ, Cognitive Failure Questionnaire; M, mean; SD, standard deviation.

RMSEA (0.068, 0.072)], and all structural paths were significant at $p < 0.001$. All path coefficients were significant in the overall group analysis. The direct effects of depressive symptoms, cognitive efficiency, and sleep disturbances on mistakes at work were all significant at $p < 0.001$.

The direct effect of sleep disturbances was 0.35, the most influential value among other variables. The direct effect of cognitive efficiency and depressive symptoms were 0.18, and 0.08, respectively. The relationships of depressive symptoms and sleep disturbances with mistakes at work were both significantly mediated by cognitive efficiency ($p < 0.001$) (Supplementary Table S2).

The individual models for shift and non-shift workers fit the data well [χ^2 (df = 114, n = 4,561) = 2,812.582, $p < 0.001$, CFI = 0.933, TLI = 0.910, RMSEA = 0.072, 95% CI RMSEA (0.070, 0.074) for the shift workers and χ^2 (df = 114, n = 2,093) = 1,153.725, $p < 0.001$, CFI = 0.937, TLI = 0.916, RMSEA = 0.066, 95% CI RMSEA (0.063, 0.070) for the non-shift workers]. For the shift workers, sleep disturbances was associated with cognitive efficiency (path coefficient = 0.138; $p < 0.001$) and mistakes at work (path coefficient = 0.405; $p < 0.001$), but depressive symptoms was not significantly associated with mistakes at work (path coefficient = 0.123; $p = 0.193$). For the non-shift workers, sleep disturbances were associated with cognitive efficiency (path coefficient = 0.080; $p = 0.035$) and mistakes at work (path coefficient = 0.260; $p < 0.001$); depressive symptoms was also associated with mistakes at work (path coefficient = 0.240; $p < 0.001$). All other path coefficients were statistically significant at $p < 0.001$ (Figure 2).

The multi-group SEM analyses showed a significant difference in the magnitude of path coefficients between the two groups (Figure 2). The path coefficients of sleep disturbances and depressive symptoms on mistakes at work were significantly different between the groups ($p = 0.013$ and 0.003, respectively).

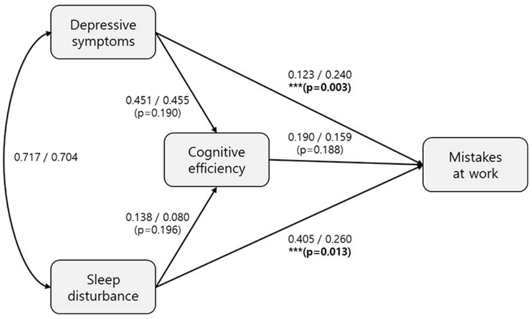

FIGURE 2
Structural equation model of the effects of depressive symptoms, sleep disturbances and cognitive efficiency on mistakes at work by shift and non-shift workers. The structural equation model includes sleep disturbances, depressive symptoms, cognitive efficiency, and mistakes at work by shift and non-shift workers. The path coefficients for the shift and non-shift workers are on the left and right side of the slashes, respectively. The models for shift and non-shift workers both fit the data well: χ^2 (df = 114, n = 4,561) = 2,812.582, $p < 0.001$, CFI = 0.933, TLI = 0.910, RMSEA = 0.072, 95% CI RMSEA [0.070, 0.074] for shift workers and χ^2 (df = 114, n = 2,093) = 1,153.725, $p < 0.001$, CFI = 0.937, TLI = 0.916, RMSEA = 0.066, 95% CI RMSEA (0.063, 0.070) for non-shift workers. In the shift workers, sleep disturbances were associated with cognitive efficiency (path coefficient = 0.138; $p < 0.001$) and mistakes at work (path coefficient = 0.405; $p < 0.001$), while depressive symptoms were not significantly associated with mistakes at work (path coefficient = 0.123; $p = 0.193$). In the non-shift workers, sleep disturbances were associated with cognitive efficiency (path coefficient = 0.080; $p = 0.035$) and mistakes at work (path coefficient = 0.260; $p < 0.001$), while depressive symptoms were associated with mistakes at work (path coefficient = 0.240; $p < 0.001$). The path coefficient between cognitive efficiency and mistakes at work was statistically significant ($p < 0.001$) in both shift and non-shift workers. The comparison of path coefficients between shift and non-shift workers were tested using multi-group structural equation model. The p-values of path coefficient comparisons were presented in (). ***Indicates a statistically significant difference between shift and non-shift workers.

Discussion

The current study used an SEM to investigate the influence of depressive symptoms, sleep disturbances, and cognitive efficiency on mistakes at work. We aimed to improve understanding of the differences in these pathways between shift and non-shift workers. To the best of our knowledge, this study was the first to explore the direct and indirect effects of these interrelated variables on mistakes at work in shift and non-shift workers.

Consistent with our hypothesis, shift workers made more mistakes at work compared to non-shift workers. Shift work was also associated with more depressive symptoms, poorer sleep quality, and lower cognitive efficiency. As expected, depression, sleep, cognition, and performance were closely interrelated, both in shift and non-shift workers. Moreover, our findings showed that depression, sleep, and cognition had significant effects on mistakes at work in both shift and non-shift workers. As mistakes at work were positively correlated with depression, sleep, and cognition in both groups, the greater frequency of mistakes in shift workers may be due to more severe depressive symptoms, and poorer cognitive efficiency and sleep.

Depression, sleep, and cognition influenced work performance in overall groups, and cognition mediated the well-established association between sleep and performance. This finding suggests that the role of cognition is important to understand how sleep affects performance at work. Our results were in line with previous studies reporting that cognitive efficiency mediates the relationship between sleep and performance in both academic and occupational settings (28). Global cognitive processes, including not only basic attention/sustained vigilance (14), but also higher executive functioning (29), are vulnerable to be affected by sleep deprivation. Executive function deficits may cause sluggishness, tiredness/lethargy, and slowed thinking or processing, which leads to impaired performance (30). A mediating effect of cognition on the relationship between sleep and performance was found in both shift and non-shift workers, suggesting that cognition may be crucial to performance regardless of working conditions.

The major finding of our study was that there was a group difference in pathways to mistakes in performance. In shift workers, cognitive efficiency mediated the relationship between sleep and performance, and there was no significant effect of depression on performance. On the other hand, all of the tested pathways involving cognitive efficiency were significant in non-shift workers. One possible explanation for this is that depression in shift workers may be significantly affected by sleep disturbances. Moderate to severe sleep disturbances were common in the shift workers in the current study, while depressive symptoms did not reach clinical or subclinical levels in most of those workers. This suggests that sleep problems might be the main factor impairing cognitive functioning, leading to mistakes at work by shift workers. In addition, depressive symptoms in shift workers may be mild or independent from the sleep disturbances.

The multi-group analysis showed that the overall effect of sleep on performance was greater in shift workers than non-shift workers, as the overall effect of depression on performance was greater in non-shift workers. In other words, sleep had a greater impact on performance in shift workers, while mood had a greater impact on performance in non-shift workers. Shift workers may experience a greater physical burden with diverse health problems due to the working conditions. Even shift workers marginally adapted to the conditions can experience long-term sleep disturbances, which may reduce tolerance and resilience (31–33). In this case, even a slight change in sleep pattern may have a large impact on cognition and performance in shift workers. Whereas, shift workers are primarily vulnerable to sleep disturbances, non-shift workers might be affected by many factors other than sleep. For example, mood problems due to work-related stress, interpersonal conflict, or burnout might disturb the performance of employees. Thus, intervention to regulate mood and manage stress might be helpful for non-shift workers.

The importance of sleep on performance in shift workers in the current study indicates the necessity of sleep-targeted interventions. For example, cognitive behavioral therapy for insomnia could improve performance in shift workers. In cases where flexible work schedules prevent face-to-face interventions, digital or internet-based therapies may be good alternatives, especially for shift workers.

The main strengths of this study included the use of a multidimensional model, which integrated multiple factors that may influence performance, and the fact that it was the first study to use a multi-group SEM to compare the effects of sleep, depression, and cognition on performance between shift and non-shift workers. In addition, the study had a large sample size collected through the online survey and well-validated instruments were used to evaluate sleep, depression, and cognition, which increased the reliability and validity of the results.

The study also had some methodological limitations. First, there was a potential selection bias. As all of the respondents participated in the survey voluntarily, workers with severer psychopathologies might have been excluded. Second, as performance was assessed using only two items, various aspects of performance other than mistakes may have been overlooked. Third, self-reported questionnaires were used instead of objective measures of sleep (e.g., actigraphy and polysomnography) and work performance (e.g., labor productivity). Objective evaluation of these factors may yield more understanding in future studies.

Conclusion

The current study demonstrated close associations of sleep, depression, and cognition, with work performance. Cognition mediated the relationship between sleep and performance in both shift and non-shift workers. This study provides insight into the causal relationship between sleep and performance with mediating role of cognition. Notably, sleep disturbance was an important factor with respect to mistakes at work, especially by shift workers. Sleep should be considered as a factor that affects functioning in shift workers, both independently and in association with other factors.

Even when other work-related factors were taken into account, sleep problems may be the main cause of performance impairments in night-time or rotating or irregular shift workers. Non-shift workers can maintain their sleep-wake pattern constant, but their performances may also be compromised by work-related stressors other than the sleep-wake cycle. Therefore, it is necessary to provide individual interventions for employees to well-function in the work system.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by the Institutional Review Board of Samsung Medical Center (Protocol Code: 2019-04-095). The patients/participants provided their written informed consent to participate in this study.

Author contributions

The data collection of the project was done by JL, SL, and JK. The idea for the paper, the data analysis, and the writing was done by HY. The data cleaning is done by YH. The review of the paper and suggested ideas were done by SJ ad SK. The review and final edits of the paper were done by SK. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2022.1030710/full#supplementary-material

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Attitudes toward the pandemic and COVID-19 vaccination intention among German university students and the general population: Results from two cross-sectional surveys

Sabrina Baldofski[1†], Ezgi Dogan-Sander[2†], Sophia E. Mueller[1], Freia De Bock[3], Lena Huebl[4], Elisabeth Kohls[1,2‡] and Christine Rummel-Kluge[1,2*‡]

[1]Department of Psychiatry and Psychotherapy, Medical Faculty, Leipzig University, Leipzig, Germany, [2]Department of Psychiatry and Psychotherapy, University Leipzig Medical Center, Leipzig University, Leipzig, Germany, [3]Unit for Health Services Research, Clinic of General Pediatrics, Neonatology and Pediatric Cardiology, Medical Faculty and University Hospital Duesseldorf, Düsseldorf, Germany, [4]Department for Tropical Medicine, Bernhard-Nocht-Institute for Tropical Medicine and I. Department of Medicine, University Medical Center Hamburg-Eppendorf, Hamburg, Germany

EDITED BY
Wulf Rössler,
Charité Universitätsmedizin
Berlin, Germany

REVIEWED BY
Sebastian Contreras,
Max Planck Society, Germany
Srikanth Umakanthan,
The University of the West Indies St.
Augustine, Trinidad and Tobago

*CORRESPONDENCE
Christine Rummel-Kluge
christine.rummel-kluge@medizin.uni-leipzig.de

†These authors have contributed equally to this work and share first authorship
‡These authors share last authorship

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Background: The COVID-19 pandemic has had an impact on nearly all people. Vaccines provide an effective tool to combat the pandemic, however, vaccination hesitancy remains an issue. This study aims to investigate (a) students' attitudes toward the pandemic, (b) potential differences in attitudes between university students and the general population, and (c) to examine predictors of vaccination intention in both samples.

Methods: In this cross-sectional study data from two research projects were analyzed and compared. First, attitudes toward the COVID-19 pandemic in German university students were assessed within a cross-sectional anonymous online survey (March-April 2021, $N = 5{,}639$) and analyzed quantitatively and also qualitatively (free text field answers examined positive and negative aspects of the pandemic). Second, data from a cross-sectional survey within the COVID-19 Snapshot Monitoring project (COSMO; 29th wave of data collection, December 2020, $N = 1{,}387$) in the German general population was analyzed. Both samples, were compared in sharedly used variables, regarding attitudes toward the pandemic and vaccination intention, and factors associated with vaccination (logistic regression analyses).

Results: In comparison to the general population, university students were significantly more likely to report being worried about/thinking about the coronavirus and to perceive the coronavirus as overrepresented in the media (all $p < 0.001$). University students reported a more supportive attitude toward vaccinations in general (students: $M = 4.57$, $SD = 0.85$; general population: $M = 3.92$, $SD = 1.27$) and a significantly higher vaccination intention (students: $n = 4{,}438$, 78.7%; general population: $n = 635$, 47.7%) than the general population ($p < 0.001$). Regression analyses revealed that in university students, vaccination intention was significantly predicted by not having children, a supporting attitude toward vaccinations in general, the belief that the coronavirus is overrepresented in the media, and less thinking about/worrying about the coronavirus (all $p < 0.05$). In the general population, vaccination intention was significantly associated with male gender, higher age, not having children, a supporting attitude toward vaccinations in general, and the belief that the coronavirus is overrepresented in the media ($p < 0.05$). The qualitative analysis among university students revealed that the most frequently stated positive aspect of the pandemic was to be more flexible due to digitalization ($n = 1,301$ statements, 22.2%) and the most frequently stated negative aspect was restriction in social life ($n = 3,572$ statements, 24.2%).

Conclusion: The results indicate differences in the attitudes toward the pandemic between university students and the general population. In addition, differences regarding factors associated with vaccination intention were found in both samples. These results could be important to be considered when designing and targeting vaccination campaigns aiming at informing different population or age groups.

Study registration: DRKS00022424.

KEYWORDS

COVID-19, vaccination intention, COVID-19 vaccination, university students, COVID-19 attitudes, general population

Introduction

On March 11th, 2020, the World Health Organization (WHO) proclaimed COVID-19 a pandemic, which emerged from China. Through several ways of transmission such as direct transmission, contact transmission and airborne transmission the virus has quickly spread throughout the world, affecting people of all generations (1). The governments mandated several measures to avoid the spread of SARS-CoV-2 in the absence of vaccines and specific effective therapy, until on December 21st, 2020, the first COVID-19 vaccine was authorized in Europe (2).

Vaccination is an important milestone toward achieving herd immunity and thus, protecting populations. However, despite the availability of vaccines, the COVID-19 pandemic is expected to continue, affecting societies worldwide, due to a lack of international vaccine distribution as well as vaccine hesitancy among the population (3). In 2019, the WHO identified vaccine hesitancy as one of the top global health threats (4). Vaccine hesitancy may be defined as a low vaccination intention, specifically a "delay in acceptance or refusal of vaccination despite availability of vaccination services" (5). Reasons for vaccination hesitancy might include (amongst others) a low perception of disease risk, restricted vaccine affordability, as well as general lack of trust and doubts about the efficiency and safety of the vaccine, and a belief to be already immunized (6). Understanding factors influencing COVID-19 vaccination intention still plays an important role to end or limit the COVID-19 pandemic. Studies have reported significant differences regarding the COVID-19 vaccination intention between countries. Few countries, like Portugal, Malta or Denmark, have reached the WHO's declared goal of 80% vaccination coverage (7). Countries like Germany have failed to meet this target. A survey within the COVID-19 Snapshot Monitoring project (COSMO) in January, 2022, in Germany showed that among people who had not yet received a COVID-19 vaccination, 13% reported they were planning to receive a vaccination, 10% were unsure, 12% were hesitant, and 63% refused receiving a vaccination (8–10). Besides the vaccine hesitation the waning immunity after vaccination or infection and different protection rates of vaccines agains the novel Coronavirus variants are playing an important role in containment of COVID-19 (11, 12).

Regarding refusal of vaccination, female gender, lower education level, poor vaccination compliance in the past, no chronic physical conditions (except for hypertension), and lower perceived severity of COVID-19 showed the strongest associations, while age showed an inverted U-shaped relationship (10, 13). A recent systematic review and meta-analysis of 28 studies highlighted an increase in refusal of COVID-19 vaccines over time (14). Being female, younger age, lower income or education, and belonging to an ethnic minority group were found to be consistent sociodemographic predictors of a low vaccination intention (14). A cross-sectional study in five countries reported the following predictors of vaccine hesitancy using a machine learning model: paranoid pandemic-related concerns, vaccination conspiracy beliefs, a general conspiracy mentality, COVID-19 anxiety, high perceived risk of infection, low perceived social rank, lower age, lower income, and higher population density (15). Inversely, another study reported a positive association between trust in governments and acceptance of the vaccination (offered by the employer; (16). Furthermore, the role of media/social media has also been investigated: Vaccine hesitant/resistant respondents from the United Kingdom were found to consume more information about the COVID-19 pandemic from social media, but less information from newspapers, television, and radio (17). Overall, social environment factors play an important role in vaccine intention as well as perception of the pandemic (18).

University students are in general a vulnerable population (19–22) and have also been hit hard by the pandemic (23–25), but little is known about their attitudes toward the pandemic, and especially toward vaccination.

The estimated intention to receive a COVID-19 vaccination among the university student population differs between different studies and across countries. It appears that comparable to other populations, there is still a relevant proportion of university students who are hesitant or unsure about receiving a vaccination (26, 27). A study from Italy demonstrated that 14% of the university students showed low vaccination intention (28). Based on similar rates of vaccination intention between students in healthcare and non-healthcare curricula, the authors suggested that vaccination intention may be influenced by motivational and psychological factors, not only by the medical knowledge of students. Further, some studies found higher vaccine acceptance among students in Health Schools compared to other faculties (29). In this study, conspiracy beliefs and social media-based knowledge about COVID-19 vaccines were associated with a lower vaccination intention (29).

This study aimed to investigate (a) students' attitudes toward the pandemic, (b) potential differences in attitudes between university students and the general population, and (c) to exploratively examine predictors of vaccination intention in both, university students and the general population. To this end, data from two research projects were used. First, attitudes toward the COVID-19 pandemic in German university students were assessed within a cross-sectional and anonymous online survey. Second, data from a cross-sectional survey within the COSMO project in the German general population were analyzed.

Methods

Study sample and setting

Data from two cross-sectional research projects were used, comprising a sample of German university students and a sample of the German general population, respectively.

Regarding the sample of university students, a cross-sectional online survey was conducted in students of the University of Leipzig, Germany, between March and April 2021 [for details on study procedure see (24)]. The survey took place during the second pandemic lockdown, which was in force since November 2020, and due to high infection rates, harder measures had been imposed since December 2020. All students at the university ($N = \sim 30{,}000$) were invited *via* email and social media channels of the university to participate. The only inclusion criterion was current enrollment as a university student, with no exclusion criteria being applied. The Ethics Committee of the Medical Faculty of the University of Leipzig waived approval for this study because of anonymity of the survey (March 3rd, 2021). All participants provided informed consent prior to participation. The sample comprised $n = 5{,}642$ participants. In order to ensure comparability with the sample of the general population, $n = 3$ participants were excluded due to an age < 18 years, resulting in a final student sample of $N = 5{,}639$.

Regarding the sample of the general population, data from the COVID-19 Snapshot Monitoring project (COSMO) was used. COSMO is an ongoing, serial cross-sectional study in the German general population aged 18 to 74 years, aiming to assess the relations between risk perceptions, knowledge, public trust and protective behavior regarding COVID-19 (30). Participants were members of an ISO 26362:2009-compliant online panel (respondi.de, https://www.iso.org/standard/43521.html). They were compensated for participation by the data collection company at their usual rate. The quota samples match current distributions of the general population regarding age, gender, and residency in a German federal state. The cross-sectional online surveys started in March 2020 and have since been conducted weekly or bi-weekly. Participants were recruited *via* an external study sample provider, and informed consent was provided prior to study participation. Ethical approval was obtained from the University of Erfurt's institutional review board (#20200302/20200501).

For this analysis, data from the 29th wave (assessed in December 2020) was used (8), since this wave contained the respective variables for comparison. The non-probabilistic quota sample representing the German adult general population for the characteristics age x sex x state consisted of $n = 1{,}387$ respondents in total. In order to ensure comparability with the student sample, $n = 56$ participants were excluded due to an age > 70 years, resulting in a final sample of $N = 1{,}331$.

Measures

Sociodemographic information

Surveys in both university students and the general population, respectively, contained information on sociodemographic data (gender, age, relationship status, having underage children, education, and migration background). Further, the presence of experiences related to the pandemic (current or past infection with the coronavirus, infection and/or death due to an infection in the circle of acquaintance) and the presence of chronic somatic diseases were assessed.

Attitudes toward the pandemic in university students

In the student sample, participants were asked how their personal situation was affected by the pandemic and about their attitudes toward the pandemic using 13 items, rated on a 5-point Likert scale from 1 = "do not agree at all" to 5 = "agree completely" (see Table 2 for detailed items).

Further, positive and negative aspects of the pandemic were assessed in free text format. The answers were not restricted in number of words.

Attitudes toward the pandemic in university students and the general population

In both samples, four items on attitudes toward and perceptions of the pandemic were assessed (i. e., thinking about, worrying about, and fearing the coronavirus, respectively, and media representation of the coronavirus), rated on 7-point Likert scales (for details see Table 3). Further, the self-reported likelihood of infection with the coronavirus was assessed. To ensure comparability between the samples, the likelihood of infection was recoded in both samples into a 3-point scale from 1 = "unlikely" to 3 = "likely."

One item was used to assess the attitude toward vaccinations in general on a 5-point Likert scale from 1 = "rejecting" to 5 = "supporting" in both samples. Finally, vaccination intention regarding COVID-19 vaccination was assessed with one item in both samples ("If you had the possibility to receive a vaccination against COVID-19 in the next week, how would you decide?"), with answers being harmonized across samples to reflect a dichotomous answer format (yes/no).

Statistical analyses

First, descriptive statistics on sociodemographic characteristics and experiences related to the pandemic in both samples were reported. Sample differences in these variables were examined using χ^2 tests for all categorical dependent variables (gender, relationship status, having underage children, education, migration background, current or past infection with the coronavirus, infection in the circle of acquaintance, and death due to an infection in the circle of acquaintance) and Mann-Whitney U test for the continuous dependent variable (age), due to non-normal distribution (as indicated by Shapiro-Wilks test, $p < 0.05$).

Second, to analyze students' attitudes toward the pandemic, descriptive statistics on 13 items assessing personal attitudes were reported. Further, the qualitative data of the free text fields of positive and negative aspects of the pandemic were analyzed using MAXQDA qualitative software (version 2022.0.0) to manage and code the textual data. Based on Mayrings approach of the summarizing content analysis (31), a coding dictionary was developed to analyze the answers, separately for the positive and negative aspects, respectively. The aim was to develop as few codes as possible, but as many as necessary to represent every free text statement in the coding. One author coded all qualitative data with the final coding manual. To ensure validity of the coding manual, inter-rater reliability was estimated: A randomly selected subset (25%) of the qualitative data of the positive aspects was coded by a second researcher unfamiliar with the project, and both ratings were then compared (32). The resulting estimated inter-rater reliability of $\kappa = 0.80$ is based on a mean-rating ($k = 2$), absolute-agreement, 2-way mixed-effects model. This estimation is indicative of a very good reliability (33).

Third, differences in attitudes between university students and the general population were analyzed. Group differences in continuous dependent variables (four items on attitudes toward the pandemic, self-reported likelihood of infection, attitude toward vaccinations in general) were analyzed using Mann-Whitney U tests, due to non-normal distribution of all dependent variables (as indicated by Shapiro-Wilks tests, all $p < 0.05$). Differences on the categorical dependent variable (vaccination intention) were computed using a χ^2 test.

Finally, two multivariable logistic regression analyses were performed to examine predictors of vaccination intention (dependent variable) in university students and the general population, respectively, separately in each sample. The following variables were included as independent (predictor) variables: gender, age, relationship status, having underage children, education, migration background, chronic disease, likelihood of infection, attitude toward vaccinations in general, and four items on attitudes toward the pandemic (i. e., thinking about, worrying about, and fearing the coronavirus, respectively, and media representation of the coronavirus). Data were checked for outliers. Further, correlations between predictors were low ($r < 0.80$), indicating that multicollinearity was not a confounding factor.

To ensure comparability between the samples regarding gender, people with diverse gender in the student sample ($n = 84$, 1.5%) were excluded from the analysis on group differences in gender and from the multivariable logistic regression analysis, as the survey in the general population only assessed male and female, but not diverse gender.

To estimate effect sizes for χ^2 tests, the φ coefficient was used, with $\varphi = 0.10$ indicating a small, $\varphi = 0.30$ a medium, and $\varphi = 0.50$ a large effect (34). Effect sizes for Mann-Whitney U tests were interpreted as small, $r < 0.30$, medium, $r < 0.50$, and large, $r > 0.50$ (34). In the logistic regression analyses, the amount of explained variance as indicated by *Nagelkerke's* R^2 was interpreted as small, $R^2 > 0.20$, medium, $R^2 > 0.40$, and large,

TABLE 1 Sociodemographic characteristics and group differences between university students and the general population.

Variable	University students ($n = 5{,}639$)	General population ($n = 1{,}387$)	Test	p	Effect size
Gender, n (%)			χ^2 (1.6886) = 196.75	**<0.001**	$\varphi = 0.17$
Female	3.914 (70.5)	669 (50.3)			
Male	1.641 (29.5)	662 (49.7)			
Age, M (SD)	23.47 (4.46)	44.22 (15.03)	$U = 768{,}611.50$	**<0.001**	$r = 0.54$
Relationship status, n (%)			χ^2 (1.6970) = 206.03	**<0.001**	$\varphi = 0.17$
In a relationship	2.708 (48.0)	930 (69.9)			
Single	2.931 (52.0)	401 (30.1)			
Children under 18, n (%)	237 (4.2)	391 (29.4)	χ^2 (1.6970) = 832.37	**<0.001**	$\varphi = 0.35$
Higher education ($\geq$ 12 years), n (%)	5.278 (93.6)	744 (55.9)	χ^2 (1.6970) = 1.302.43	**<0.001**	$\varphi = 0.43$
Migration background, n (%)	647 (11.5)	213 (16.1)	χ^2 (1.6965) = 20.90	**<0.001**	$\varphi = 0.06$
Current or past infection with COVID-19, n (%)	263 (4.7%)	46 (3.5%)	χ^2 (1.6970) = 3.71	0.054	$\varphi = 0.02$
Knowing someone with COVID-19 infection, n (%)	4.304 (76.3%)	491 (36.9%)	χ^2 (1.6970) = 780.10	**<0.001**	$\varphi = 0.34$
Knowing someone who died due to COVID-19, n (%)	907 (21.1%)	113 (23.0%)	χ^2 (1.4795) = 0.99	0.323	$\varphi = 0.01$

Calculation of % from valid cases. Bold values indicate statistical significance at the $p < 0.05$ level.

$R^2 > 0.50$ (35). Statistical analyses were performed using IBM SPSS Statistics version 27.0. A two-tailed $\alpha = 0.05$ was applied to statistical testing. In the case of missing values, participants with missing values were excluded from the respective analyses. Descriptive statistics were reported including only valid cases.

Results

Sample characteristics

The student sample comprised $n = 3{,}914$ (70.5%) female and $n = 1{,}641$ (29.5%) male participants with a mean age of 23.47 years ($SD = 4.46$, range 18–70 years), while the sample of the general population consisted of $n = 669$ (50.3%) female and $n = 662$ (49.7%) male participants with a mean age of 44.22 years ($SD = 15.03$, range 18–70 years; see Table 1). Regarding relationship status, in the student sample $n = 2{,}708$ (48.0%) stated being in a relationship, while the sample of the general population consisted of $n = 930$ (69.9%) participants in a relationship.

Significant differences between both samples (small to medium effects) were found for all variables except for current or past infection with COVID-19 and knowing someone who died due to COVID-19, respectively (both $p > 0.05$; see Table 1). Specifically, in comparison with the general population, the sample of university students consisted of significantly more females, reported a lower age, was less likely to be in a relationship, have underage children or report a migration background. Further, students had a significantly higher educational level, as expected. Finally, the percentage of participants knowing someone with a COVID-19 infection was significantly higher among students than among the general population.

Attitudes toward the pandemic in university students

When asked about their attitudes toward the pandemic, students tended to be rather worried because of COVID-19 ($M = 3.77$, $SD = 1.04$), while still being optimistic about surviving the crisis unharmed ($M = 3.49$, $SD = 1.01$; see Table 2). Further, while generally supporting the government-mandated measures ($M = 3.83$, $SD = 1.02$), participants also indicated that they felt restricted by them ($M = 3.56$, $SD = 1.11$). The results further imply that students viewed themselves as particularly hit hard by the corona crisis in general ($M = 3.73$, $SD = 1.01$) and by the measures to reduce the crisis ($M = 3.69$, $SD = 1.05$). Overall, participants did not agree with the statements that the pandemic is part of a conspiracy ($M = 1.14$, $SD = 0.51$) and that they feel responsible for the corona crisis ($M = 1.43$, $SD = 0.80$).

Students had also been asked in free text format about positive and negative aspects of the pandemic. The results of the qualitative analysis revealed that the most frequent positive aspects among the $N = 5{,}858$ statements were (in descending order): (1) flexibility due to more digitalization (e. g., online lectures; $n = 1{,}301$, 22.2%), (2) more intense social contacts ($n = 773$, 13.2%), (3) more time for yourself ($n = 488$, 8.3%), (4) deceleration, calm, and less stress ($n = 451$, 7.7%), and (5) more free time due to less commuting time ($n = 380$, 6.5%).

The most frequently reported negative aspects of the pandemic among $N = 14{,}792$ statements in total were (in descending order): (1) restrictions in social life ($n = 3{,}572$,

TABLE 2 Attitudes toward the pandemic in university students ($N = 5{,}639$).

Item	*M (SD)*
I am worried because of COVID-19.	3.77 (1.04)
I personally feel in danger because of COVID-19.	2.77 (1.08)
I am particularly at risk from the coronavirus due to existing medical conditions.	1.57 (1.03)
I fully support government measures to slow down the spread of the coronavirus.	3.83 (1.02)
I feel severely restricted by the government measures to slow down the coronavirus.	3.56 (1.11)
I think the general fear of the coronavirus is exaggerated.	2.02 (1.06)
Government measures to slow down the spread of the virus are excessive, they do more harm than good.	2.19 (1.08)
I am optimistic that I will survive the corona crisis unscathed.	3.49 (1.01)
Students are particularly hit hard by the corona crisis.	3.73 (1.01)
The measures to reduce the crisis hit students particularly hard.	3.69 (1.05)
Overall, it is good for me that I do not have to go out as much and have less contact with other people.	1.85 (1.05)
The pandemic is part of a larger conspiracy.	1.14 (0.51)
I feel responsible for the corona crisis.	1.43 (0.80)

All items were assessed on 5-point answer scales from 1 = "do not agree at all" to 5 = "agree completely."

24.2%), (2) restrictions in use of leisure time (n =1,137, 7.7%), (3) loss of daily structure and difficulties due to being home alone all day ($n = 834$, 5.6%), (4) negative economic and occupational impact ($n = 785$, 5.3%), and (5) challenges of home office and remote working or learning ($n = 772$, 5.2%).

Attitudes toward the pandemic in university students and the general population

In comparison to the general population, students were significantly more likely to report being worried about and thinking about the coronavirus, and to perceive the coronavirus as overrepresented in the media (all $p < 0.001$, small effects; see Table 3). No significant sample differences emerged regarding fear of the virus ($p > 0.05$).

Further, samples did not differ in the perceived likelihood of infection ($p > 0.05$). However, students reported a more supportive attitude toward vaccinations in general and a significantly higher vaccination intention than the general population (all $p < 0.001$, small effects).

Predictors of COVID-19 vaccination intention in university students and the general population

Both logistic regression models in university students and the general population, respectively, were statistically significant (all $p < 0.001$), resulting in a large amount of explained variance in university students (*Nagelkerke's* $R^2 = 0.55$) and a medium amount of explained variance in the general population (*Nagelkerke's* $R^2 = 0.42$; see Table 4). In university students, vaccination intention was significantly predicted by not having underage children ($p = 0.016$), a supporting attitude toward vaccinations in general, the belief that the coronavirus is overrepresented in the media, and less thinking about and worrying about the coronavirus (all $p < 0.001$). In the general population, vaccination intention was significantly predicted by male gender ($p < 0.001$), higher age ($p = 0.004$), not having underage children ($p = 0.016$), a supporting attitude toward vaccinations in general, and the belief that the coronavirus is overrepresented in the media (all $p < 0.001$).

Discussion

This study examined attitudes toward the pandemic and predictors of COVID-19 vaccination intention in university students and the general population. The results showed significant differences in attitudes toward the pandemic between both samples. Further, besides negative aspects, many of the university students reported various positive aspects of the pandemic. The results also indicate that predictors of vaccination intention in university students and the general population are overall similar, despite slight differences.

Regarding their attitudes toward the pandemic, university students in the present study tended to be worried and frightened because of the pandemic. Further, they were significantly more likely to be worried and think about the coronavirus in comparison to the general population. Only few previous studies focused on understanding the attitudes and beliefs of university students regarding the COVID-19 pandemic. One of these studies reported that 38% of university students were worried about the coronavirus, and 44% of them stated to fear an infection (36). In addition, a recent meta-analysis reported that students experienced a moderate level of fear concerning the pandemic (37), which is in accordance with our findings. Overall, these findings emphasize that university

TABLE 3 Differences in attitudes toward the pandemic between university students and the general population.

Item/variable	University students ($n = 5{,}639$) M (SD)	General population ($n = 1{,}387$) M (SD)	Test	p	Effect size
The coronavirus is…					
… something I permanently think about / hardly ever think about[a]	2.95 (1.39)	3.76 (1.56)	$U = 2{,}607{,}067.50$	**<0.001**	$r = 0.21$
… frightening / not frightening[a]	3.62 (1.63)	3.68 (1.75)	$U = 3{,}696{,}505.00$	0.386	$r = 0.01$
… overrepresented in the media / not represented enough in the media[a]	3.18 (1.17)	3.39 (1.57)	$U = 3{,}445{,}732.50$	**<0.001**	$r = 0.06$
… something I worry about / do not worry about[a]	2.60 (1.52)	3.09 (1.72)	$U = 3{,}131{,}671.00$	**<0.001**	$r = 0.12$
Likelihood of infection	1.86 (0.71)	1.90 (0.82)	$U = 3{,}697{,}748.00$	0.369	$r = 0.01$
Attitude toward vaccinations in general	4.57 (0.85)	3.92 (1.27)	$U = 2{,}553{,}285.00$	**< 0.001**	$r = 0.24$
	n (%)	n (%)			
Vaccination intention	4.438 (78.7)	635 (47.7)	χ^2 (1.6970) = 522.18	**< 0.001**	$\varphi = 0.27$

[a] Items were assessed on scales from 1 to 7, with two verbal anchors for 1 and 7, respectively. Bold values indicate statistical significance at the $p < 0.05$ level.

TABLE 4 Predictors of vaccination intention in university students and the general population.

Predictor variable	University students ($n = 5{,}469$)[a]				General population ($n = 1{,}260$)[a]			
	B	SE	p	OR [95% CI]	B	SE	p	OR [95% CI]
Gender	−0.16	0.11	0.133	0.85 [0.69; 1.05]	−0.89	0.14	**<0.001**	0.41 [0.31; 0.55]
Age	0.02	0.01	0.144	1.02 [0.99; 1.04]	0.02	0.01	**0.004**	1.02 [1.01; 1.03]
Relationship status	0.08	0.10	0.429	1.08 [0.90; 1.30]	−0.03	0.16	0.863	0.97 [0.72; 1.32]
Children under 18	−0.58	0.24	**0.016**	0.56 [0.35; 0.90]	−0.38	0.16	**0.016**	0.68 [0.50; 0.93]
Higher education	−0.13	0.21	0.520	0.88 [0.58; 1.31]	0.03	0.15	0.842	1.03 [0.77; 1.38]
Migration background	0.01	0.15	0.957	1.01 [0.76; 1.34]	0.22	0.21	0.288	1.24 [0.83; 1.86]
Chronic disease	−0.06	0.13	0.626	0.94 [0.73; 1.21]	0.08	0.16	0.626	1.08 [0.80; 1.46]
Likelihood of infection	0.04	0.07	0.603	1.04 [0.91; 1.18]	0.07	0.09	0.476	1.07 [0.89; 1.28]
Attitude toward vaccinations	2.01	0.07	**<0.001**	7.44 [6.52; 8.50]	1.05	0.08	**<0.001**	2.86 [2.46; 3.32]
Thinking about coronavirus	−0.16	0.04	**<0.001**	0.85 [0.79; 0.92]	−0.02	0.06	0.744	0.98 [0.87; 1.10]
Worrying about coronavirus	−0.22	0.04	**<0.001**	0.81 [0.74; 0.88]	−0.06	0.06	0.343	0.94 [0.83; 1.07]
Fear of coronavirus	−0.03	0.04	0.479	0.97 [0.89; 1.05]	−0.07	0.06	0.249	0.93 [0.82; 1.05]
Media representation of coronavirus	0.40	0.04	**<0.001**	1.50 [1.38; 1.63]	0.24	0.05	**<0.001**	1.27 [1.15; 1.40]
Constant	−7.76	0.55	< 0.001	0.00	−4.98	0.60	<0.001	0.01
χ^2	χ^2 (13) = 2385.84, $p < 0.001$				χ^2 (13) = 482.42, $p < 0.001$			
R^2 (Cox-Snell / Nagelkerke)	0.35 / 0.55				0.32 / 0.42			

[a] Reduced sample sizes due to missing values. Coding for gender: 0 = male, 1 = female. OR, odds ratio; CI, confidence interval.
Bold values indicate statistical significance at the $p < 0.05$ level.

students are more vulnerable to the pandemic situation and the side effects of control measures compared to the general population (25).

To our knowledge this is the first study conducted in university students examining positive and negative aspects of the pandemic assessed in free text format. Despite the frequently mentioned negative aspects on various platforms (e. g., on social media or in the news), such as restrictions in social life and leisure time, university students in this study also reported various positive aspects like flexibility due to more digitalization (22.2%), more intense social contacts (13.2%), and more time for themselves (8.3%). Furthermore, a certain percentage of students (7.7 %) described being calm and less stressed as a positive aspect of the pandemic. This result is in line with a study reporting that a "calmer life" was one of the most common positive effects reported (38).

Students in this study showed a significantly higher vaccination intention (78.7%) than the general population (47.7%). In contrast to this finding, earlier studies reported a higher vaccine hesitancy in young people compared to older populations (14, 39). However, an inverted-U-shaped relationship between age and anti-COVID vaccination behavior was also reported, which might explain our findings (13). Important to highlight here again that (given the nature of both samples) there is an age difference between the sample of university students and the sample of the general population. It might be that some of the differences in vaccination intention could also be explained by this age difference. Further studies among young people not being university students would be needed to clarify this.

In our study, vaccination intention in both university students and the general population was significantly predicted by not having underage children, a supporting attitude toward vaccinations in general, and the belief that the coronavirus is overrepresented in the media. In addition, less thinking about and worrying about the coronavirus significantly predicted a higher vaccination intention in students, while male gender and higher age were predictors in the general population. The results of the regression analyses were mostly in line with previous findings. Regarding the general population, studies also showed an association of female gender and younger age with a low vaccine intention (14, 39, 40). However, gender was not a significant predictor in university students in our study. In line with this, there are also studies suggesting that gender does not play a role in self-reported willingness to receive a COVID-19 vaccine (41). Furthermore, our results showed no predictive effect of migration background and education on vaccine intention in both groups, which was also reported by other studies (14, 39). Earlier studies also indicated that having school-age children was related with refusal of COVID-19 vaccine (42), which was in line with our results. However, when interpreting the results on the association between not having underage children and vaccination intention, the uneven distribution of having children in both samples (as would be expected from the nature of the samples) has to be considered. Further, as would be expected, positive attitudes toward vaccinations were associated with vaccine intention in both groups. On the other hand, the belief that the coronavirus is overrepresented in the media was positively associated with vaccine intention in both groups, which was unexpected since previous studies emphasized a positive association between vaccine hesitancy and higher social media consumption (43, 44). A potential explanation for this somewhat unintuitive finding could be that people believe in the vaccination to be a secure and safe way to combat the pandemic and end the "over"-representation in the media and move back to daily life with no or at least less restrictions.

Strengths of this study include the large sample sizes for both samples of university students and the general population, respectively, and the mixed-methods approach including quantitative and qualitative methods. The student sample included university students from all faculties of the University of Leipzig, which is an important strength considering the fact that most previous studies focused mainly on students in healthcare settings. Additionally, both surveys were conducted during the second peak time of the pandemic in Germany, with higher mortality and morbidity rates, which makes the findings particularly relevant. Nevertheless, although very close in time, the time points of the surveys were not identically (which was due to fact that not all waves of the general population survey contained the respective variables for comparison). Hence, it were different time points in seasonality of SARS-CoV-2 transmission, vaccine availability in Germany, case numbers, ICU occupancy and dominant SARS-CoV-2 variants, which might additionally influence respondents' attitudes and answers in the surveys. Other limitations might also be considered when interpreting the results. First, no causal relationships can be determined due to the cross-sectional study design. Second, only students of one German university were contacted for the anonymous survey, which might lead to underrepresentation of the attitudes and vaccine intention among students in other regions of Germany. Third, the nature of data collection might have resulted in a selection bias. As vaccine intention varies in each country, the measurement implemented by governments also vary (45, 46). Trust in government policies as well as healthcare sector are playing important roles as predictors of vaccine intention (47). Also, other correlates of vaccine hesitancy such as trust in science in vaccine development and negative perceptions of safety were reported as significant predictors of vaccine hesitancy in different investigations (48).

In conclusion, the results of this study might be important to be considered when designing and targeting vaccination campaigns to university students as opposed to messages to the general public. Specifically, it is of great importance to include university students in the COVID-19 vaccination program considering that they are an important risk group due to their vulnerability to an infection with the coronavirus and transmission-associated behaviors. The results on the attitudes of students and the general population about the pandemic in general and about the COVID-19 vaccine in particular may be useful to support health engagement and plan future management of public health strategies. Additionally, implementing more digital platforms for a low-threshold access to reliable information on the COVID-19 vaccine may reduce vaccine hesitancy among university students and also the general population. Further, to our knowledge this is the first study investigating not only negative, but also positive aspects of the pandemic reported by university students. It is of great importance to identify positive aspects of the pandemic and related restrictions to find ways to promote community resilience.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by University Leipzig, Ethical Committee of the Medical Faculty. The patients/participants provided their written informed consent to participate in this study.

Author contributions

EK and CR-K conceptualized the study and constructed the questionnaires. SB, ED-S, and EK performed data analyses and drafted the initial version of the manuscript. SM, FD, LH, and CR-K critically reviewed and revised the manuscript. All authors have read and approved the content of the final manuscript.

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Conflict of interest

CR-K received lecture honoraria from Recordati and Servier outside and independent of the submitted work.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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EDITED BY
Wulf Rössler,
Charité Universitätsmedizin
Berlin, Germany

REVIEWED BY
Jean Morrissey,
Trinity College Dublin, Ireland
Laurie Burke,
Burke Psychological Services, LLC,
United States
Lorenza Entilli,
University of Padua, Italy

*CORRESPONDENCE
Nicole T. M. Hill
Nicole.hill@telethonkids.org.au

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Reach and perceived effectiveness of a community-led active outreach postvention intervention for people bereaved by suicide

Nicole T. M. Hill[1,2,3]*, Roz Walker[3,4,5], Karl Andriessen[6], Hamza Bouras[1], Shawn R. Tan[1], Punam Amaratia[1], Alix Woolard[1,2], Penelope Strauss[1,3], Yael Perry[1,2] and Ashleigh Lin[1,2]

[1]Telethon Kids Institute, Nedlands, WA, Australia, [2]Centre for Child Health Research, University of Western Australia, Nedlands, WA, Australia, [3]School of Population and Global Health, University of Western Australia, Nedlands, WA, Australia, [4]Ngangk Yira Institute for Change, Murdoch University, Murdoch, WA, Australia, [5]School of Indigenous Studies, University of Western Australia, Perth, WA, Australia, [6]Melbourne School of Population and Global Health, University of Melbourne, Carlton, VIC, Australia

Background: Postvention is a core component of suicide prevention strategies, internationally. However, the types of supports provided to people impacted by suicide vary widely. This study examines the perceived effectiveness of the Primary Care Navigator (PCN) model for people bereaved by suicide. The PCN model was implemented in response to a suicide cluster. It is an active outreach postvention intervention, initiated by police in response to a suspected suicide and links individuals to support in the immediate aftermath of their loss.

Methods: A retrospective cross-sectional mixed methods approach was used to (1) identify the reach of the PCN model, (2) describe the type of support provided to people bereaved by a suspected suicide and (3) identify the perceived effectiveness of the PCN model from the perspective of WA police, postvention stakeholders and individuals bereaved by suicide. Quantitative data was used to examine the characteristics of suicide in the region, the characteristics of people who received bereavement support, and the types of support that were provided. Interviews with police, postvention stakeholders, and people bereaved by a suspected suicide were conducted to identify the perceived effectiveness of the intervention.

Results: Between 1 January 2019 and 31 March 2021 there were 80 suspected suicides. Active outreach was provided to 347 bereaved individuals via the PCN model. Just under half of those who were offered outreach accepted further support ($N = 164$) in the form of suicide bereavement information (98%), mental health or clinical support (49.6%), specialized postvention counseling (38.4%), financial assistance (16%) and assistance with meals (16%), followed by housing assistance (14%) and referral to community services (11%). Police, stakeholders, and people with lived experience of a suspected suicide perceived the PCN model to be effective at connecting them to the community, linking people to support, and preventing suicide.

Conclusion: The results provide evidence supporting the perceived effectiveness of an active outreach approach to postvention that provides acute support to people bereaved by suicide. Findings highlight important practical areas of support such as providing referral pathways and information on grief and suicide loss in the immediate aftermath of a suicide loss.

KEYWORDS

postvention, suicide prevention, suicide cluster, community intervention, suicide prevention and intervention

Introduction

Suicide prevention is a significant public health priority in Australia. In 2020, 3,139 Australians died by suicide representing a rise from 11.2 per 100,000 in 2019 to 12.1 per 100,000 in 2020 (1). It is estimated that for every suicide approximately five or more immediate family members are affected and up to 135 individuals within the broader community (2, 3). A recent meta-analysis showed that approximately 1 in 20 people are impacted by a suicide in the past year, whereas 1 in 5 individuals will be impacted by a suicide during their lifetime (4).

Suicide bereavement is associated with an increased risk of adverse physical and mental health outcomes (5, 6), including increased risk of suicide, suicide attempt (7, 8), and the development of suicide clusters (multiple suicides that occur close in space and time, or those that involve social links between cluster members) (9). Access to timely postvention, defined as activities that provide support and facilitate recovery in those bereaved by suicide (10), has been identified as a core component of local, state-and national suicide prevention strategies in Australia and internationally (11, 12). Furthermore, timely postvention is considered a gold-standard approach for the prevention of suicide clusters (13).

To date, most literature has examined the effectiveness of psychological interventions (e.g., bereavement counseling) on people bereaved by suicide (14, 15). Evidence from controlled studies, for example, suggest that engagement in psychological interventions following a suicide loss is associated with some improvements in grief and suicidal ideation compared to those who do not receive psychological support (14). However, the needs of people bereaved by suicide varies widely between individuals and at different stages post-loss (16–18). A recent qualitative study by Ross and colleagues, for example, found that in addition to psychological needs, individuals bereaved by suicide experience a range of practical needs including assistance with funeral arrangements, managing finances and assistance accessing appropriate psychological support to guide them through the bereavement process (17). Moreover, the type of support that is needed and sought may depend on factors such as the availability of social support and relationship to the deceased. For example, Entilli et al. found that individuals with high social support were less likely to seek support from formal services (e.g., psychiatric services) compared to those with low social support (19). Another study found people with different family roles may require different types of support, with mothers reporting more frequent symptoms of depression compared to fathers (18).

Furthermore, previous research shows, many people bereaved by suicide would like to receive support following their loss but for various reasons are not able to access the help they need (20–23). Barriers include long waitlist times (or the absence of services altogether), lack of clarity regarding where to look for support, or the belief that service providers may not think their problems are serious enough to warrant support (21, 23). Arguably, postvention interventions which address these barriers in the immediate aftermath of a suicide have significant potential for improving access to postvention support for individuals impacted by suicide.

There is some evidence that those who receive practical postvention support in the immediate aftermath of a suicide are more likely to engage in interventions targeting their psychological recovery. Cerel and Campbell found that bereaved individuals who received practical support in the immediate aftermath of their loss presented to postvention counseling services on average 50 days sooner than those who did not receive practical support soon after their loss (24). The type of postvention outreach provided to people in the immediate aftermath of a suicide has also been linked to improved outcomes in people bereaved by suicide. For example, previous studies have shown that people who receive active postvention outreach (where outreach and support is initiated by a support service or organization) as opposed to passive postvention (where individuals are provided with passive information about supports and/or are required to initiate support themselves) is associated with better psychosocial outcomes including fewer work-related absences, less contact with health professionals, and improved engagement in psychological supports (16, 24, 25). Despite the potential benefits, active outreach is infrequently provided. For example, in a survey of people bereaved by suicide, 18 found less than 15% of people had received direct outreach during the aftermath of their loss. Yet, 90% of those who received outreach were happy with the support they were provided (19).

Despite promising evidence, the acceptability and perceived effectiveness of active postvention outreach remains limited. It is not currently known whether an active outreach model is feasible from a service delivery perspective, or whether bereaved individuals who receive active outreach perceive the approach as beneficial for their recovery. The aim of the present study is to address these gaps in evidence in a descriptive study that investigates the reach and perceived effectiveness of an active outreach model known as the Primary Care Navigator (PCN) model implemented in the PaRK region in Western Australia (WA). Specifically, we sought to: (1) identify the reach of the Primary Care Navigator model, (2) describe the type of support provided to people bereaved by a suspected in the region, and (3) identify the perceived effectiveness of the PCN model from the perspective of WA police, postvention stakeholders and individuals bereaved by suicide. In the current study we refer to the deaths as suspected suicides as not all had been confirmed by the coroner, which can take up to 2 years following a sudden death notification from police.

Methods

Local context and intervention description

In 2016–2017 a cluster of suicides occurred in southwest metropolitan Perth (PaRK region). In response to the deaths, stakeholders from local mental health services, WA Primary Health Alliance, and WA police developed the Primary Care Navigator Model. The purpose of the PCN model is to link individuals to practical postvention support in the form of active outreach in the immediate aftermath of a suspected suicide.

In Australia, the loss of an individual to a suspected suicide requires the involvement of the state coroner to investigate both the cause and circumstances of death (26). This process is facilitated by police, who work on behalf of the coroner and are required to identify the individual who died, collect statements from caregivers, close contacts, and witnesses, and notify individuals and families that a death has occurred. Whilst the purpose of police is to assist with the collection of information on behalf of the coroner, they are often the first to contact individuals bereaved by suicide.

Under the PCN model, police ask bereaved individuals for their consent to receive active outreach via a sudden death notification form (SD1 form), which is facilitated by the PCN lead. The SD1 form records the demographic characteristics and other individuals nominated by the bereaved person who may benefit from postvention outreach. The rapid referral between police and the PCN lead was designed to provide immediate postvention support to those who are bereaved by suicide with the aim of improving recovery and preventing further suicides and suicide attempts. A suicide prevention community response group comprising stakeholders from community organizations (e.g., local council, mental health services, and schools) meet monthly to identify opportunities for suicide prevention. When a suicide occurs, the response group reviews deidentified information on the deceased (e.g., demographic information) to identify other individuals in the community who may benefit from outreach and support (e.g., young people in community sports groups). A summary of PCN model is shown in Figure 1.

The study used a cross-sectional mixed methods approach. We analyzed quantitative data that described the characteristics of individuals who died by suspected suicide and individuals bereaved by suspected suicide who received active postvention outreach from the PCN model between 1 January 2019 and 31 March 2021 in the PaRK region in Western Australia. We obtained data on suspected suicides from the SD1 forms, recorded by the service provider (Anglicare WA) responsible for providing bereaved individuals with active postvention support under the PCN model. We collected qualitative data from semi-structured interviews with people bereaved by suicide, stakeholders and police involved in the delivery of the PCN model.

Quantitative analysis

Data sources

Ascertainment of suspected suicide deaths and bereaved participants

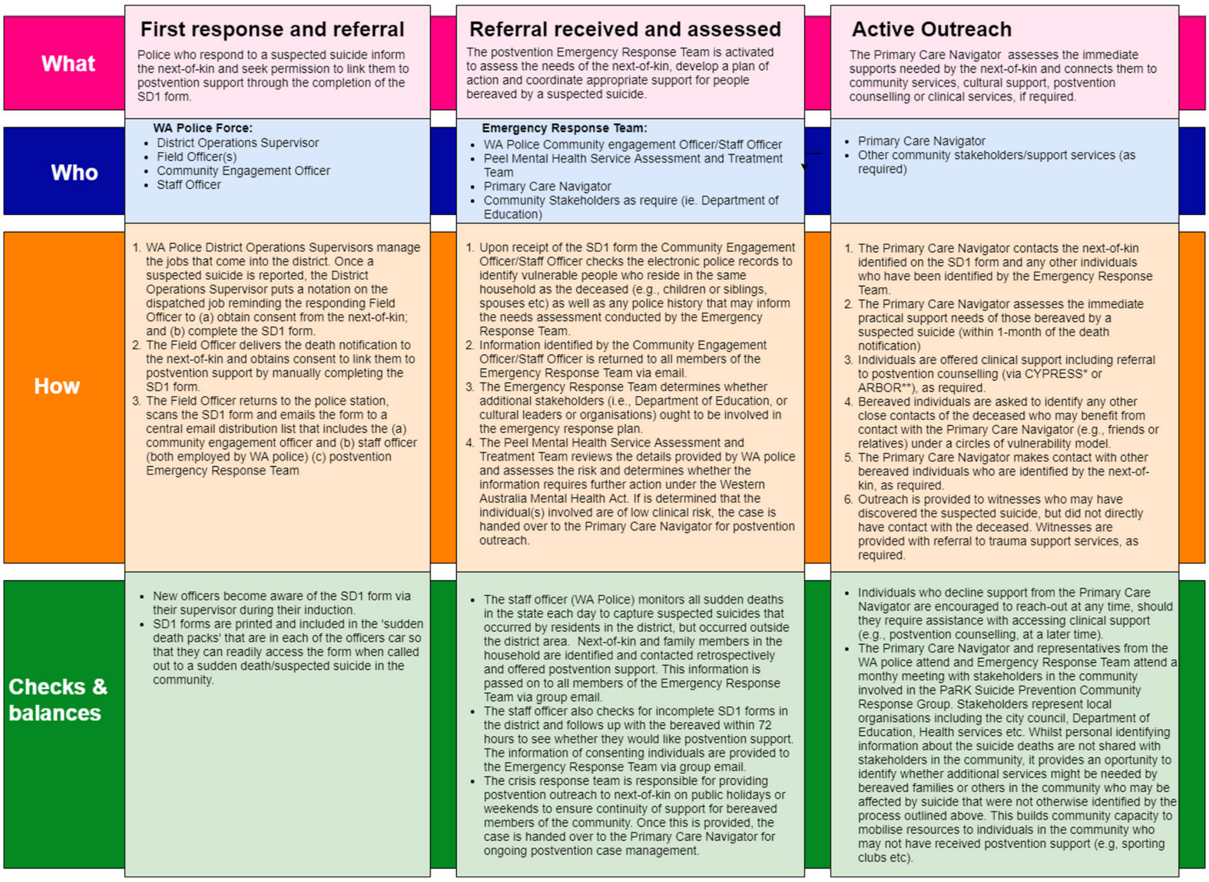
We identified suspected suicides that occurred between 1 January 2019 and 31 March 2021 from a spreadsheet collected by the Primary Care Navigator for all people who died by suspected suicide and those who received active outreach. Each bereaved individual was linked to the case record of a suspected suicide using a numerical code generated by the service provider (Anglicare WA). A list of the variables provided by Anglicare WA to the research team for descriptive analysis is shown in Table 1.

Ascertainment of population size

We used the Australian Bureau of Statistics (ABS) Table builder to extract data on estimated resident population for 2019 (the midpoint of our study) for each of the five local government areas included in the catchment region. Age was coded into 5-year bands from ages 15-85+ to reflect the age of the population who died by suspected suicide in the PaRK region.

Statistical analysis (quantitative data)

Age specific rates of suspected suicide per 100,000 person years were calculated for each age group. We used descriptive statistics to summarize the characteristics (by gender) of those who died by suspected suicide as well as bereaved people who



	First response and referral	Referral received and assessed	Active Outreach
What	Police who respond to a suspected suicide inform the next-of-kin and seek permission to link them to postvention support through the completion of the SD1 form.	The postvention Emergency Response Team is activated to assess the needs of the next-of-kin, develop a plan of action and coordinate appropriate support for people bereaved by a suspected suicide.	The Primary Care Navigator assesses the immediate supports needed by the next-of-kin and connects them to community services, cultural support, postvention counselling or clinical services, if required.
Who	**WA Police Force:** • District Operations Supervisor • Field Officer(s) • Community Engagement Officer • Staff Officer	**Emergency Response Team:** • WA Police Community engagement Officer/Staff Officer • Peel Mental Health Service Assessment and Treatment Team • Primary Care Navigator • Community Stakeholders as require (ie. Department of Education)	• Primary Care Navigator • Other community stakeholders/support services (as required)
How	1. WA Police District Operations Supervisors manage the jobs that come into the district. Once a suspected suicide is reported, the District Operations Supervisor puts a notation on the dispatched job reminding the responding Field Officer to (a) obtain consent from the next-of-kin; and (b) complete the SD1 form. 2. The Field Officer delivers the death notification to the next-of-kin and obtains consent to link them to postvention support by manually completing the SD1 form. 3. The Field Officer returns to the police station, scans the SD1 form and emails the form to a central email distribution list that includes the (a) community engagement officer and (b) staff officer (both employed by WA police) (c) postvention Emergency Response Team	1. Upon receipt of the SD1 form the Community Engagement Officer/Staff Officer checks the electronic police records to identify vulnerable people who reside in the same household as the deceased (e.g., children or siblings, spouses etc) as well as any police history that may inform the needs assessment conducted by the Emergency Response Team. 2. Information identified by the Community Engagement Officer/Staff Officer is returned to all members of the Emergency Response Team via email. 3. The Emergency Response Team determines whether additional stakeholders (i.e., Department of Education, or cultural leaders or organisations) ought to be involved in the emergency response plan. 4. The Peel Mental Health Service Assessment and Treatment Team reviews the details provided by WA police and assesses the risk and determines whether the information requires further action under the Western Australia Mental Health Act. If is determined that the individual(s) involved are of low clinical risk, the case is handed over to the Primary Care Navigator for postvention outreach.	1. The Primary Care Navigator contacts the next-of-kin identified on the SD1 form and any other individuals who have been identified by the Emergency Response Team. 2. The Primary Care Navigator assesses the immediate practical support needs of those bereaved by a suspected suicide (within 1-month of the death notification) 3. Individuals are offered clinical support including referral to postvention counselling (via CYPRESS* or ARBOR**), as required. 4. Bereaved individuals are asked to identify any other close contacts of the deceased who may benefit from contact with the Primary Care Navigator (e.g., friends or relatives) under a circles of vulnerability model. 5. The Primary Care Navigator makes contact with other bereaved individuals who are identified by the next-of-kin, as required. 6. Outreach is provided to witnesses who may have discovered the suspected suicide, but did not directly have contact with the deceased. Witnesses are provided with referral to trauma support services, as required.
Checks & balances	• New officers become aware of the SD1 form via their supervisor during their induction. • SD1 forms are printed and included in the 'sudden death packs' that are in each of the officers car so that they can readily access the form when called out to a sudden death/suspected suicide in the community.	• The staff officer (WA Police) monitors all sudden deaths in the state each day to capture suspected suicides that occurred by residents in the district, but occurred outside the district area. Next-of-kin and family members in the household are identified and contacted retrospectively and offered postvention support. This information is passed on to all members of the Emergency Response Team via group email. • The staff officer also checks for incomplete SD1 forms in the district and follows up with the bereaved within 72 hours to see whether they would like postvention support. The information of consenting individuals are provided to the Emergency Response Team via group email. • The crisis response team is responsible for providing postvention outreach to next-of-kin on public holidays or weekends to ensure continuity of support for bereaved members of the community. Once this is provided, the case is handed over to the Primary Care Navigator for ongoing postvention case management.	• Individuals who decline support from the Primary Care Navigator are encouraged to reach-out at any time, should they require assistance with accessing clinical support (e.g., postvention counselling, at a later time). • The Primary Care Navigator and representatives from the WA police attend and Emergency Response Team attend a monthy meeting with stakeholders in the community involved in the PaRK Suicide Prevention Community Response Group. Stakeholders represent local organisations including the city council, Department of Education, Health services etc. Whilst personal identifying information about the suicide deaths are not shared with stakeholders in the community, it provides an oportunity to identify whether additional services might be needed by bereaved families or others in the community who may be affected by suicide that were not otherwise identified by the process outlined above. This builds community capacity to mobilise resources to individuals in the community who may not have received postvention support (e.g, sporting clubs etc).

FIGURE 1
Operational description of the primary care navigator (PCN) model.

received outreach from the PCN lead. Differences between sexes was determined using Chi-square analysis with significance determined at the $p<0.05$ level. The reach of the PCN service was analyzed using descriptive statistics that summarized the ratio of outreach contacts made per suspected suicide in addition to the frequency and type of outreach provided to individuals who received outreach through the PCN model during the study period. All quantitative analysis was conducted in R v3.8.

Semi-structured qualitative interviews

Semi structured qualitative interviews were conducted online via Microsoft Teams with 5 bereaved individuals, 18 stakeholders from the PaRK Suicide Prevention Response Group (SRG) and 5 employees of the WA police force who were involved in the implementation and delivery of the PCN model. Key topics covered in the semi structured interviews included: 1) the operational efficiency of the PCN model; 2) the strengths and barriers associated with the model; and 3) the perceived effectiveness of the model for people bereaved by suicide in the community. The current study focuses on responses to the perceived effectiveness of the PCN model and areas for future improvement.

Recruitment

All participants were recruited between 1 July 2021 and 1 October 2021. A purposive sampling method was employed for each participant group. Bereaved participants were recruited by the PCN lead via email, and stakeholders were recruited by the Suicide Prevention Project Support officer using the email distribution list for the local suicide response group, hosted by Anglicare WA. WA Police were recruited by the research team using an email distribution list of police who have responded to a suspected suicide. The email distribution list was prepared by the district Inspector of police in the region.

TABLE 1 Variables included in the quantitative analysis.

Variable	Description
Date of police referral to the PCN	Day, Month, Year.
Case number	A unique number linked to the deceased person.
Relationship to the deceased	Describes the relationship to the person who died by suicide (e.g., First degree relative – spouse, sibling, parent, stepparent, step siblings, ex-spouse, other relative; OR Acquaintance: neighbor, employee, colleague, friend, other).
Gender	Describes the persons gender identity (e.g., Male, Female, Nonbinary, Trans male Trans Female).
Age (numerical number)	Age at the time of contact with the PCN
Postcode	Residential postcode.
The number of referrals to community services that the PCN provided to the client.	Numerical descriptor.
The types of services included in each referral	The type of referrals that were made (e.g., clinical, funeral, financial, biological hazard clean-up, postvention counseling, mental health services).
The number of calls/contacts made per client	Total number per client.
Date of suspected suicide	
Gender of the deceased person	Describes the persons gender identity (e.g., Male, Female, Nonbinary, Transgender).
Age of the deceased person	Age at the time of police notification.
Postcode of the deceased person	As above.
Method of suspected suicide	The mechanism resulting in death.

Qualitative analysis

Two researchers (RW and NTMH) conducted the interviews between 1 September 2021 and 31 October 2021. Convergent themes between groups (e.g., stakeholders, police, and people with lived experience) were identified using a general inductive approach (27). Emerging themes were defined as experiences or opinions that shared similar content or meaning. A theme was identified as a convergent theme if it was reported across all three participant groups (stakeholders, police and lived experience). RW and NTMH each generated emerging themes and discussed the results until consensus was reached. To facilitate deep engagement with the data, NTMH checked the recordings against the transcriptions for accuracy. Analysis of the data was iterative and involved: familiarization with the data; generating themes; coding; reviewing themes; naming and defining themes; and synthesizing the results in the written manuscript (28–30). Segments of interest that provided meaningful insight into the semi-structured interview questions were identified and coded (28). The coding process was flexible and iterative and emerging themes were revised through discussion between RW and NTMH (29, 30).

Recordings were transcribed by a professional transcription service. Transcripts were imported into QSR NVivo 11 to facilitate data management and analysis. Two interviews were not successfully recorded and were therefore included on the basis of field notes collected by the interviewer.

Ethics approval

The study was approved by the University of Western Australia Human Research Ethics Committee (2021/ET0000306) and the Western Australia Police Force Research Governance Office (T570). All participants provided written informed consent.

Results

Results of the quantitative analysis

Characteristics of suspected suicide in the region (2019–2021)

Between 1 January 2019 and 31 March 2021 there were 80 suspected suicides that were referred by police to the PCN via the SD1 referral form (Table 2). Males accounted for 80% of suicides during the study period. The overall age specific rate of suspected suicide in the PaRK region between 2019 and 2021 was 26.2 per 100,000 people. The age specific rate of suspected suicide was highest among young people aged 20–24 years (65.9 per 100,000 people), followed by those aged 15–19 years (45.1 per 100,000 people). Together, young people aged 15–24 accounted for 35% of suspected suicides within the PaRK region during this period. Most people who died by suspected suicide in the region were adults over the age of 18 (90%; Table 2). Over half were known to inpatient and outpatient alcohol and other drug services (53.8%) and/or community mental health services (50.8%). Overall, 11.3% of those who died by suicide were exposed to the suicide of a relative, friend or acquaintance during their lifetime.

TABLE 2 Characteristics of those who died by suspected suicide in the PaRK region, 2019 to 2021.

Characteristics	Total	Male	Female	Chi square *p*-value
Number of people	80 (100%)	64 (80.0%)	16 (20%)	<0.01
Suspected suicides in 2019	17 (21.3%)	14 (82.4%)	3 (17.6%)	<0.01
Suspected suicides in 2020	46 (57.5%)	35 (76%)	11 (24%)	<0.01
Suspected suicides in 2021	14 (17.5%)	13 (92.9%)	1 (7.1%)	<0.01
15 to 19	8 (10.0%)	7 (10.9%)	1 (6.7%)	0.61
20 to 24	12 (15.0%)	6 (9.4%)	6 (40.0%)	<0.01
25 to 29	8 (10.0%)	7 (10.9%)	1 (6.7%)	0.61
>30 years	52 (65.0%)	43 (67.2%)	9 (60.0%)	0.58
Aboriginal and Torres Strait Islander	9 (11.3%)	8 (12.5%)	1 (6.7%)	0.52
Exposed to suicide (lifetime)	10 (12.5%)	8 (12.5%)	2 (13.3%)	0.93
Known to Community Mental Health Services	47 (58.8%)	34 (53.1%)	13 (86.7%)	0.01
Known to Alcohol and Other Drug Services	43 (53.8%)	37 (57.1%)	6 (40.0%)	0.22

TABLE 3 Characteristics of individuals bereaved by a suspected suicide, 2019 to 2021.

Characteristic	Total ($N = 164$)	Male ($N = 60$)	Female ($N = 104$)	Chi square *p*-value
Age				
Adult >18 years	73 (44.5%)	40 (60.7%)	33 (31.7%)	<0.01
Minor <18 years	91 (55.5%)	20 (33.4%)	71 (68.3%)	<0.01
Relationship to the deceased				
Spouse*	25 (15.2%)	2 (3.3%)	23 (22.1%)	<0.01
Parent*	29 (17.7%)	10 (16.7%)	19 (18.3%)	0.79
Son/daughter*	61 (37.2%)	26 (43.3%)	35 (33.7%)	0.22
Sibling*	22 (13.4%)	7 (11.7%)	15 (14.4%)	0.63
Other relative	4 (2.4%)	1 (1.7%)	3 (2.9%)	0.63
First responder or witness	6 (3.7%)	3 (5.0%)	3 (2.9%)	0.49
Friend or acquaintance (colleague, neighbor, housemate)	17 (10.4%)	11 (18.3%)	6 (5.8%)	0.01

*Includes defacto spouse, step-parent(s), step-children, and step-siblings.

Characteristics of individuals bereaved by suicide

The characteristics of individuals bereaved by suicide is shown in Table 3. Females accounted for 63% of bereaved individuals in the community. Of the 80 suspected suicides, postvention outreach in the first 48–72 hours of a suspected suicide loss was provided to 347 bereaved individuals under the PCN model (see Supplementary Figure 1). The number of people who received initial outreach increased from 75 bereaved individuals (20 completed SD1 referrals in response to a suspected suicide) in 2019 to 235 (46 completed SD1 referrals in response to a suspected suicide) in 2020. Approximately 10% of people who were provided outreach from the PCN lived outside the catchment region but were identified by the SD1 form as requiring postvention support.

Reach and nature of support provided by the Primary Care Navigator

On average, postvention outreach was provided to ∼4 bereaved persons per suspected suicide (range = 1–16 bereaved individuals). Overall, 164 (47.2%) people accepted postvention support, of which just under half accepted further support in the form of practical support (e.g., financial support, funeral arrangement, etc.) and/or clinical support (e.g., suicide bereavement postvention counseling). Compared to those who accepted support, those who declined further support following initial contact from the PCN were more likely to be male and were more likely to be a friend or acquaintance of the deceased, or a bystander witness who discovered the deceased (Table 3).

Types of support received

Table 4 shows the types of support provided to bereaved individuals by the PCN. Of the 164 of bereaved individuals who accepted outreach by the PCN, 92.7% received a referral for clinical or specialized postvention counseling, of which more than three-quarters attended at least one appointment.

Results of the qualitative analysis

Four overarching themes were identified in the analysis of perceived effectiveness of the PCN model from participants bereaved by suicide, and stakeholders and police involved in the response to suicide in the region.

Linking individuals to the support they need

There was consensus among stakeholders, police and bereaved participants that the PCN model contributed to the coping and recovery of individuals and their family members

TABLE 4 Description and frequency of support provided to bereaved people in the PaRK region.

Practical support	Examples of support provided	Proportion of bereaved people who received support n(%)[a]
Mental health/clinical services	Child and Adolescent Mental Health Services Private counseling services	81 (49.6%)
Specialized postvention counseling	Children and Young People Responsive Suicide Support (CYPRESS) Active Response Bereavement Outreach (ARBOR)	63 (38.4%)
Suicide bereavement information	Information on how to talk with children about suicide and the suicide death of their loved one Information on suicide related bereavement and grief processes	160 (98%)
Financial support	Vouchers for household items and groceries Assistance finding support for funeral costs Information on services to assist with legal costs Assistance with managing general bills and utilities Assistance with rent or mortgage support	26 (16%)
Meals	Identifying support networks to assist with meals.	26 (16%)
Housing assistance	Assistance to navigating the potential loss of home due to inability to pay rent or lease discontinuation Connecting families to housing support	23 (14%)
Referral to community services	Headspace Youth services Community services Indigenous postvention services Indigenous community development services	18 (11%)
Legal services	Closing of personal affairs/accounts Rent/housing advocacy following the loss of a primary income earner	7 (<5%)
Funeral support	Locating suitable premises for funeral Assistance with writing a eulogy	9 (5%)
Liaising with Department of Child Protection (DCP)	Collaboration with the Department of Child Protection for at risk families to assess their needs and identify appropriate supports and assess risk and safety for children and young people	7 (<5%)
Transport	Transport assistance to arrange personal affairs in the absence of alternative transport options.	4 (<5%)

mental health and grief response. They also described that the support provided by the PCN was needed at the time they received it: *"I had lost my son and he just let me grieve my way but gave me tools to cope I guess. I had lost my brother to suicide seven years prior, and my father had died 6 months before so I had a lot of grief to deal with. They arranged for me to have 20 out of the 10 sessions [bereavement counseling]. They were fantastic, very supportive, they knew I needed more counseling than just ten sessions"* [Bereaved Participant A].

Bereaved participants described receiving valuable information on how to talk to young people in their families about the suicide loss, how to cope with grief through the provision of specialist postvention counseling, that they would not have known about had they not received outreach: "*I really appreciated the fact that that help was offered [by the PCN] because I didn't know it existed*" [Bereaved Participant C].

"With [my son] then passing, even my brain was telling me, "You need to talk to someone, you do need to talk to someone this time." So, that's what probably made me go along to the sessions [bereavement counseling arranged by the PCN], and I really didn't know where to start because I've never been and didn't know.... By about six, I felt I was – had had enough. I was okay" [Bereaved Participant B].

One bereaved participant noted that the outreach provided by the PCN helped them process their feelings by talking about what they had experienced and prevented them from "*bottling it all up.*" [Bereaved Participant B]. Another noted: *"I had some really down times and he helped me through those. I had lost my son and he just let me grieve my way but gave me tools to cope"* [Bereaved Participant A].

Both stakeholders and police noted that the model had benefits for their own wellbeing and provided them with the psychological comfort to walk away knowing that the community had an effective strategy in place to support people who received the distressing news of the suicide of a loved one. As one police officer noted: *"it feels like we've [the police] thrown a hand grenade into their household and just let it explode and walk away. Now, when they fill that form [the referral to the PCN], we're not taking that burden home after their night shift because they know that someone is going to pick up and go and help those people"* [Police Participant B].

Postvention as suicide prevention

Participants expressed that they thought the support provided by the PCN had the potential to avert further suicides in the community. One police officer noted that the model had the potential to prevent further suicides by providing active outreach when people are most vulnerable *"So, we're trying to break those cycles of the impacts of suicide leading to [more] suicides. So, I think that's incredibly powerful."* [Police Participant B]. Another stakeholder noted: *"I have no doubt that this initiative has actually saved lives just by – a small thing to us like [the PCN lead] making a phone call to a family can be life-changing to someone who's sitting there on their own"* [Stakeholder Participant A].

The feedback from bereaved participants reinforced those reported by stakeholders. One bereaved participant noted that the support provided by the PCN kept them in close contact with counseling services when they were feeling vulnerable to suicide themselves: *"they knew I needed more counseling than just ten sessions. I mean that is the postvention suicide prevention isn't it, I hit some very low spots, I could have taken my life a few times"* [Bereaved Participant A].

Maintaining connection to the community

There was consensus among participants that the PCN model provided people bereaved by suspected suicide with connection in the community by linking them to postvention counseling with other bereaved individuals, and providing a touchpoint for further support, should they need it. One bereaved participant noted: *"Having to go through this experience, it's made it really good to know there's people around you and knowing I can reach out to those people too, that if I do have some concerns for myself or something like that there are people in the background and that's the biggest part that you know you're supported"* [Bereaved Participant C].

Both stakeholders and police echoed the importance of maintaining connection in the community, particularly for individuals who did not have strong support networks at the time of their loss. For example, one police officer noted: "*Some people have their church beliefs, and they have a lot of public support or community support around them, but I think they still appreciate the fact that the offer was there*" [Police Participant B].

Areas for improvement

Some participants highlighted areas that could improve the potential effectiveness of the program for people bereaved by suspected suicide in the region. Bereaved participants described a desire for ongoing follow-up and support at later time points such as anniversaries and other important events: *"You get so much with so many people there with you in the initial stages, but it's down the track. I think you probably need it after the first year as well. it's always the first, the first birthday with kids and the first Christmas that's the hardest"* [Bereaved Participant D].

Bereaved participants also noted that it would be helpful to talk to someone who has lost someone to suicide who would understand their experience: *"I think something that I have tried to look up and get some access to is to just talk about it with other people that have possibly been through the same thing. I don't know if there's any group that you can go to. I did try to look up online but I couldn't find anything where – a bit like the Alcoholics Anonymous, so that sort of thing just so that you can get together with people who've experienced the same thing. For me, I think I'd benefit from that. I don't know if that even exists"* [Bereaved participant B].

Police and stakeholders noted that the effectiveness of the PCN model was conditional on the availability of support services in the community: *"Where the system will fall down is if the police are getting that filled out and sending it off, but the structures behind it aren't robust enough to be able to support the families"* [Police Participant B]. Concerns about the availability of continued funding for services and the implications this would have for bereaved participants was echoed by stakeholders who noted that further funding and central coordination was needed for the PCN model to be sustained in the community. One stakeholder noted: *"We're looking at a sector here that is very stretched and very understaffed, a lot of our mental health sector down in this area. [We need] the resourcing to draw everyone else together"* [Stakeholder Participant F].

Discussion

This study sought to describe a novel community-led active postvention outreach intervention provided to individuals bereaved by suspected suicide. Results from the quantitative analysis provide key insights into the needs of individuals bereaved by suicide who received active outreach through the PCN model. Specifically, the present study found that between that for every suicide between 1 and 16 people were provided outreach from the PCN in the immediate aftermath of the suicide loss. The most common form of support provided to bereaved members of the community involved specialized postvention counseling, of which 92% attended at least one appointment. That between 1 and 16 individuals may benefit from proactive outreach may also have important implications for the planning and resources required to improve the reach of postvention services to those impacted by suicide in the community. This public health approach to postvention is warranted given previous research shows that 95% of bereaved individuals believe they need help accessing support, yet <50% of bereaved people actually receive it (20, 21, 23), despite multiple points of contact (e.g., from police, ambulance, funeral providers) in the immediate aftermath of a suicide (20, 21).

In the current study, participants who received support from the PCN model reported feeling a greater connection to their community, felt less isolation, and expressed that the intervention had the potential to prevent further deaths from occurring. Additionally, participants found that the practical support provided was highly beneficial (e.g., linking them to specialized postvention counseling, of which many bereaved participants did not know existed). Access to postvention counseling in the aftermath of a suicide loss has been identified as an essential need among individuals bereaved by suicide. Moreover, previous research conducted with people bereaved by suicide suggests that bereavement counseling and support groups is critical for recovery following a suicide loss (31). Despite this, previous studies indicate barriers such as lack of awareness of services, distance, cost and waitlist times can act as significant barriers to accessing support (23). Under the PCN model, barriers to help seeking are assessed during initial contact with bereaved individuals to facilitate better access to postvention services.

Previous studies report a positive association between a need for support and psychosocial complaints, trauma response, and complicated grief (20). In contrast, those who receive active postvention outreach, compared to passive postvention, show greater improvement in mental health and psychosocial outcomes (32, 33). For example, Gehrmann and colleagues found that individuals who received active postvention support reported significantly less suicidal ideation and social loneliness in the 12-months post-bereavement compared to those who sought support themselves (32). Moreover, being able to access support early after the loss also appears to be beneficial. Sanford and colleagues reported that those who recognize the need for help and obtain it earlier perceive greater benefit than those who access support later (33). Together, the findings from the present study provide further support outlining the benefits of an active-outreach approach to postvention for people in the community impacted by a suspected suicide.

In addition to supporting the needs of individuals bereaved by suicide, the present study found important secondary benefits for service providers in the community. It is well documented that police are frequently exposed to a range of occupational stressors including homicide, suicide and fatal accidents (34). These stressors place police at heightened risk for mental health morbidities, such as post-traumatic stress disorder and feelings of hopelessness, and suicidal ideation which can be exacerbated in working conditions where there is a perceived lack of support. In the present study, the PCN model was described by police as providing them with a sense of psychological comfort by allowing them to step away from a distressing situation knowing that individuals in distress would receive support within the next 24–72 h, should they need it. Additionally, police described these benefits to coincide with limited administrative burden, suggesting that the impact of the PCN model may be associated with wide reaching benefits within the community. These findings may underline the need of providing postvention training for first responders who are often exposed to suicide within their roles. A study by McDonnell and colleagues found that first responders trained in Postvention Assisting Those Bereaved by Suicide (PABBS) reported positive changes in knowledge, skills, and confidence in suicide bereavement (35).

Results from both the quantitative and qualitative findings provide further evidence that describe the practical needs of individuals during the immediate aftermath of a suspected suicide. Participants in our study received a wide range of postvention supports including education informing others about a suicide loss and referrals to suicide bereavement and specialist postvention counseling. Participants also received financial assistance, legal support, and transport assistance in addition to psychosocial support. It is noteworthy that many bereaved participants highlighted a need for peer support and long-term follow-up (e.g., at anniversaries and other important milestones) as areas of unmet needs. The potential benefits of peer support among people bereaved by suicide have been reported previously and include providing people with a chance to connect with others who have lived through similar or shared experiences (17). The unmet needs identified by participants in the present study provide important insights that could inform further service development of the PCN model in the PaRK region.

Taken together, the findings presented in the present study have important policy and practice implications for the design and delivery of postvention services more generally. Specifically, we show the benefits that may arise from establishing a collaborative pathway between police (or other first responders) and postvention services during the immediate aftermath of a suspected suicide. Importantly, the current study showed that the established referral pathway between police and the PCN was determined feasible with little administrative burden to first responders during a sudden death investigation. Second, the findings provide further support for a proactive outreach approach to postvention that provides practical support and in addition links individuals to specialist bereavement counseling. Lastly, individuals bereaved by suicide reported a need to connect with others who have lived experience of suicide themselves as well as opportunities for follow-up at different points during their bereavement journey. In response to this need, the PaRK suicide prevention response group has implemented a peer support program for individuals bereaved by suicide known as the Roses in the Ocean Peer CARE Companion program (36). This new peer support program has been implemented as a direct result of the current study, highlighting the benefits that can arise from program evaluation.

Limitations

Several limitations should be noted when interpreting the study findings. In the absence of a control group or longitudinal follow-up, it is not possible to determine whether the current model leads to better grief outcomes among individuals who received active postvention support compared to those who receive passive postvention or no support. Moreover, further investigations are needed to assess whether the PCN model is a sustainable postvention approach in other communities which have fewer services or lack the capacity (e.g., the presence of long waitlist times for support services) that may prevent them from meeting the needs of individuals impacted by suicide in the community. In the present study, perceived effectiveness was investigated through interviews without statistical support to corroborate the qualitative findings. Future research that seeks to understand the specific characteristics of individuals who receive support from the PCN model has the potential to assist with service provision and planning. Lastly, it is possible that some individuals received postvention support in response to a death that had been misclassified as a suspected suicide. National data on suicide statistics in Australia suggest approximately 6% of suicides are recoded following a coronial investigation (37).

Conclusion

The delivery of postvention support to people bereaved by suicide is a core component of suicide prevention strategies in Australia and internationally. The present study described the reach and perceived effectiveness of a novel community-led postvention intervention initiated by police following a suspected suicide. The results provide preliminary evidence supporting the perceived effectiveness of a proactive outreach approach that provides acute support to people bereaved by suspected suicide. The study highlights the importance of a public health approach to postvention that addresses the practical needs of individuals in addition to the psychological support to facilitate recovery in the immediate aftermath of a suicide loss.

Data availability statement

The datasets presented in this article are not readily available because of the sensitivity of these data and the pending coronial investigation. Requests to access the datasets should be directed to nicole.hill@telethonkids.org.

Ethics statement

The studies involving human participants were reviewed and approved by University of Western Australia Human Research Ethics Committee. The patients/participants provided their written informed consent to participate in this study.

Author contributions

NH was responsible for the study design, data collection, data analysis, data interpretation, drafting the manuscript, and revising the manuscript. RW was responsible for data collection, data interpretation, and drafting the manuscript. PA was responsible for generating the figures. HB, KA, ST, AW, PS, YP, and AL were responsible for writing the manuscript interpreting the results and providing methodological support. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2022.1040323/full#supplementary-material

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Wulf Rössler,
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REVIEWED BY
Carl Weems,
Iowa State University, United States
Abdolvahab Samavi,
University of Hormozgan, Iran

*CORRESPONDENCE
Wenjie Duan
✉ duan.w@outlook.com

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Assessing perceptions of resilience: The understanding from network analysis

Rong Liu[1] and Wenjie Duan[2]*

[1]Student Counseling and Mental Health Center, East China University of Science and Technology, Shanghai, China, [2]Social and Public Administration School, East China University of Science and Technology, Shanghai, China

Introduction: Previous studies have yet to reach a consensus on the construct of resilience perception, and how to enhance the effect of resilience intervention remains an urgent issue. In this consideration, this study examines the fundamental construct of resilience. It provides insight into the critical prevention goal for resilience intervention by utilizing the latest methods of psychological network analysis.

Methods: The sample is the graduate students enrolled in September 2021. Participants completed (1) the Connor-Davidson Resilience Scale, (2) the University of Washington Resilience Scale-8 Item, (3) the Brief Resilience Scale, and (4) the Resilience Scale for Adults, each representing different orientations of resilience.

Results: The network analysis grants greater clarity to the resilience perception as a dynamic system that interacts between an individual's tendency to intrinsic capacity and response to external resources. This study has shown that a positive perception of external social resources is the most important for individuals' resilience cognition; the effect of resilience intervention can be achieved more quickly by changing the individual's sense of hope.

Discussion: Based on the results, a psychometric instrument that integrates different orientations of resilience concepts and is based on time-varying needs to be developed.

KEYWORDS

resilience, multi-systems, psychometric, factor structure, network analysis

1. Introduction

The idea of resilience has become prevalent in international development (1) due to mounting global risks (2–4). The most typical study of resilience is the traumatic resilience research (5–7). Recently, researchers have realized that shifting from the focus on the traditional methods of psychological disorder treatment, such as posttraumatic stress disorder, to the maintenance of stress-related mental health is a promising strategy, which helps to narrow the prevention gap (8–11). Bonanno et al. (12) recommended that individual resilience has an important contribution to the prevention of anxiety and depression. Therefore, resilience is conceptualized as the maintenance or quick recovery of a healthy mental state during and after adversity (5, 11).

This study focuses on individual resilience perception assessment. The concept of resilience has been widely used in interdisciplinary research to deal with interference and change, involving psychological, social, ecological, economic, neurological, and biological categories (2, 13). The resilience science of dynamic multisystem emphasizes the interaction between system and individual (14). Liu et al. (15) presented a multisystem model of resilience (MSMR) to support the hypotheses of three systems. In this model, the innermost system includes health and health-related internal resources within the individual. The intermediate system reflects the individual's tendency and response to life and the external environment as a dynamic process bridging internal and external systems. The outermost system is the social and ecological resources of resilience that act as the external system. The perception of individual resilience is similar to the intermediate system, so we assume that the resilience structure includes the tendency to internal characteristics and the response to external resources. However, Windle et al. (16) noted that contemporary resilience questionnaires contribute minimally to predicting an individual's positive adaptation after adversity. Focusing on different facets of the resilience construct may be the cause of inconsistent resilience estimates (17). For example, the meta-analysis of resilience intervention measured by Liu et al. (18) showed that although these studies have achieved remarkable statistical results, the overall effects are limited. Therefore, how to enhance the effect of resilience intervention remains an urgent issue (19).

The critical to resilience as disease prevention may be the consistency in resilience estimates. The construct of resilience varies in its emphasis on capacity, process, outcome, and protective resources (20). Therefore, the existing scales with higher scores of individual resilience are selected to verify the most important structure of resilience and the relationship between them to better improve the effectiveness of resilience intervention. Capacity-oriented resilience is defined as a fixed individual characteristic, which helps to identify resilient qualities that facilitate recovery from adversity (21–24). The Connor–Davidson Resilience Scale (CD-RISC) is the representative psychometric sound scale for capacity-oriented resilience (25). It has shown good validity and reliability in America (25), Africa (26), and China (27). Although satisfactory psychometric properties were reported, the construct validity of resilience has always been a controversial issue (28). Process-oriented resilience focuses on the specific reaction and response process when an individual is threatened (29). This approach to resilience attempts to answer the question of "how resilient qualities are acquired" (21, 30). The University of Washington Resilience Scale-8 Item (UWRS-8) is a more recent questionnaire calibrated to modern psychometric methods with scores on a T-metric (31). The UWRS-8 has been verified by validity and reliability in American (31) and international samples (51.4% Europe, 30.4% America, and 18.2% others) (32) but is lacking for Chinese samples. Outcome-oriented resilience concerns whether individuals have recovered from adversity and exhibited positive adaptation (33). In other words, it primarily focuses on the binary question of whether adversity has been overcome (20). The Brief Resilience Scale (BRS) is the representative psychometrically sound scale for outcome-oriented resilience (34). It has been verified by good validity and reliability in America (34) and China (35), and psychometric properties were reported. Unlike the orientations discussed above, protective resources-oriented resilience is viewed from outside an individual's interpersonal and social environment (14). It highlights an individual's interdependence with the various systems in his or her life (14). The Resilience Scale for Adults (RSA) is the representative psychometric sound scale for protective resources-oriented resilience (36). It has been verified by validity and reliability in Norway (36), Africa (37), and China (38). Although satisfactory psychometric properties were reported, the construct validity of resilience has always been a controversial issue.

Studies have increasingly shown that traditional approaches are limited in verifying the multifactor resilience scale (39). The current studies cannot fit the prediction of resilience because they are limited by traditional assumptions, that is, resilience is not a dynamic adaptation system but is measured as a stable trait (11). Psychopathological network analysis provides a new method for explaining the complex dynamics of mental health (40). Contrary to the traditional accounts that view an episode of disorder as a potential and unobservable disease entity, network analysis considers an episode as the causal interactions between its symptom elements, directly reflecting the psychological process of individuals in nature (41–46). For example, Bringmann et al. (47) uses network analysis to dynamically assess the depressive symptoms of patients during 14 weeks of treatment, revealing more clearly the direct and indirect connections between symptoms through time-dependent patterns. Network analysis can identify the core projects that make it possible to develop more effective treatment strategies by examining the centrality of symptoms and community structures.

For the present study, the long-term adverse risks to people's mental health, such as anxiety and depression, have increased remarkably with the spread of the COVID-19 pandemic, making mental illness a more serious influence on individual and even public health (48, 49). In accordance with the Report on National Mental Health Development in China (2019–2020), the average level of anxiety among young adults aged 18–34 is remarkably higher than in other age groups. Evans et al. (50) pointed out that graduate students are more than six times more likely to experience depression and anxiety than ordinary people. In 2019, Nature magazine surveyed 6,300 early professional researchers in various scientific fields around the world, and more than 36% of the respondents sought help due to anxiety and depression caused by overwork, the economy, imbalance, and future uncertainty. It also showed another aspect of stress, namely, greater personal satisfaction and resilience in this context (51). Thus, we choose this group to investigate the structure and important nodes of resilience to better understand the perceptions of individual resilience. First, we will measure the resilience of the four networks.

TABLE 1 Psychometric properties for resilience scales and subscales (N = 1,896).

	Items	M	SD	Range	Cronbach's α
Tenacity	13	28.27	5.088	8–40	0.90
Strength	8	29.89	4.278	8–40	0.76
Optimism	4	15.26	2.639	4–20	0.72
UWRS-8	8	30.78	4.863	8–40	0.90
BRS	13	21.08	3.435	7–30	0.71
Perception of self	6	30.94	5.257	8–42	0.75
Planned future	4	20.71	4.417	4–28	0.80
Structure style	4	20.93	3.752	10–28	0.55
Social competence	6	30.31	6.032	9–42	0.75
Family cohesion	6	32.95	6.123	6–42	0.79
Social resources	7	41.61	6.105	13–49	0.81

Tenacity, strength, and optimism are the three subscales of CD-RISC that represent the capacity-oriented resilience, UWRS-8 and BRS are unidimensional scales that separately represent the process-oriented and outcome-oriented resilience. Perception of self, planned future, structure style, social competence, family cohesion, and social resources are the six subscales of RSA that represent the protective resources of resilience.

TABLE 2 Bivariate correlations (Pearson's r) among resilience variables ($N = 1,896$).

	1	2	3	4	5	6	7	8	9	10	11
1. Tenacity	1										
2. Strength	0.870**	1									
3. Optimism	0.662**	0.706**	1								
4. UWRS-8	0.743**	0.732**	0.589**	1							
5. BRS	0.601**	0.587**	0.464**	0.631**	1						
6. Perception of self	0.605**	0.587**	0.528**	0.604**	0.627**	1					
7. Planned future	0.550**	0.525**	0.526**	0.539**	0.508**	0.671**	1				
8. Structures style	0.313**	0.342**	0.383**	0.351**	0.361**	0.463**	0.510**	1			
9. Social competence	0.478**	0.504**	0.481**	0.433**	0.410**	0.509**	0.458**	0.385**	1		
10. Family cohesion	0.297**	0.308**	0.307**	0.317**	0.309**	0.392**	0.406**	0.336**	0.426**	1	
11. Social resources	0.422**	0.426**	0.457**	0.415**	0.408**	0.513**	0.516**	0.417**	0.535**	0.599**	1
M	28.27	29.89	15.26	21.08	30.78	30.94	20.71	20.93	30.31	32.95	41.61
SD	5.088	4.278	2.639	3.435	4.863	5.257	4.417	3.752	6.032	6.123	6.105
Cronbach's α	0.901	0.764	0.720	0.708	0.900	0.753	0.799	0.554	0.753	0.787	0.808

$^{**}p < 0.01$.

We will then evaluate the complex network that integrates the four different resilience measurements (1) to investigate whether the construct compared with the network is consistent with the hypothesis, (2) to explain the resilience structure and the relationship between them, and (3) to find the key prevention goal for resilience intervention.

2. Method

2.1. Participants and procedure

This study selected Chinese graduate samples. In accordance with 3.77 million graduate students enrolled in 31 provinces and municipalities throughout the country in 2021, the proportion of students enrolled in the eastern, central, and western regions of China is 51: 30: 19 (52). This study used stratified sampling to extract 1,275 people from the eastern region, including Beijing, Shanghai, Guangdong, and other 11 provinces and municipalities; 750 people in the central region, including eight provinces, such as Shanxi, Jilin, and Heilongjiang; 475 people in the western region, including 12 provinces and municipalities, such as Inner Mongolia, Guangxi, and Chongqing, and conducted an online questionnaire survey on the research samples from September to October 2021. Data sieving: insufficient effort response and response time analysis were used to avoid statistically and significantly biased estimates and invalid inferences. Participants included 1,896 graduate students (male = 956, female = 940; mean age = 22.74, SD = 1.215, range = 20–27). Detailed demographic information can be found in Table 1. All participants completed the four scales: the CD-RISC, the UWRS-8, the BRS, and the RSA. All analyses were run on Jeffreys' Amazing Statistics Program. More information can be found in Love et al. (53). The Human Subjects Ethics Subcommittee has approved this study.

2.2. Measures

2.2.1. CD-RISC

The capacity of resilience was measured by the CD-RISC comprising 25 items. Each item was scored from 0 ("not true at all") to 4 ("true nearly all of the time"). A higher aggregate score indicated greater resilience. A previous study demonstrated good internal reliabilities in the American population of graded prevention (Cronbach's α higher than 0.89) (25). The Chinese version demonstrated satisfactory consistency (Cronbach's $\alpha = 0.60$–0.88) in the general population among different ages; however, the factor constructs were modified as "tenacity," "strength," and "optimism" (27). In this study, the scale has good internal reliability of the three-factor construct in university samples (Cronbach's $\alpha = 0.72$–0.93).

2.2.2. UWRS-8

The process of resilience was measured by the UWRS-8 comprising 8 items (31). Each item was scored from 1 ("not at all") to 5 ("very much"). A higher aggregate score indicated greater resilience. A previous study demonstrated good internal reliability in the physically disabled and the general population in the USA (Cronbach's α higher than 0.8) (31). The Chinese version has not been tested. In this study, the scale has good internal reliability in university samples (Cronbach's $\alpha = 0.9$).

2.2.3. BRS

Resilience outcomes were measured by the BRS (34) comprising six items. Each item was scored from 1 ("strongly disagree") to 5 ("strongly agree")—the reverse coding items were 2, 4, and 6. A higher aggregate score indicated greater resilience. A previous study demonstrated good internal reliability and test-retest reliability in the patients and general population in the USA (Cronbach's $\alpha = 0.80$–0.91, $r = 0.69$) (34). The Chinese sample demonstrated satisfactory

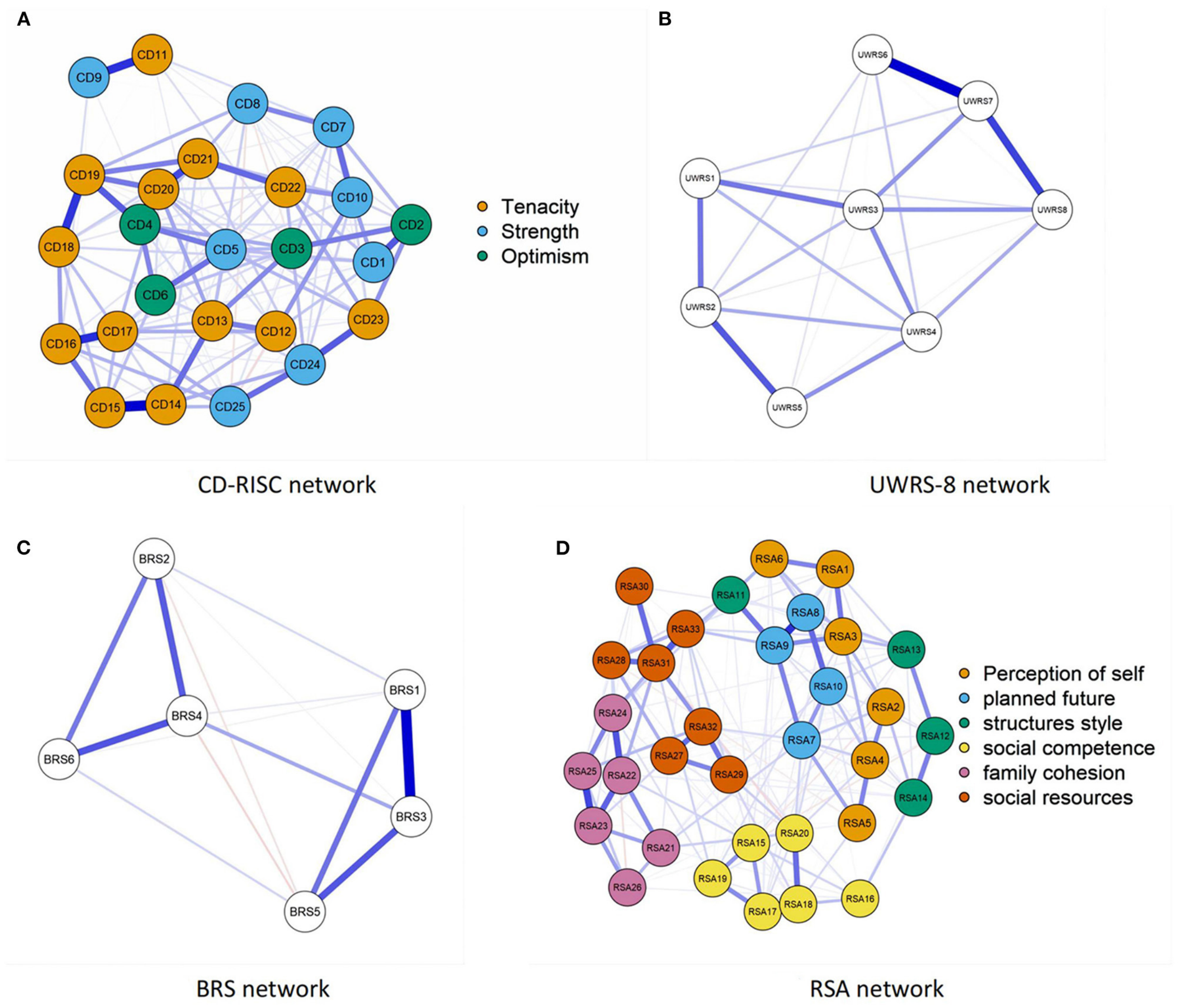

FIGURE 1
Structure of factors' network of resilience as measured by four single scales. **(A)** CD-RISC network. **(B)** UWRS-8 network. **(C)** BRS network. **(D)** RSA network.

consistency (Cronbach's $\alpha = 0.71$) and good validity (35). In this study, the scale has good internal reliability in university samples (Cronbach's $\alpha = 0.708$).

2.2.4. RSA

The protective resources of resilience were measured by the RSA (36, 54) comprising 33 items that assessed five general resilience protective resources. Each item was scored from 1 ("not true at all") to 5 ("true nearly all of the time")—the reverse coding items included 16 items. A higher aggregate score indicated greater resilience. A previous study demonstrated good internal reliability in patients with psychiatric diagnoses in Norway (Cronbach's α higher than 0.8) (54). The Chinese version showed satisfactory consistency reliability (Cronbach's $\alpha = 0.76$ to 0.87) and good validity (38). In this study, the scale has good internal reliability of the three-factor construct in university samples (Cronbach's $\alpha = 0.55–0.81$).

The network consists of nodes and edges, where the nodes indicate the research object, and the edges indicate the connections between nodes, similar to the neurons in the neural network. The strength centrality is the number of edges connecting it to other nodes in the network, which represents the most critical node. The betweenness centrality is the number of times that a node appears on the shortest path between two other nodes. If it is removed, then it will decrease the speed of network transmission. The closeness centrality is the average distance between it and all other nodes in the network, which can be transferred information to other nodes in the network more quickly (41, 55).

3. Results

3.1. Descriptive and correlation statistics

Mean, standard deviation, range, and Cronbach's α values are provided in Table 1. In this study, the four scales have shown good internal reliability (CD-RISC = 0.72–0.90; UWRS-8 = 0.90; BRS = 0.71; RSA = 0.55–0.81). Tenacity, strength, and optimism are

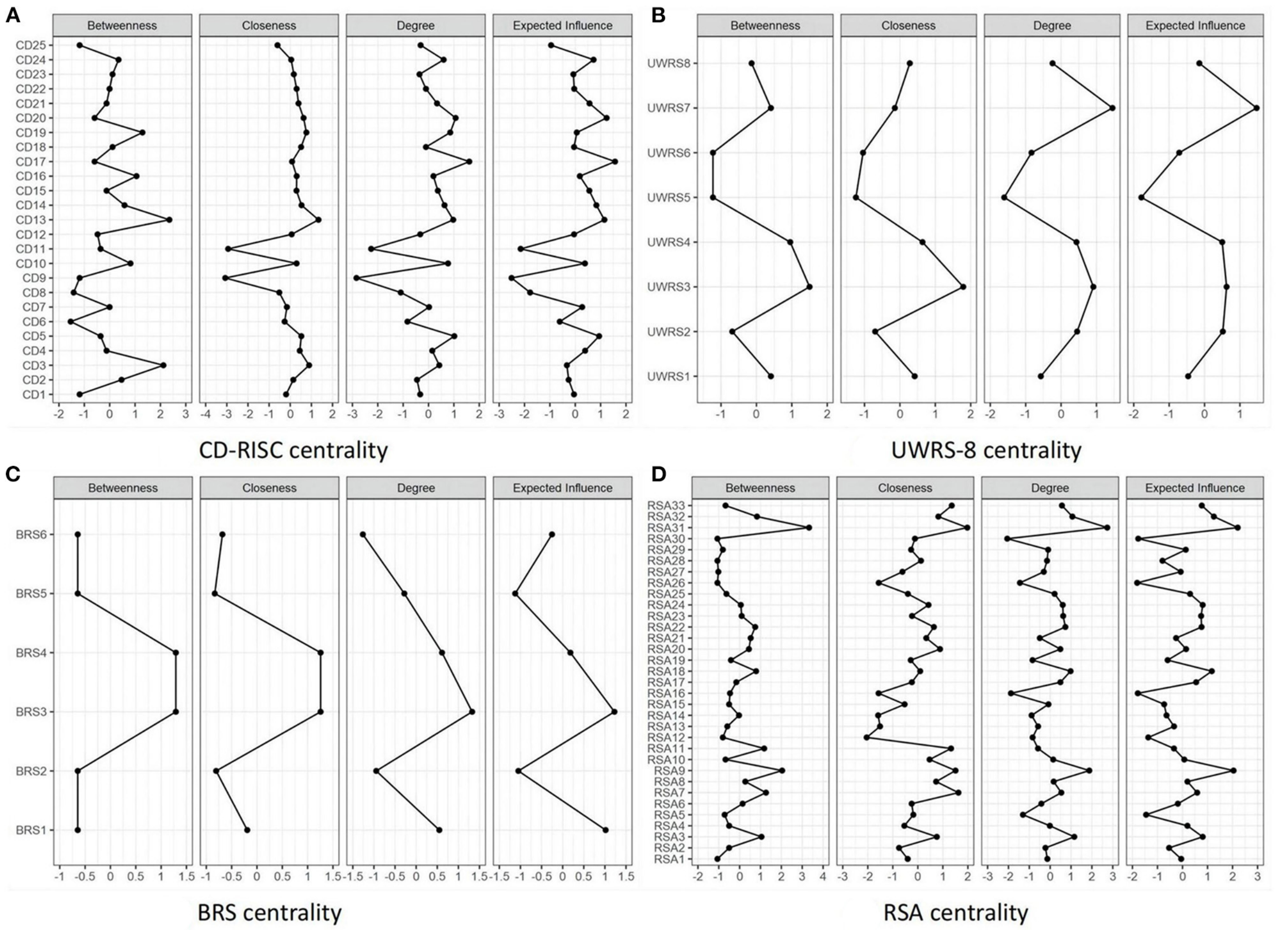

FIGURE 2
Centrality network of resilience as measured by four single scales. **(A)** CD-RISC centrality. **(B)** UWRS-8 centrality. **(C)** BRS centrality. **(D)** RSA centrality.

the three subscales of CD-RISC, and perception of self, planned future, structure style, social competence, family cohesion, and social resources are the six subscales of RSA. The BRS, the UWRS, and the subscales of CD-RISC and RSA have a high correlation with each other in Table 2.

3.2. Network analysis of a single scale of resilience

The network analysis structure of the four facets of resilience assessed using CD-RISC, UWRS-8, BRS, and RSA are shown in Figures 1A–D, respectively. The CD-RISC [CD1–CD25, (a)], the UWRS-8 [UWRS1–UWRS8, (b)], the BRS [BRS1–BRS6, (c)], and the RSA [RSA1–RSA33, (d)] show four different orientation resilience network analysis structures. Positive correlation between nodes is expressed by blue lines, negative correlation by red lines, and correlation intensity by edge thickness and brightness. The centrality of each scale of the resilience network can be found in Figures 2A–D. The (a) CD-RISC centrality, the (b) UWRS-8 centrality, the (c) BRS centrality, and the (d) RSA centrality show four different orientation resilience network centralities, including node strength, closeness, and betweenness.

For the CD-RISC network, the constructs of resilience representing the three-domain networks did not perform as expected. The highest node strength was CD17 (Think of self as a strong person), and the lowest was CD9 (Have to act on a hunch). CD13 (Past success gives confidence for a new challenge) had the highest node closeness and betweenness, node closeness was the lowest for CD9 (Have to act on a hunch), and node betweenness was the lowest for CD6 (See the humorous side of things).

For the UWRS-8 network, the highest node strength was UWRS7 (When something stressful happens, I keep going), and node betweenness and closeness were the highest for UWRS3 (When I experience a setback, I keep moving forward). By contrast, node strength, betweenness, and closeness were the lowest for UWRS5 (During stressful times, I am usually calm and relaxed).

For the BRS network, BRS3 (It does not take me long to recover from a stressful event) and BRS4 (It is hard for me to snap back when something bad happens) had the highest node strength, betweenness, and closeness, and BRS3 had the highest node strength. Contrarily, BRS6 (I tend to take a long time to get over setbacks in my life) had the lowest node strength, and node closeness was the lowest for BRS5 (I usually come through difficult times with little trouble).

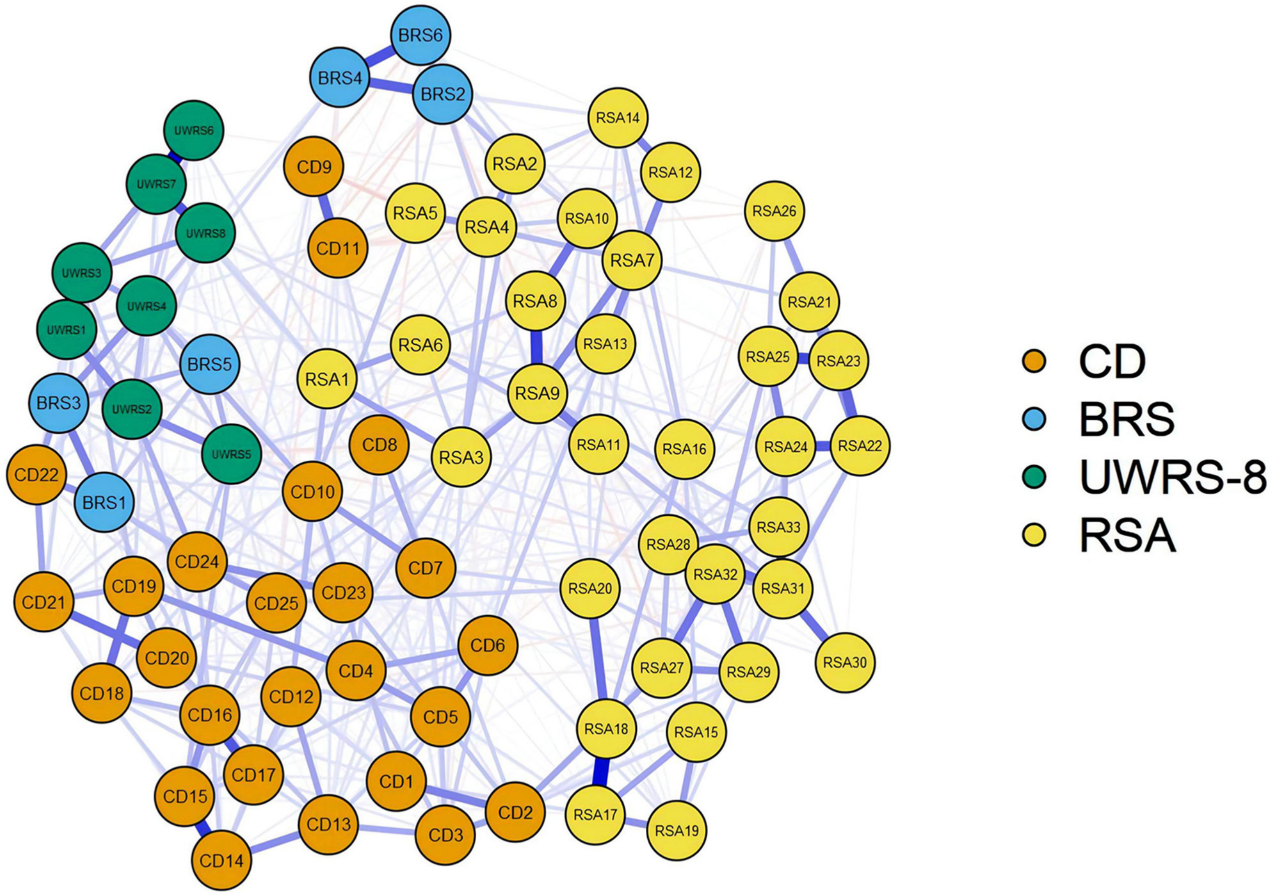

FIGURE 3
Resilience structure network analysis of CD-RISC, UWRS-8, BRS, and RSA.

For the RSA network, the resilience network showed that the constructs of resilience were unstable in the six-domain network, and the three factors were mixed. The node with the highest node strength, betweenness, and closeness was RSA31 (I get support from friends/family members), node strength and betweenness were the lowest for RSA30 (When a family member experiences a crisis/emergency I am informed right away), and node closeness was the lowest for RSA12 (When I start on new things/projects, I rarely plan, just get on with it).

3.3. Resilience construct network analysis of CD-RISC, UWRS-8, BRS, and RSA

The four combined network analysis structures with different orientations of resilience are shown in Figure 3 to investigate resilience as measured by the four scales of the CD-RISC, UWRS-8, BRS, and RSA, representing capacity, process, outcome, and protective resources of resilience, respectively The centrality of the four different orientation resilience combined network can be found in Figure 4.

For the combined network, the CD-RISC and RSA were connected and relatively independent, and the nodes of UWRS and BRS were confused with other constructs of resilience. The node strength was the highest for RSA31 (I get support from friends/family members) and RSA9 (I feel that my future looks very promising), and betweenness was the highest for RSA31 (I get support from friends/family members) and RSA9 (I feel that my future looks very promising). The node with the highest closeness was RSA9 (I feel that my future looks very promising) and RSA3 (Belief in myself gets me through difficult periods). Positive associations emerged between UWRS4 (Although I feel bad sometimes, I usually bounce right back) and CD10 (Can handle unpleasant feelings), UWRS2 (When something happens that makes me feel stressed, I usually calm down quickly) and CD24 (Under pressure, focus and think clearly), and CD2 (Close and secure relationships) and RSA27 (I can discuss personal issues with No one).

4. Discussion and applications to practice

This research aims to examine whether the structure of resilience is consistent with the hypothesis and find the key prevention goal from the network analysis. Compared with the limitations of the traditional approaches (56), the proposed method performed better in capturing the true construct of resilience. The network analysis is a breakthrough in methodology and development theory, which provides reliable and effective resilience measurement methods that

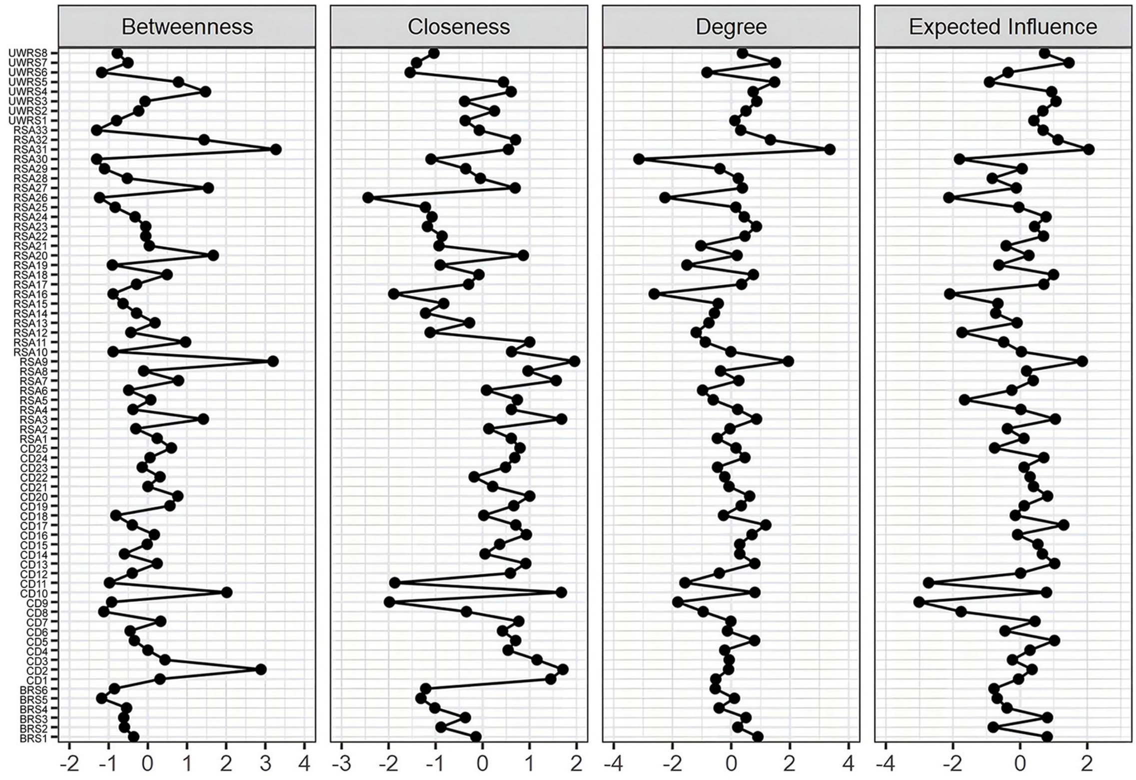

FIGURE 4
Centrality network analysis of CD-RISC, UWRS-8, BRS, and RSA.

enable us to achieve more accurate results in personalized treatment (57–59). This study demonstrated that the resilience structure of capacity and protection resources is obvious. A high correlation is observed between the four scales, so its capacity and protective resources of resilience are interrelated rather than heterogeneous. The results support the MSMR theoretical model that the structure of individual resilience perception is not capacity, process, outcome, and resource (15), but a state of mind that interaction between individual's tendency to intrinsic capacity and response to external resources (60). Resilience is an adaptive process of fluidity and interaction rather than an individual characteristic (57).

Protective resources-oriented resilience is considered a decisive factor in the resilience structure. The highest nodes of strength, closeness, and betweenness were found in the RSA, which represented resilience to external responses, including access to external support, services, and environmental resources (15). However, how to enhance the effect of resilience intervention remains an urgent issue. Kalisch et al. (61) proposed a unified theoretical framework for neuroscience research on general resilience mechanisms. The positive appraisal style is a key resilience mechanism through which all resilience factors converge and affect resilience. The highest node of strength is RSA31 (I get support from friends/family members). Studies have shown that individuals' positive perception of external social resources, such as the belief that they can get social support, is the most important for individuals' resilience cognition (62). The highest node of closeness is RSA9 (I feel that my future looks very promising) and RSA3 (Belief in myself gets me through difficult periods). Positive perceptions of future outcomes indicate that they will have positive experiences or potential negative situations will not occur, and that individuals think of their ability to cope with the aversive situation. When the two aspects change, individuals can adapt to the current obstacles more quickly (63, 64). Hope theory demonstrates that one's perception of the ways to overcome obstacles and the motivation to use these ways to achieve goals plays an important role in the adaptive response to obstacles (65).

However, this study has some limitations. First, this study only delved into the structure of resilience by collecting existing scales that abstract resilience into potential variables developed using traditional measurements. A new psychometric instrument is needed to depict resilience factors directly. For instance, the hybrid symptom-and-resilience factor models proposed by Kalisch et al. (60) directly introduce the resilience factors into the mental symptom network, deconstruct resilience into entities, and maintain individual mental health by weakening the interconnection of symptoms. The resilience network can better explain the dynamics of mental health maintenance in the process of stress exposure. Second, a tool that can identify the time-varying efficiency of resilience factors must be developed to study the dynamic characteristics of individual networks. Previous and current studies usually infer from the cross sectional analysis at the group level. In accordance with ecological fallacy theory, the pattern at the group level may be completely different from that at the individual level even if individuals are homogeneous (66, 67). Therefore, cross sectional analysis cannot capture the psychological process' variables and time-varying natural attributes (55). Previous studies showed that network analysis can better describe the process of time-varying external influence and internal interaction. For instance, the multilevel vector autoregressive time-series model has been able to evaluate how variables change with time in the same measurement window and predict each other at the previous and next point in time (55, 68–70). Thus, the new measurement can enable resilience intervention efficacy. Third, this study did not explore how variables external to the network itself affect network dynamics. The interaction between individuals and the external environment (person-in-situation) must be explained. Finally, the sample of the findings is Chinese college students of the general population: the sample did not include those who experienced past trauma. Therefore, future studies should investigate the resilience of different groups to verify the accuracy of this study's results.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by the Human Subjects Ethics Sub-Committee of East China University of Science and Technology. The patients/participants provided their written informed consent to participate in this study.

Author contributions

RL: conceptualization, data curation, formal analysis, investigation, visualization, and writing-original draft. WD: conceptualization, methodology, project administration, supervision, validation, and writing—review. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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EDITED BY
Wulf Rössler,
Charité Universitätsmedizin Berlin, Germany

REVIEWED BY
André Nienaber,
University Psychiatric Clinic Basel, Switzerland
Mary V. Seeman,
University of Toronto, Canada

*CORRESPONDENCE
Philine Fabel
✉ philine.fabel@oberhavel-kliniken.de

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Treatment with Soteria-elements in acute psychiatry—Effectiveness for acutely ill and voluntarily treated patients

Philine Fabel[1]*, Theresa Wolf[1], Helena Zyber[1], Julian Rubel[2] and Maria C. Jockers-Scherübl[1]

[1]Department of Psychiatry and Psychotherapy, Academic Teaching Hospital of the Charité Berlin, Oberhavel Kliniken GmbH, Hennigsdorf, Germany, [2]Department of Psychology and Sports Sciences, Justus-Liebig-University Giessen, Giessen, Germany

Objective: This article aims at evaluating the treatment outcomes of acute psychiatric patients before and after the implementation of Soteria-elements in an acute psychiatric ward. The implementation process resulted in an interconnected small locked and much larger open area, enabling continuous milieu therapeutic treatment by the same staff in both areas. This approach enabled the comparison of structural and conceptual reconstruction regarding treatment outcomes of all voluntarily treated acutely ill patients before (2016) and after (2019). A subgroup analysis focused on patients suffering from schizophrenia.

Methods: Using a pre-post design, the following parameters were examined: total treatment time, time in locked ward, time in open ward, antipsychotic discharge medication, re-admissions, discharge circumstances, and treatment continuation in day care clinic.

Results: Compared to 2016, there was no significant difference in the total time of stay in the hospital. However, data show a significant decrease of days spent in locked ward, a significant increase of days in open ward, a significant increase of treatment discontinuation but without an increase of re-admissions, and a significant interaction of diagnosis and year regarding the medication dosage, resulting altogether in a reduction of antipsychotic medication for patients suffering from schizophrenia spectrum disorder.

Conclusion: The implementation of Soteria-elements in an acute ward facilitates less potentially harmful treatments of psychotic patients, likewise enabling lower dosages of medication.

KEYWORDS

Soteria, acute psychiatry, schizophrenia, inpatient treatment, medication dosage

1. Introduction

Based in the movement of anti-psychiatry in the 1960's, Lauren Mosher provided an alternative to the traditional psychiatric treatment of patients suffering from schizophrenia by establishing the first Soteria House in the 1970's in San Francisco. Mosher and colleagues aimed to implement a treatment, which instead of the traditional medical understanding of illness and treatment was based on a psychosocial approach (1, 2). This included not only an abandonment of the complex wards and authoritarian social structures often found in traditional psychiatry at that time. Mosher and colleagues created a space for six selected patients (first psychotic episode, age between 14–30 years), who were treated in a community house with their own room, high-frequent care by medical laymen and without any antipsychotic medication (2).

Luc Ciompi adapted the idea and founded the Soteria Bern in 1984. Since Ciompi postulated stress as an important factor causing psychotic episodes in his theory of affect logic (3), all treatment interventions aimed at a maximum reduction of stress and were supposed to take place in a normal, non-psychiatric setting (4). Thus, he created eight treatment principles, that required (1) a small, stress reducing and transparent milieu, (2) high-frequency care during the psychotic episode ("being with"), (3) conceptual and personal continuation during the treatment, (5) close cooperation with family and relatives, (5) transparent communication between the patient, family and staff regarding the disease, treatment, risks and chances, (6) elaboration of realistic common goals and perspective with patient and relatives, (7) the least possible dosage of antipsychotic medication, with the goal of the patient's controlled self-medication and (8) outpatient after care and relapse prevention for at least 2 years (4). The original concept of Soteria treatment was specifically designed for patients suffering from psychotic disorders.

The empirical evidence of the effectiveness of Soteria-treatment regarding equivalent or better outcomes of patients is still poor (4). Bola and Mosher conducted the most detailed analysis in 2003 (1, 5), showing in a randomized controlled trial (RCT), that Soteria-patients showed equivalent or better outcomes after a 6-week-treatment without medication, compared to patients treated as usual. Even within a 2-year follow-up period, there were small to medium effects in the general functioning level (1). Ciompi et al. (6) showed similar outcomes in Soteria-patients with no or low dosage of antipsychotic medication compared to patients treated as usual in a 2-year follow-up period, even though this finding is based on a small sample size of index-patients ($n = 14$). Further research is based on qualitative analysis (4, 7, 8), getting to similar results of comparable outcomes between Soteria- and standard-care patients. There appears to be an agreement about the need for more empirical analysis of the effectiveness of Soteria-treatment as an alternative to standard care.

To evaluate the impact of the Soteria-concept, its limits have to be taken into account. In the traditional concept, the treatment was only offered to selected patients, also not all of them could be held in the Soteria (since the foundation of Soteria Bern, 10–15% of a total of around 2,000 treated patients had to be transferred to regular care because of reduced controllability; 3, 4). In the 1990's, first attempts were made to establish the Soteria idea in acute regular care. The Westfälische Klinik Gütersloh was the first hospital trying to integrate the principles of Soteria-treatment in acute regular care by implementing both structural (i.e., ward with open door, combined living room and kitchen, soft room, continuous treatment staff) and conceptual (i.e., negotiating instead of treating, low dosage application of antipsychotics, "being with," abandonment of coercive measures) changes. In qualitative accompanying research, a change in the ward atmosphere, growing acceptance by patients and relatives as well as a notable reduction of coercive measures [10% compared to other wards; (2, 9)] were observed. Unfortunately, there are no empirical data available and due to changes in administration, the concept in Gütersloh could not be continued.

There are numerous initiatives to offer Soteria-treatment to a larger number of patients in Europe, where the patients are selected (e.g., Soteria Bern, Soteria Berlin, Soteria Klinikum München-Ost, Soteria im Zentrum für Psychiatrie Reichenau, Soteria an der Münsterklinik Zwiefalten, also see https://Soteria-netzwerk.de/Soteria-einrichtungen). To our knowledge, the acute psychiatric ward with Soteria-elements in Hennigsdorf (Oberhavel Kliniken) is the only one in Europe in acute regular care. It is also the only ward for acutely ill psychiatric patients in the Hennigsdorf hospital (other than the geropsychiatric ward). A transfer to other wards in case of reduced controllability is thus not possible. Previously published data (10) demonstrated a significant benefit for legally accommodated patients treated with Soteria-elements in acute care in the Oberhavel Klinik Hennigsdorf. The present article however, focusses on the effect of Soteria-elements in acute care on all patients in the same acute ward, who were treated voluntarily and who constitute the vast majority. Further subgroup analysis focusses on all the schizophrenic patients who were treated in our hospital in 2016 and 2019 on a voluntary basis, thereby comparing the treatment outcomes before and after the implementation of Soteria-elements.

2. Methods

2.1. Implementation of Soteria-elements in acute care in the Oberhavel Klinik Hennigsdorf

In 2017, the acute ward of the hospital with 24 beds and optionally closed door was spatially and conceptually restructured into a ward with Soteria-elements with the aim to offer a disorder specific treatment for psychotic patients on the acute psychiatric ward. Soteria is Greek for salvation, safety, deliverance. Soteria treatment in acute care is supposed to be carried out in a small, stress reducing milieu that promotes interpersonal contacts and enables an individual companionship during the psychotic episode ["being with"; (11)]. To implement the Soteria-elements, major spatial and conceptual changes were made. After the re-opening in 2018, the acute psychiatric ward with Soteria-elements comprises a larger open area with 15 beds and a small protected area with 6 beds. Since the two areas are interconnected, it is possible for the patients to switch between those two areas according to their individual needs (i.e., as soon as someone was able to keep to agreed conditions, a transfer to the open area of the ward took place), allowing treatment continuation by the same members of the therapeutic team. A return to the open ward can take place gradually (e.g., temporarily spending the nights in the protected area and still being part of the larger patients' community in the open area).

The fundamental conceptual changes made were based on the criteria for "ward with Soteria-elements" of the Soteria Fidelity Scale (12). Major changes include the establishment of milieu therapy in everyday treatment. This required a development of the staff's attitude toward the patients in establishing a recovery-oriented mindset, which implies an accepting, supportive and less hierarchical mind-set toward the patients. High frequent de-escalation trainings were conducted. Antipsychotic drug treatment is discussed and agreed upon in an open dialogue with the patients. The staff is meant to support and accompany the patient throughout the psychotic episode and to help find a meaning in the individual experience. A crucial element of Soteria-treamtent is "being with" – the continuous companionship during the acute psychotic episode. Therefore, substantially/up to 4 times more group therapy was implemented into the schedule to guarantee more than 50% of working hours directly with the patients. Besides disorder specific group therapies there are numerous occupational therapies in the open and protected area of the ward to train everyday skills and improve cognitive abilities and social skills. A large dining area for all patients enables interpersonal encounters and milieu therapeutical offers. Daily breakfast, lunch and dinner is planned, prepared and consumed by the patients and staff together. Since there are still other acute patients on the acute psychiatric ward, time with the patients must be planned—in contrast to traditional Soteria houses. Therefore, daily group therapies are defined in the therapy plan. Patient participation is always agreed on individually according to the current abilities and needs. In the same manner, a voluntary shift between the open and protected area is discussed with the patient and the team.

Multi-professional working group meetings monitoring the process took place weekly. Frequent internal and external trainings as well as external supervision were provided. There was no change in the ward's and hospital's senior staff. Professional exchange with colleagues from the above-mentioned Soteria facilities supported the process.

Relapse prevention is given by the admission to the hospital's psychiatric outpatient clinic and close cooperation with local social organizations. The structures of our other inpatient wards and day-care clinics remained essentially the same. However, in the same year, an additional ward for psychotherapeutic crisis intervention was established in the hospital, focusing on short term interventions, predominantly for patients with borderline personality disorders and PTSD and the like.

The Hennigsdorf Hospital is part of the Oberhavel Hospitals. The Department of Psychiatry and Psychotherapy offers a total of 101 beds and 57 day-care clinic places at the locations Hennigsdorf, Oranienburg and Gransee as well as a large outpatient clinic. The department is responsible for the psychiatric treatment in the Oberhavel catchment area, which is located in the federal land of Brandenburg in the North of Berlin and has a population of about 202,000. The treatment offered comprises a disorder-specific group therapy concept and, additionally to the acute ward with Soteria-elements and the abovementioned ward for crisis intervention, there is an interdisciplinary geropsychiatric ward, a ward specifically treating affective disorders, and a ward for addiction and comorbid disorders. This conceptual re-organization allows a treatment with focus on the specific disorders. Thus, patients with an acute psychotic disorder (legally accommodated patients according to state law or legal guardian law as well as help-seeking patients on a voluntary basis) in the Oberhavel catchment area can thus be treated in a small sized acute ward with Soteria-elements. Since it is the only acute psychiatric ward of the catchment area, patients with other severe mental health crises are admitted, too, following the platform model (13). Nevertheless, the aim of the reconstruction was the specification of treatment interventions for a relatively homogenous group of patients with psychotic disorders. This complies with the concept of Mosher, who developed the Soteria-treatment specifically for psychotic patients. The Soteria Fidelity Scale (12) demands a majority of psychotic patients for wards with Soteria-elements.

2.2. Evaluation of the implementation

In June 2018 the acute care ward with Soteria-elements was opened after the implementation and was officially recognized as a "ward with Soteria-elements." The acknowledgment took place by the evaluations using the Soteria Fidelity Scale (12) comprising the dimensions "spatial setting," "care team," "treatment setting" and "Soteria everyday life." In addition, the International Working Group Soteria (IAS), including professor Luc Ciompi, came for an audit to our hospital to evaluate the implementation. This resulted in their classification as recognized an acute psychiatric ward with Soteria-elements (also see https://soteria-netzwerk.de/soteria-einrichtungen).

The effect of the implementation of Soteria-elements in the acute ward in Hennigsdorf Oberhavel Kliniken on the treatment outcomes was evaluated regarding the total treatment duration, the treatment time in the protected and open areas of the ward, the medication dosage, the number of stays per year ("revolving door effect"), the discharge circumstances, and the transfer to day-care clinic. The object of this study is the evaluation of implementation of Soteria-elements in an acute psychiatric ward mandated to provide regional healthcare service. Additionally, the aim is to provide new insights into the effectiveness of Soteria-treatment for patients suffering from schizophrenia and psychotic disorders. Thus, the following analyses refer to all the voluntarily treated patients overall, as well as to the relevant subgroup.

2.3. Data analysis

Data were gathered *via* the hospital's internal information system and extracted from the discharge letters, complemented by the daily documentation records. When admitted to hospital voluntarily patients sign a treatment contract containing the approval of the retrospective evaluation of clinical outcome in a pseudonymised way. Collected data of all the patients admitted to the acute psychiatric ward between 1st of January and 31st of December in 2016 (t0, before the reconstruction) and 2019, (t1, after the reconstruction) respectively, have been analyzed in a pre-post design. The following dependent variables were examined: duration of total stay, duration of voluntary stay in the protected area, duration of stay in the open area, neuroleptic dosage measured *via* chlorpromazine equivalents (CPZE, based on Benkert and Hippius, 14), number of stays per year ("revolving door effect"), discharge circumstances, and transfer to day-care clinic. The data processing was carried out anonymously.

Data gathering was run with Microsoft Excel and the statistical analysis with IBM SPSS 22.0. The research focused on group differences between t0 (2016) and t1 (2019). Therefore, uni- or multivariance analysis of variances (ANOVA or MANOVA) were run for metric dependent variables, Bonferroni adjusted for multiple testing. Since none of the dependent variables were normally distributed and there were several outliers and multivariate outliers, Kruskal-Wallis test was used for non-parametric testing. To evaluate the effect of implementation of Soteria-elements in the acute ward, those patients with a total stay-duration of <24 h (mostly intoxicated patients admitted for one night) were excluded from the analysis as it must be assumed that those patients could not have benefitted from the therapeutical concept. Other outliers regarding treatment time or medication dosage were not excluded from the analysis since the data represent the realistic care situation in an acute psychiatric ward, where the treatment with Soteria-elements is supposed to apply. Excluding these elements would diminish the external validity. Even though ANOVA is shown to be robust against the violation of normally distributed data (14–16), Kruskal-Wallis tests were used to test for effect consistency. Since non-parametric testing showed robust directions of all the effects, results of parametric analysis are reported**.** Differences in categorical variables were tested *via* chi² tests. To keep the analysis straightforward we analyzed the outcomes of the patient's first stay per year, tackling multiple stays in separate variables (number of stays per year, re-admission rate).

The number of patients with schizophrenia spectrum disorder who were treated voluntarily in both years on the acute psychiatric ward was considerably small (all diagnoses: $n = 34$, patients with schizophrenia: $n = 7$). Because of the limited validity and interpretability of statistical comparisons, those patients were excluded from this article.

All diagnoses were made according to ICD-10 (17) and DSM-5 (18) criteria by trained psychiatrists. All the patients who were treated on the acute psychiatric ward needed intensive treatment in all three dimensions following the platform model (13).

CPZE values (19) were determined for all prescribed oral and depot antipsychotic medication. Individual CPZE values per patient were thus generated to enable a comparison between the years 2016 and 2019.

The circumstances of discharge were coded as follows: 1 = planned discharge, 2 = discharge upon patient's own request, 3 = discharge against medical advice, 4 = premature termination by patient, 5 = transfer to other ward, 6 = no further treatment offer.

To analyze whether the circumstances of discharge changed depending on the treatment, three categories were created: "by agreement" (condition 1, 2, 5 = we did not see further treatment on our ward as necessary), "discontinuation" (4, 6 = attrition), and "against medical advice" (3).

In 2019, all patients diagnosed with schizophrenia spectrum disorder were admitted to our acute psychiatric ward with Soteria-elements. Considering that in 2016, there was no treatment offer in an open area on the acute psychiatric ward, an assessment of a change in treatment time in the open sector was not possible (days in open ward = 0). To address this matter, an additional *post-hoc* data collection was run, filtering all patients with a main diagnosis of schizophrenia, who in 2016 were initially admitted to other open wards, either because of a lower level of severeness or because of the wards' capacities. 28 patients were thus included. By including those patients into the main analysis of 2016 in addition to those admitted initially to the protected ward and further being transferred to open wards, a comparison of treatment time in the open ward without Soteria-elements (in 2016) and with Soteria-elements (in 2019) is possible.[1] In 2019, the staff of the ward with Soteria-elements accompanied (through frequent consultation of the hospital's internal ethic committee) a long-term patient on his way to death, who suffered from severe somatic illness rejecting medical treatment because of manifested psychotic delusions. This patient was excluded from the analysis.

This article has two objectives: the evaluation of the implementation of Soteria-elements in a hospital's only acute ward as well as new findings specifically regarding the efficiency of the treatment with Soteria-elements of patients suffering from schizophrenia. Therefore, analyses aim at different groups of patients: (1) all patients treated on the acute ward with Soteria-elements, regardless of their diagnoses—admitted due to severity of illness, (2) all patients suffering from schizophrenia spectrum disorder at whom the treatment concept of the acute ward with Soteria-elements originally aims at.

3. Results

3.1. Description of the sample

In 2016, $n = 341$ patients and in 2019 $n = 173$ patients were included in the main analysis. Table 1 shows the sociodemographic data as well as the distribution of diagnoses per year of all patients. In 2019, the patients treated on the acute psychiatric ward—regardless of their diagnosis-were significantly younger [F (1,512) = 23.539, $p < 0.001$]. This effect is consistent for the subgroup of patients diagnosed with schizophrenia spectrum disorder treated in 2019 [$F(1,115) = 10.213$, $p = 0.002$]. Considering all patients except those with schizophrenia, this effect remained the same [F (1,395) = 13.186, $p < 0.001$]. Thus, age was taken as covariate in every calculation.

There was no significant difference regarding the gender of all patients [$\chi^2(1) = 0.908$, $p = 0.341$] (see Table 1). Also for the subgroup of schizophrenic patients, the distribution of gender did not differ significantly [$\chi^2(1) = 2.550$, $p = 0.110$]. Sociodemographic data of the subgroup are presented in Table 2.

The distribution of diagnoses did differ significantly between the years [$\chi^2(8) = 28.279$, $p < 0.001$] (see Table 1).

In the following, the results of the between subject-design analysis will be reported.

3.2. Between subject design

A one-way MANOVA showed a statistically significant difference between the years on the combined dependent variables [F (5,504) = 17.429, $p < 0.001$, *partial* $\eta^2 = 0.147$, *Wilk's* $\Lambda = 0.853$]. Follow up ANOVAs were run.

There was a significant difference between 2016 and 2019 regarding the frequency of treated diagnoses [$\chi^2(8) = 28.279$, $p < 0.001$] on the acute ward, resulting in an increase of patients suffering from schizophrenia and psychotic disorders with substance use disorders (SUD) and a decrease of patients primarily with organic mental disorders and SUD as main diagnosis (see Table 1). Due to the implementation of disorder specific treatment offers on the other wards (i.e., ward for short-term crisis intervention and the geropsychiatric ward) it was possible in the first place, to offer a psychosis specific treatment for those patients in need in 2019.

3.2.1. Total duration of stay

The duration of voluntary treatment of all patients admitted to the acute psychiatric ward did not differ significantly between the years [F (1,507) = 0.090, $p = 0.764$] (see Table 3). Also the total

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[1] A sensitivity analysis resulted in four patients, who would not have been included in the data set, if the *post-hoc* data collection strategy would have been used for all patients. Since an exclusion of those four patients caused no differences in the results, *post-hoc* data collection strategy was considered to be reliable and thus permissible. The reported results include the four identified patients who were admitted in an intoxicated state, thus the main diagnose at time of admission was none of the abovementioned categories.

TABLE 1 Sample characteristics.

	2016	2019	Statistics
Sample size (*n*)	341	173	
Age *M* (SD)	52.12 (18.06)	44,14 (16.71)	$F\ (1{,}512) = 23.539,\ p < 0.001^{***}$
Gender in % (m/f)	58.7/41.3	63.0/37.0	$\chi^2(1) = 0.908,\ p = 0.341$
Diagnosis *n* (%)			$\chi^2(8) = 28.279,\ p < 0.001^{***}$
Organic mental disorders	72 (21.1%)	14 (8.1%)	
Substance use disorders	84 (24.6%)	31 (17.9%)	
Schizophrenia	66 (19.4%)	51 (29.5%)	
Depression	29 (8.5%)	19 (11.0%)	
Trauma, stress disorders, anxiety disorders	5 (1.5%)	3 (1.7%)	
Personality disorders + additional disorder	15 (4.4%)	7 (4.0%)	
Psychotic disorder + comorbid SUD	35 (10.3%)	34 (19.7%)	
Depression + comorbid SUD	25 (7.3%)	9 (5.2%)	
Manic episode	10 (2.9%)	5 (2.9%)	

n, Number of subjects; M, mean value; SD, standard deviation; $^{***}p < 0.001$.

TABLE 2 Sample characteristics of patients with schizophrenia spectrum disorder.

	2016	2019	Statistics
Sample size (*n*)	66	51	
Age *M* (SD)	49.27 (14.19)	40.86 (14.01)	$F\ (1{,}115) = 10.213,\ p = 0.002^{**}$
Gender in % (m/f)	43.9/56.1	58.8/41.2	$\chi^2(1) = 2.550,\ p = 0.110$

n, Number of subjects; *M*, mean value; SD, standard deviation; $^{**}p < 0.01$.

treatment time of patients suffering from schizophrenia did not differ significantly [$F\ (1{,}114) = 0.777$, $p = 0.380$]. Mean values are presented in Table 3.

3.2.2. Duration of voluntary stay in protected ward

Since 2019 a switch according to the patient's needs between the protected and open area of the ward was possible, the differences between the treatment time in the respective area were analyzed (see Table 3). A global view of all treated patients showed that in 2019 the number of days voluntarily spent in the protected ward was significantly reduced [$F\ (1{,}507) = 56.043$, $p < 0.001$].

This effect persisted in individual consideration of patients with schizophrenia [$F\ (1{,}114) = 12.606$, $p < 0.001$]

3.2.3. Duration of stay in open area

To explore the effect of Soteria-elements on treatment time in the open area, a variable of total open treatment time was created. Since 2016 there was no possibility to be treated in an open area on the acute ward, therefore some cases were transferred to other open wards. To maintain comparability, the number of days the respective patients spent on other open wards in 2016 were included in the analysis. In 2019, a significant increase of treatment time in the open sector was noticed [$F\ (1{,}507) = 31.805$, $p < 0.001$] over all patients, regardless of diagnosis.

Subgroup analysis showed consistent results for patients with schizophrenia [$F\ (1{,}114) = 7.532$, $p = 0.007$] (see Table 3).

3.2.4. Medication dosage at discharge (CPZE)

Comparing the dosage of medication at discharge, CPZE values of antipsychotic discharge medication were generated. Differences in mean CPZE values are presented in Table 4. A univariate two-way ANOVA showed no significant main effect of the year of treatment [$F\ (1{,}509) = 0.263$, $p = 0.609$]. The main effect for the existence of schizophrenia on medication dosage is statistically significant [$F\ (1{,}509) = 94.915$, $p < 0.001$]. There is a significant interaction between the year and type of diagnosis [$F\ (1{,}509) = 6.358$, $p = 0.012$] (see Figure 1). The reduction of medication between the years is significantly moderated by the type of diagnosis, resulting in less medication for patients diagnosed with schizophrenia. The increase of medication for the other groups of patients will be discussed subsequently.

3.2.5. "Revolving door effect" and number of stays per year

Comparing all patient groups, there was neither a significant difference between the number of patients with multiple stays per year ("revolving door effect") [$\chi^2(1) = 0.003$, $p = 0.956$], nor a significant change in the number of admissions per patient in 2016 or 2019, respectively [$F(1{,}507) = 0.074$, $p = 0.786$].

Concurrently, neither did the number of patients diagnosed with schizophrenia with multiple stays per year diminish significantly in 2019 [$\chi^2(1) = 2.291$, $p = 0.122$], nor did the number of stays per year per patient of this group differ significantly between the years [$F(1{,}114) = 0.346$, $p = 0.557$] (see Table 3).

TABLE 3 Total treatment duration, treatment duration in protected ward, treatment duration in open ward, number of stays, circumstances of discharge, admission to day-care clinic before and after the implementation of Soteria-elements.

	2016	2019	Statistics
Total sample size (N)	341	173	
Diagnosed with schizophrenia (n)	66	51	
Total treatment duration in days (M ± SD)			
Total sample	20.39 (±20.69)	20.10 (±17.44)	F (1,507) = 0.090, p = 0.764
Schizophrenia	30.18 (±29.21)	23.25 (±17.91)	F (1,114) = 0.777, p = 0.380
Voluntary treatment duration in protected ward in days (M ± SD)			
Total sample	9.77 (±15.15)	1.17 (±3.14)	F(1,507) = 56.043, $p < 0.001^{***}$
Schizophrenia	14.80 (±28.27)	0.27 (±1.01)	F(1,114) = 12.606, $p < 0.001^{***}$
Treatment duration in open ward in days (M ± SD)			
Total sample	10.60 (±18.05)	18.94 (±17.15)	F(1,507) = 31.805, $p < 0.001^{***}$
Schizophrenia	15.38 (±21.86)	22.98 (±17.92)	F(1,114) = 7.532, $p = 0.007^{**}$
Multiple stays per year in % (yes/no)			
Total sample	37.2/62.8	37.0/63.0	$\chi^2(1) = 0.003$, $p = 0.956$
Schizophrenia	45.5/54.5	31.4/68.6	$\chi^2(1) = 2.391$, $p = 0.122$
Number of stays per year (M ± SD)			
Total sample	1.71 (±1.38)	1.75 (±1.69)	F (1,507) = 0.074, p = 0.786
Schizophrenia	1.79 (±1.31)	1.63 (±1.67)	F (1,114) = 0.346, p = 0.557
Circumstances at discharge in % (by agreement—discontinuation—against medical advice)			
Total sample	87.4/3.2/9.4	75.7/13.3/11.0	$\chi^2(2) = 19.759$, $p < 0.001^{***}$
Schizophrenia	95.5/1.5/3.0	78.4/13.7/7.8	$\chi^2(2) = 8.520$, $p = 0.014^{*}$
Admission to day-care clinic in % (yes/no)			
Total sample	8.8 91.2	13.9/86.1	$\chi^2(1) = 2.382$, $p = 0.123$
Schizophrenia	15.2/84.8	17.6/82.4	$\chi^2(1) = 0.132$, $p = 0.717$

n, Number of subjects; M, mean value; SD, standard deviation;
$^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

3.2.6. Circumstances of discharge

To compare the circumstances in which the patients ended the inpatient treatment, a variable with three categories was created: (1) discharge by agreement (including planned discharges, discharges upon the patient's own request, transfer to further external treatment), (2) discontinuation (premature termination, no further treatment offer), and (3) against medical advice. Relative frequencies are shown in Table 3. Results show a significant difference between the years for all patients [$\chi^2(2) = 19.759$, $p < 0.001$], resulting in an increase of premature termination in 2019.

Patients diagnosed with schizophrenia ended the treatment significantly more often prematurely [$\chi^2(2) = 8.520$, $p = 0.014$], (compare Table 3).

3.2.7. Admission to day-care clinic

Direct admission to the hospital's day-care clinic after inpatient treatment was assessed (relative frequencies are reported in Table 3). Over all treated patients, the admission rate between the years did not change significantly [$\chi^2(1) = 2.382$, $p = 0.123$].

The difference of patients with schizophrenia admitted to day-care clinic between the years is not statistically significant [$\chi^2(1) = 0.132$, $p = 0.717$] (see Table 3).

4. Discussion

Results suggest that inpatient treatment with Soteria-elements is not only feasible but also beneficial in terms of a less restricted and harmful treatment experience in an acute psychiatric ward. The subject of evaluation is the only acute psychiatric ward in the county Oberhavel where Soteria-elements were implemented in 2017. This means that selecting patients was not possible—all acutely ill patients in need of treatment had to be admitted.

A more homogenous population of patients was necessary in order to enable us to offer a more psychosis specific treatment on the acute ward. After the reconstruction, the distribution of diagnoses was thus significantly different. In 2019, an increase in the number of patients with schizophrenia spectrum disorder and acute psychotic disorder was notable. When added to the legally accommodated patients [treatment outcomes are presented in a previous article (10)], this group forms the majority of patients treated on the acute ward. This is in keeping with the requirements of the Soteria Fidelity Scale (12) for a ward with Soteria-elements.

Since the distribution of diagnoses changed significantly between the years, comparisons of all other patients must be interpreted with care. Still, the presented data offer insights into how a less restricted, more recovery-oriented treatment is possible for all patients.

TABLE 4 Medication dosage at discharge in chlorpromazine equivalents (CPZE) ($M \pm SD$) before and after the implementation of Soteria-elements.

	CPZE ($M \pm SD$)		Statistics
Main effects			
Year of treatment			
2016	157.91 (±279.74)		$F(1{,}509) = 0.263$, $p = 0.609$
2019	219.46 (±294.94)		
Type of diagnosis			
Without schizophrenia	112.90 (±232.21)		$F(1{,}509) = 94.915$, $p < 0.001^{***}$
With schizophrenia	401.68 (±336.25)		
Interaction	2016	2019	
Without schizophrenia 2016 $n = 275$ 2019 $n = 122$	92.09 (±211.14)	159.82 (±268.91)	$F(1{,}509) = 6.358$, $p = 0.012^{*}$
With schizophrenia 2016 $n = 66$ 2019 $n = 51$	432.18 (±355.94)	362.21 (±308.87)	

n, Number of subjects; M, mean value; SD, standard deviation; $^{*}p < 0.05$; $^{***}p < 0.001$.

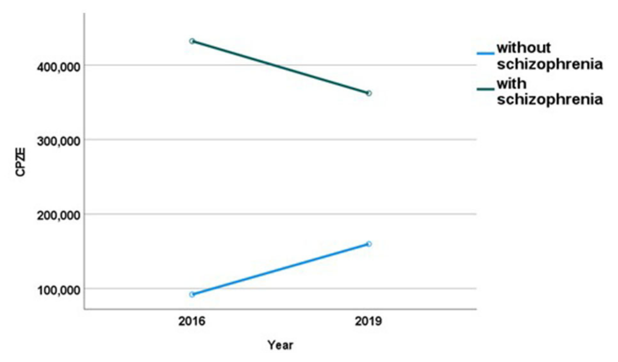

FIGURE 1
Mean medication dosage in chlorpromazine equivalents (CPZE) at discharge before (2016) and after (2019) the implementation of Soteria-elements.

With respect to the total number of patients, when comparing treatment outcomes before and after the implementation of Soteria-elements, the total treatment duration did not change significantly. However, by creating an alternative ward environment-spatially and therapeutically—all patients were able to spend significantly less days in the protected area and significantly more days in the open area of the ward, regardless of their diagnosis. Comparing the treatment offered in 2016 with that provided in 2019 for all patients suffering from schizophrenia spectrum disorder, the results show that it was possible to reduce the time spent in the protected area and increase the time in the open area. The mean treatment duration of 23 days in 2019 of this subgroup was much shorter when compared to other Soteria projects, who report 38 to 63 days (20, 21) of total treatment time.

We can only speculate as to why there was a significant decrease of mean age in the whole patient group. This applies to the whole group of patients as well as to the schizophrenic patients. In all calculations, age was integrated as a covariate.

Patients with diagnosed schizophrenia spectrum disorder appear to benefit more from the setting than other patient groups with respect to medication dosage. Lower medication dosages were significantly linked to the group of diagnosis, favoring schizophrenia. A reduction of medication for patients with schizophrenia is in line with the demands of Mosher and Ciompi, who were able to show decreasing medication dosages in Soteria housing (1, 6). Also, the fact that the reduction of medication dosage is notable for this particular patient group, but not for patients suffering from different diagnoses supports Ciompi's hypothesis that Soteria-treatment might specifically have a stress reducing effect for psychotic patients (3, 4), subsequently allowing lower medication dosages. In Hennigsdorf hospital, patients suffering from schizophrenia were discharged in 2019 with approximately 70 CPZE less than in 2016. This corresponds approximately to 1.5 mg risperidone or 50 mg quetiapine per day. The medication dosage in the Hennigsdorf hospital is comparable to or even below the mean dosage of 450 CPZE for acutely ill psychiatric patients in a Norwegian health study (22). Furthermore, our results show a slight increase of medication dosage for patients with diagnoses other than schizophrenia. This might be due to the specialization of the therapeutic concepts of the acute ward and the other psychiatric wards. We tended to admit patients primarily to the respective specialized ward. Thus, we assume that those who were still admitted in 2019 to the acute ward needed more intense and high frequent treatment corresponding to group Psy_2 in the platform model (13). This might explain the increase of higher antipsychotic medication dosages for those patients.

Premature discontinuation of inpatient treatment increased significantly in 2019 after reconstruction and implementation of the open doors policy. This applies to the whole group of patients as well as to the subgroup of the patients suffering from schizophrenia spectrum disorder. Research shows inconsistent results regarding the effect of open-door policies on this matter (23). Steinert et al. could observe that in some studies, a reduction of premature discontinuation was notable during open doors, in others early discharges were increasing, or could only be prevented by closing the ward's doors. Since the Hennigsdorf hospital is responsible for the whole catchment area Oberhavel in Brandenburg, monitoring of re-admission rates after early treatment drop-out is easily done. Acutely ill patients admitted to a different hospital in the area will be re-transferred to the responsible hospital promptly. Bearing that in mind, although not statistically significant, the "revolving door effect" has been diminished for the patients with schizophrenia. These findings allow to draw the conclusion that treatment with Soteria-elements including the established relapse prevention might contribute to the success of sustainable treatment of acutely ill patients suffering from schizophrenia. With respect to a planned discharge management, further outpatient treatment options in the county are presented and established right from the beginning of the treatment. This can also be used by patients who leave the inpatient treatment prematurely. These findings are in line with research regarding planned early discharge to prevent long-time hospitalization without increasing the "revolving door effect" (24). It can be assumed that by providing a Soteria-specific day-care clinic in Hennigsdorf hospital in the future, the admission rate of patients with schizophrenia to disorder specific treatment can be further improved. First experiences were made in Bern/Switzerland and the kbo-Isar-Amper-Klinikum Munich/Germany.

In conclusion, treatment with Soteria-elements seems to have a favorable effect on the treatment outcome of psychotic patients (e.g., shorter treatment duration in a locked ward, lower medication dosage) and can thus be evaluated as applicable in a ward where acutely ill patients—repeatedly or recently ill are admitted to. Also, the World Health Organization (WHO) recommended Soteria-treatment as a good clinical practice to foster patients' rights and recovery (25). This corresponds to the claims of the ratification of the UN Convention on the Rights of Persons with Disabilities (26), which demands a more critical application of coercive measures in acute psychiatry. Additionally, a safe and supporting environment as well as transparency and participation during the treatment comply with aspects patients wish for in a crisis (27).

5. Limitations

The goal of the study was to evaluate whether Soteria-elements in acute psychiatry made any change to the treatment outcome. Previous authors referring to Soteria always emphasized the assumed beneficial value of Soteria treatment specifically in schizophrenia. However, they had no comparison group. We tried to compare in a pre-post design the actual differences in treatment outcomes before and after the changes on the ward. There are evident limitations due to the fact that the data are based on a retrospective analysis. Thus, a randomization was not possible in this design. Also, the shift of the distribution of diagnoses between the years allows only limited conclusions for the group of all patients. While some comparisons did not reach a level of statistical significance, a trend of changing mean values in favor of Soteria-treatment was notable. This replicates findings from earlier Soteria evaluation studies, which argue that Soteria-treatment appears to be at least equally effective as treatment as usual, while at the same time reducing medication dosages (8). To optimize the future research process regarding Soteria-treatment offers, accompanying research should be carried out before, during, and after the implementation with additional standard measures as the Positive and Negative Syndrome Scale [PANSS (28)] or Global Assessment of Functioning (GAF). Follow-up data would also be helpful to assess the sustainability of the treatment with Soteria-elements compared to the treatment as usual. We understand that there is a large overlap in the guidelines for Soteria treatment and the national guidelines for the treatment in acute psychiatric wards [also see Steinert and Hirsch (29)]. There are several programs in modern psychiatry which concentrate on the prevention of coercion and violence and the increase in participation. In our opinion, Soteria treatment is one approach to comply with those guidelines.

Data availability statement

The data analyzed in this study is subject to the following licenses/restrictions: The pseudonymised data is retrieved from the hospital's internal documentation system and will be provided upon request. Requests to access these datasets should be directed to philine.fabel@oberhavel-kliniken.de.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

Author contributions

PF holds first authorship of this article, organized the database, performed the statistical analysis, and wrote the manuscript. TW, HZ, and MJ-S contributed substantially to conception and design of the study. TW and JR supported regarding the statistical analysis. MJ-S holds senior authorship and initiated and supervised the whole project. All authors contributed to manuscript revision, read, and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Wulf Rössler,
Charité Universitätsmedizin Berlin, Germany

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Rachel Dale,
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Hong Cai,
University of Macau, China
Tengteng Fan,
Peking University, China

*CORRESPONDENCE
Elvira Mauz
✉ MauzE@rki.de

†These authors have contributed equally to this work and share first authorship

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Time trends in mental health indicators in Germany's adult population before and during the COVID-19 pandemic

Elvira Mauz[1]*†, Lena Walther[1]†, Stephan Junker[1], Christina Kersjes[1], Stefan Damerow[1], Sophie Eicher[1], Heike Hölling[1], Stephan Müters[1], Diana Peitz[1], Susanne Schnitzer[2] and Julia Thom[1]

[1]Department of Epidemiology and Health Monitoring, Robert Koch Institute, Berlin, Germany, [2]Institute of Medical Sociology and Rehabilitation Science, Charité-Universitätsmedizin, Berlin, Germany

Background: Times of crisis such as the COVID-19 pandemic are expected to compromise mental health. Despite a large number of studies, evidence on the development of mental health in general populations during the pandemic is inconclusive. One reason may be that representative data spanning the whole pandemic and allowing for comparisons to pre-pandemic data are scarce.

Methods: We analyzed representative data from telephone surveys of Germany's adults. Three mental health indicators were observed in ∼1,000 and later up to 3,000 randomly sampled participants monthly until June 2022: symptoms of depression (observed since April 2019, PHQ-2), symptoms of anxiety (GAD-2), and self-rated mental health (latter two observed since March 2021). We produced time series graphs including estimated three-month moving means and proportions of positive screens (PHQ/GAD-2 score $\geq$ 3) and reports of very good/excellent mental health, as well as smoothing curves. We also compared time periods between years. Analyses were stratified by sex, age, and level of education.

Results: While mean depressive symptom scores declined from the first wave of the pandemic to summer 2020, they increased from October 2020 and remained consistently elevated throughout 2021 with another increase between 2021 and 2022. Correspondingly, the proportion of positive screens first decreased from 11.1% in spring/summer 2019 to 9.3% in the same period in 2020 and then rose to 13.1% in 2021 and to 16.9% in 2022. While depressive symptoms increased in all subgroups at different times, developments among women (earlier increase), the youngest (notable increase in 2021) and eldest adults, as well as the high level of education group (both latter groups: early, continuous increases) stand out. However, the social gradient in symptom levels between education groups remained unchanged. Symptoms of anxiety also increased while self-rated mental health decreased between 2021 and 2022.

Conclusion: Elevated symptom levels and reduced self-rated mental health at the end of our observation period in June 2022 call for further continuous mental health surveillance. Mental healthcare needs of the population should be monitored closely. Findings should serve to inform policymakers and clinicians of ongoing dynamics to guide health promotion, prevention, and care.

KEYWORDS

mental health surveillance, depressive symptoms, anxiety symptoms, COVID-19 pandemic, time trends, general population, Germany

1. Introduction

The COVID-19 pandemic poses a serious threat to mental health. Shortly after the World Health Organization declared the SARS-CoV-2 outbreak a global pandemic on March 11, 2020 (1), alarms were sounded over a potential concomitant mental health crisis (2–4). A secondary pandemic in the form of a "tsunami of mental disorders" was expected, for example by the British Psychiatric Association (5). These assumptions were based on empirical evidence of population-wide increases in mental health risks associated with previous infectious outbreaks such as Ebola, influenza, and SARS (6–8), natural disasters (9), and economic crises (10, 11). Stressors accompanying infectious outbreaks include the experience of uncertainty and anxiety, threats or damage to physical health, and potentially traumatic experiences such as the loss of loved ones. In addition to effects of the disease itself, nonpharmaceutical interventions (NPIs) to mitigate the spread of infections are discussed as contributing to mental health deterioration. As NPI-associated risk factors in the COVID-19 pandemic, the literature highlights isolation and quarantine (12, 13), an increase in domestic violence (14), and a lack of social connectedness during contact restrictions (15). Moreover, NPIs may lead to the loss of protective factors for mental health such as social and recreational activities and access to healthcare (16). In addition to these individual-level factors, societal-level mental health risks such as economic strain resulting in increased unemployment and the risk of widening social inequality are likely to arise from the pandemic (16–18). Against this background, the COVID-19 pandemic is considered a multidimensional and now chronic stressor continuously putting the mental health of populations at risk (16, 19).

Like most countries, Germany has been hit by multiple waves of rising COVID-19 incidence and mortality as well as NPIs in response, which might relate to mental health dynamics temporally. Taking various epidemiological, healthcare- and policy-related parameters into account, the course of the pandemic in Germany can retrospectively be divided into eight phases (see Figure 1) (20–24). After the first confirmed SARS-CoV-2 infection on 27th January, 2020, a nationwide first wave of infections followed (March to May 2020). NPIs were put in place, resulting in an extensive lockdown which comprised travel and contact restrictions (gatherings of more than 2 people not permitted), working from home, closed leisure facilities, childcare facilities, schools, shops and restaurants (25). A milder interim period of low case numbers referred to as a "summer plateau" (20, 23) followed from May to September 2020. From October 2020 to February 2021 a second, more severe wave with a peak in deaths (highest in the whole pandemic thus far) and hospitalizations (highest in this study's observation period) (26) unfolded, again met by several NPIs and the beginning of the vaccination campaign (24). A second "partial" shutdown from the beginning of November 2020 (27) was initially less restrictive than the first (e.g., contact with one other household, leisure time facilities closed, restaurants closed). Measures were intensified in mid-December, with closed shops, childcare facilities, and schools, and working from home where possible (28). This shutdown went on until March 2021, when a stepwise reopening was decided upon (29). After a brief period of declining case numbers, a third wave emerged from March to June 2021, albeit with fewer hospitalizations and far fewer deaths. During this time, NPIs varied substantially between federal states (30). Another short summer plateau in 2021 (June to July) was followed by a fourth wave of infections from August to December 2021 (21). With regard to COVID-19 incidence, the fourth wave was the most severe up to that point with a nearly 10-fold number of average cases per day compared to the first wave and a nonstop transition into wave five, which began in December 2021 (21–23) and was characterized by the highly contagious omicron variant with even higher infection rates (22, 25). Data on case numbers shows the largest peak to date in spring 2022 (31), with hospitalizations between about 75 to 95% of those seen in winter 2020/2021 but deaths at only about a fifth to a quarter of this peak (29). NPIs were characterized by restrictions in or mandatory tests for access to shops and leisure facilities as well as general contact restrictions for those who were neither vaccinated nor recovered from COVID-19 from autumn 2021 (32) to spring 2022. From December 2021 to end of January 2022, contact restrictions for vaccinated and recovered individuals were also put in place (33). NPIs were eased between February and March 2022 (34) and largely lifted in most German federal states at the beginning of April 2022 (35). Russia's invasion of Ukraine on 24th February, 2022, marks a further major event in this time and the beginning of another crisis on a global scale that might affect mental health dynamics.

Despite the well-founded expectation of a mental health crisis, evidence on changes in mental health of adults during COVID-19 pandemic is (still) inconclusive. Turning first to international research, reviews point to a broad heterogeneity in current findings. While some reviews conducted early in the pandemic conclude that there was an increase in depressive and anxiety symptoms (36, 37), others found quick subsequent decreases or stable symptoms in general populations (38). A later review and meta-analysis reports no changes (39). One review summarizes a most likely 'big picture' (38) emerging from heterogeneous findings: symptom increases compared to pre-pandemic data during first lockdowns followed by declines as restrictions are eased, but not down to pre-pandemic levels (40). As findings accumulate, inconsistencies are growing, while the trajectory of manifest mental disorders remains an open question (41). A recent umbrella review based on 81 systematic reviews on global mental health trends during the pandemic evaluates the current state of research as follows: "Despite high volumes of reviews, the diversity of findings and dearth of longitudinal studies within reviews means clear links between COVID-19 and mental health are not available, although existing evidence indicates probable associations" [(42), p. 2].

The existing literature from Germany prohibits clear conclusions as well. In a rapid review including 68 records published until mid-2021, we found study outcomes to be associated with the suitability of the data used for assessing changes in the general population reliably with regard to sampling methods and comparability of observation periods (43). While studies with particularly suitable research designs showed mixed results on the overall development of mental health in Germany, studies with more bias-prone designs predominantly

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Abbreviations: COVIMO, COVID-19 vaccination rate monitoring in Germany; CW, calendar week; GAD-2, Generalized Anxiety Disorder Questionnaire (2 items); GEDA, German Health Update; EHIS, European Health Interview Survey; PHQ-2/8/9, Patient Health Questionnaire (2/8/9 items); RKI, Robert Koch Institute; SES, Socio-economic status; SRMH, Self-rated mental health.

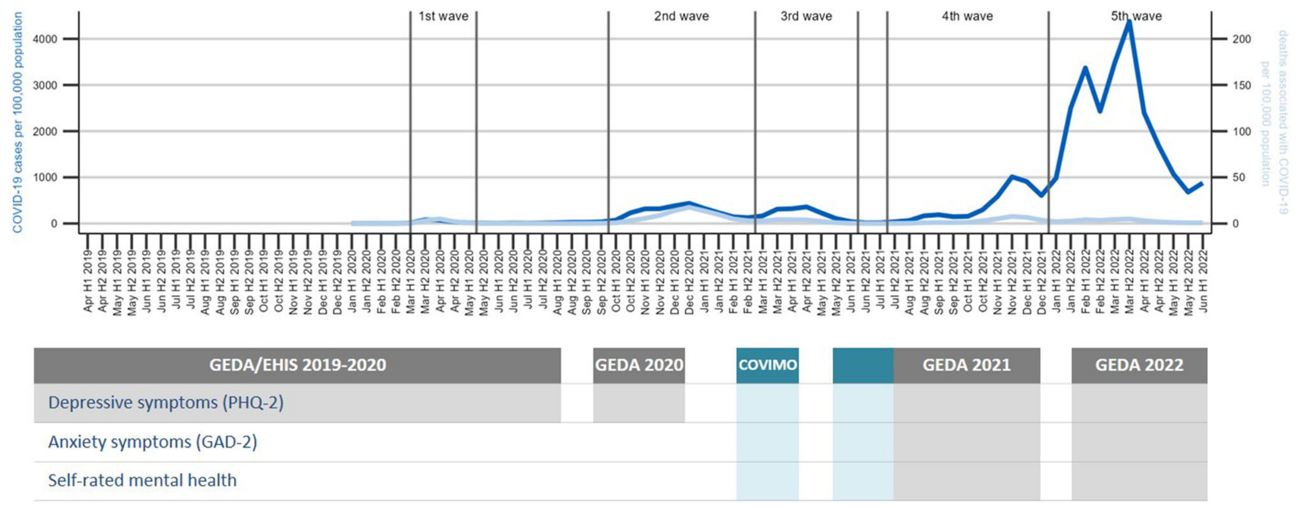

FIGURE 1
Data sources used in analyses over the course of the COVID-19 pandemic. Sums of COVID-19 cases and associated deaths per 100,000 adults as reported to the Robert Koch Institute by health authorities were calculated per first (H1) and second half (H2) of the month. Data collection periods for surveys and indicators used in study shown as gray (GEDA data) and blue (COVIMO data) bars; hatched area represents overlap in data collection between surveys.

reported deteriorating mental health. Importantly, two thirds of the reviewed studies are based on data collected during the first wave and the summer plateau of 2020, when COVID-19 incidence was comparatively low in Germany (43). The few studies that address the later course of the pandemic find an elevated frequency of depressive symptoms in the first months of 2021 (44, 45) or of depressive and anxiety symptoms into later 2020 (45, 46) compared to pre-pandemic data and an increase in mental distress (47) but a decrease in depressive and anxiety symptoms (45) in the second wave compared to the first wave. Further results from representative surveys spanning the whole pandemic period and allowing for comparisons to pre-pandemic baseline data are needed in order to adequately assess the mental health impact of the pandemic in the general population in Germany.

Mental health developments in the pandemic may also vary by population subgroups. Although social inequalities in mental health already existed in non-pandemic times (48), there is evidence that they were aggravated by the COVID-19 pandemic (16, 19, 49, 50). As expected, the widely observed gender gap resulting in mental health disadvantages for women compared to men was found to have worsened across a majority of studies [e.g., 49, 51, 52]. A comprehensive meta-analysis on gender equality in the pandemic globally attributes this to unequally distributed pandemic-related risk factors such as an increase in domestic violence, increased childcare responsibilities, and financial losses (53). With regard to age and life stages, concerns have been raised for the mental wellbeing of the elderly due to the increased risk of severe COVID-19 disease progression (16, 19) and increased risk of loneliness and isolation due to a greater need for social distancing (19) in this group. However, increases in psychological distress and symptoms of mental illness have been predominantly reported for the youngest adults in particular (41, 49, 51, 54–57). One potential explanation is a larger impact of restrictions with a stronger disruptive effect in this transitional life phase (58). In Germany, women and younger adults have also been repeatedly observed to be more severely affected than men and other age groups (57, 59–62). By contrast, international empirical findings regarding socioeconomic groups and mental health during the COVID-19 pandemic have been inconsistent despite cumulative risks of individuals with a low socioeconomic status (SES). They face a greater risk of severe infection and death from COVID-19 (49, 50) and economic stressors such as financial insecurity, reduced working hours, and income or job loss (63, 64). Previous studies from different countries have shown mixed results, including low SES as a risk factor for depression and anxiety (65, 66), no association between SES and mental health (67, 68), and individuals with higher SES at a greater risk of worsening mental health in the pandemic (52, 59, 62, 69, 70). These discrepancies may be due to national contextual differences. Also, risk and resilience factors may change over time as circumstances change, calling for Germany-specific results on mental health by subgroup over the course of the pandemic.

The dynamic nature of the COVID-19 pandemic and its high relevance to all areas of public health created specific informational needs with regard to the mental health of the population. Specifically, it calls for a public health surveillance approach (71) involving continuous observation and timely reporting of updated time trends as the basis for planning, implementing, and evaluating interventions to protect and promote the health of the population (72). Accordingly, public health authorities have set up ongoing population surveys in order to monitor mental health trends at high frequency and serve as an early warning system, for example in the US (73) and UK (74). In Germany, pre-pandemic mental health monitoring focused on the estimation of 12-month-prevalences of varying mental health indicators, based on health interview and health examination surveys conducted at perennial intervals [e.g., (75–79)]. In 2019, the Federal Ministry of Health commissioned the Robert Koch Institute (RKI) to establish a national Mental Health Surveillance in order to provide systematic and continuous evidence on the mental health of the population. As a conceptual foundation, core indicators for public mental health were identified (80) and prioritized by national stakeholders (81), integrating international expertise (82). With the onset of COVID-19 pandemic, first indicators from the comprehensive set had already been implemented in the running field work of the survey "German Health Update (GEDA)" (78). As the pandemic progressed, further measures were added to GEDA as well as to "COVID-19 vaccination rate monitoring in Germany (COVIMO)" (83). This representative data from ∼1,000 respondents per month, and, as of 2022, 3,000 per month for some indicators, makes tracking the development of several mental health indicators in the German population in high-frequency cross-sectional time series possible, addressing some of the above-mentioned research gaps.

In the present study we analyze month-by-month time series for symptoms of common mental disorders (depressive symptoms and anxiety symptoms) as well as an indicator of positive mental health (self-rated mental health) in order to address the following three research questions: (1) How did depressive symptoms develop between April 2019 and June 2022 in the adult population in Germany? (2) Did developments of depressive symptoms in the observation period differ by gender, age, and level of education? If so, did mental health differences between subgroups vary over time? (3) How did symptoms of anxiety disorders and self-rated mental health develop between March 2021 and June 2022? Importantly, we examine both mean depressive and anxiety symptom scores and proportions of the population screening positive for possible depressive or anxiety disorder. This allows us to distinguish between developments in symptom severity at the population level and changes in the percentage of the population with potentially clinically relevant symptom levels, both of which are important public health indicators (84).

2. Materials and methods

2.1. Data

2.1.1. Surveys

Figure 1 maps the data collection periods for the two surveys and three indicators used in this study onto the phases of the COVID-19 pandemic in Germany. At the start of the COVID-19 pandemic, the third survey wave of the European Health Interview Survey as part of the study "German Health Update" (GEDA 2019/2020-EHIS) for Germany (78) had been in the survey phase conducting telephone interviews since April 2019. This survey included the screening questionnaire PHQ-8 (85), which comprises its abbreviated version PHQ-2 (86), as a measure of depressive symptoms.

The survey was originally not designed for monthly reporting; however, slight adjustments of the sample weighting permitted first analyses of the development of various health indicators in the months preceding the pandemic as well as the first months of the pandemic (87). Given the new informational needs arising from the pandemic, the survey was continued until the beginning of January 2021. After the end of GEDA 2019/2020, short inventories assessing mental health indicators, including the PHQ-2 (86), the GAD-2 (88), and a self-rated mental health (SRMH) item (89) were integrated into a running population-based telephone survey from mid-March to mid-July 2021 with a one-month data collection gap from mid-May to mid-June. This survey, the "COVID-19 vaccination rate monitoring in Germany (COVIMO)," was designed to be sampled on a monthly basis (83). From July 2021 until December 2021 and February until June 2022 (with a data gap in January 2022), continuous monthly interviews were carried out within the frameworks of GEDA 2021 and GEDA 2022 (90), respectively (see Figure 1).

The GEDA surveys and COVIMO were conducted on behalf of the Federal Ministry of Health of Germany. Data was collected by an external market and social research institute (USUMA GmbH). Study design, data collection, and sampling were largely the same across these different surveys, and based on a dual frame approach of mobile and landline numbers. The study population differs between the GEDA surveys and COVIMO, as GEDA targets people aged 15 or older living in private households whose main residence is in Germany (78), whereas COVIMO includes only people aged 18 or older (83). In addition, there is a slight difference in the general content focus of the studies (general health survey in GEDA versus vaccination monitoring in COVIMO). Details of the data pipeline, which cover semi-automated data preparation, data merging, and output creation as well as a description of sample weighting can be found elsewhere (91). We examined potential study-related differences between the GEDA surveys and COVIMO in the indicators of interest: Distributions of outcome variable scores were compared between studies in their one overlapping month using boxplots and violin plots (results not shown). No pronounced differences were detected.

2.1.2. Participants

Across the entire survey period, 45,102 participants aged 18 or older were included in the analyses. The distributions by gender, age, and level of education in the different surveys are shown in Table 1, number of monthly cases are shown in Supplementary Figure A1. The GEDA-EHIS 2019, GEDA 2020, 2021, and COVIMO studies surveyed ∼1,000 participants per month. GEDA 2022 provided data for 3,000 participants per month. To reduce data gaps, the second half of each month was combined with the first half of the following month across the observation period.

2.2. Indicators of mental health status

2.2.1. Depressive symptoms

Depressive symptoms were observed prior to and during the pandemic using monthly data from beginning of April 2019 until mid-June 2022 (see Figure 1). There were four short data gaps (the largest between January and mid-March 2021). The indicator was measured with the established ultra-brief screening instrument "Patient Health Questionnaire-2" (PHQ-2) (86), which has been found to perform well as a screening tool for depressive disorders in the German general population (92). The PHQ-2 captures the frequencies of two core symptoms of depressive disorders, asking, "Over the last 2 weeks, how often have you been bothered by the following problems?": (1) "little interest and pleasure in doing things" (2) "feeling down, depressed or hopeless" (possible responses: 0 = "not at all," 1 = "several days," 2 = "more than half the

TABLE 1 Sample composition.

Survey		GEDA 19/20		COVIMO		GEDA 21		GEDA 22	
		n	%	*n*	%	*n*	%	*n*	%
Sex									
	Female	13,788	52.7	2,170	54.1	2,587	52.0	5,432	54.5
	Male	12,364	47.3	1,842	45.9	2,384	48.0	4,535	45.5
Age group									
	18–29 years	2,425	9.3	342	8.5	406	8.2	787	7.9
	30–44 years	4,326	16.5	607	15.1	795	16.0	1,568	15.7
	45–64 years	10,305	39.4	1,552	38.7	1,957	39.4	3,826	38.4
	65+ years	9,096	34.8	1,511	37.7	1,813	36.5	3,786	38.0
Level of education									
	Low	4,920	18.8	678	16.9	803	16.2	1,746	17.5
	Middle	11,531	44.1	1,798	44.8	2,209	44.4	4,320	43.3
	High	9,701	37.1	1,536	38.3	1,959	39.4	3,901	39.1

days," 3 = "nearly every day"). The total score of the PHQ-2 ranges from 0 to 6 ("no symptoms" to "severe symptoms"). According to scoring recommendations (92), scores $\geq$ 3 represent a positive screen for possible depressive disorder and indicate a potential need for further diagnostic assessment. In our analytical sample, the internal consistency of the PHQ-2 is $\alpha = 0.73$ [standardized alpha coefficient as recommended for two items (93), unstandardized $\alpha = 0.72$], slightly higher than in a comparable German sample (45). Two measures are reported in the current study: (1) the mean depressive symptom score, which tracks changes in the mean severity of symptoms in the population (73); (2) the proportion of the adult population screening positive for possible depressive disorder.

2.2.2. Symptoms of anxiety

Symptoms of anxiety were observed monthly from mid-March 2021 to mid-June 2022 (see Figure 1) with two short data gaps (mid-May 2021 to mid-June 2021 and January 2022). The indicator was measured with the established ultra-brief screening instrument "Generalized Anxiety Disorder-2" (GAD-2), which has been found to perform well as a screening tool for anxiety disorders in the German general population (88). The GAD-2 captures the frequency of two core symptoms of anxiety disorders, asking, "Over the last 2 weeks, how often have you been bothered by the following problems?": (1) "feeling nervous, anxious or on edge" (2) "not being able to stop or control worrying" (possible responses: 0 = "not at all," 1 = "several days," 2 = "more than half the days," 3 = "nearly every day"). The total score of the GAD-2 ranges from 0 to 6 (no symptoms to severe symptoms). Scores $\geq$ 3 represent a positive screen for possible anxiety disorder, including generalized anxiety disorder, panic disorder, social anxiety disorder, and posttraumatic stress disorder (88). In our analytical sample, the internal consistency of the GAD-2 is $\alpha = 0.67$ (standardized alpha unstandardized $\alpha =$ 0.66), almost the same value as in a comparable German sample (45). Just as with depressive symptoms, two measures are reported: (1) the mean anxiety symptom score and (2) the proportion of the adult population screening positive for possible anxiety disorder.

2.2.3. Self-rated mental health

SRMH was observed monthly from mid-March 2021 to mid-June 2022 (see Figure 1) with two short data gaps (mid-May 2021 to mid-June 2021 and January 2022). It was measured using the question: "How would you describe your overall mental health?" (possible responses: 5 = "excellent," 4 = "very good," 3 = "good," 2 = "fair," 1 = "poor"). The single item is an established way to measure SRMH in population based surveys (89). SRMH has been found to represent a dimension of mental health that is qualitatively distinct from psychopathology (94). Here and elsewhere (58) it is employed as a measure of positive mental health. Two measures are reported: (1) population mean SRMH score; (2) the proportion of the adult population rating their mental health as "very good" or "excellent," following previous categorization to identify the presence of positive mental health (58).

2.3. Sociodemographic variables used to measure mental health inequalities

Results are presented separately for women and men. For this purpose, respondents' information on the sex noted in their birth certificate was used. Information on gender could not be used in the present analyses, since the data for the evaluations are adjusted to the marginal distributions of the official reference statistics [source: Microcensus (95)], which lacks information on gender identity.

Four age groups were formed to capture young adulthood, different stages of middle age, and the ages of an increased risk of severe COVID-19 infection: 18–29, 30–44, 45–64, and 65 years and older.

Educational levels according to the CASMIN classification ("Comparative Analyses of Social Mobility in Industrial Nations") were used as an indicator of socioeconomic status (96). Three groups with low, medium, and high levels of education are distinguished on the basis of school and vocational qualifications.

2.4. Statistical analysis

All analyses were conducted in R version 4.1.2 and Stata /SE 17.0.

2.4.1. Estimation of moving three-month averages and smoothing curves

In order to assess mental health developments over time in the general population and by subgroup, we calculated time series of estimates along with smoothing curves to be represented graphically [for details, see (91)]. Our aim was to achieve high temporal resolution whilst working with sample size restrictions and also to smooth random fluctuations. The estimation procedure described below also ensures that possible fluctuations in distributions of sex, age, and level of education in the sample over time are corrected for and that stratified results are standardized for the other main sociodemographic characteristics.

For each of the three mental health indicators, linear and logistic regressions were used to predict a time series of means and proportions for the adult population in Germany. To handle low cell counts and reduce volatility over time, we estimated centered moving averages rather than monthly averages (97) using weighted data from three-month windows. Some three-month windows only included data from 2 months due to data gaps. The three-month windows move in steps of 1 month. The models for each three-month window regress the mental health indicators on sex, age group, and level of education, and interactions between them. While the linear models include all possible interaction terms, only all possible two-way interactions of the covariates but not the three-way interactions were included in the logistic regression models to avoid problems resulting from empty cells. Nonetheless, there were some empty cells around data gaps, where estimates are based on data from two rather than 3 months, resulting in estimation gaps in the time series of categorical PHQ-2 and GAD-2 estimates.

These regression models are the foundation for standardization for sex, age, and level of education between the three-month windows, which ensures that different distributions of these characteristics between them do not influence the results. For standardization, we calculated averaged predictions in a two-step process. First, we used the models to perform predictions on a standard population. To calculate arithmetic means of mental health indicator scores, we used the model estimates from the linear regressions and predicted the expected values of the indicator in question. To calculate proportions for categorical indicator outcomes, we predicted the expected probabilities. In a second step we averaged over all of the predictions. The standard population was calculated using data from the Microcensus 2018 (95), which approximates Germany's population in 2018.

The calculation of estimates for time series stratified by sex, age, and level of education was similar to the procedure described above. However, in order to exclude different distributions of the respective other two characteristics in different time periods as explanatory factors for temporal developments, stratified results by age group, sex, or level of education were standardized by the remaining two characteristics in the prediction step. For example, the results stratified by age group were standardized for sex and education. This was achieved by making predictions for every subgroup as if all observations in the standard population belonged to this subgroup. The standardization between subgroups means that the subgroup-specific estimates are not representative for the population subgroup. The mathematical and methodological foundations for model-based predictions and standardization can be found elsewhere (98–100).

In order to improve results interpretation by making trends more visible, we additionally estimated smoothed curves using a general additive model (101) with a smoothing spline (102, 103) and curve by factor interaction (104). Values were predicted on the same standard population. The spline was fitted on weekly observations to maximize temporal resolution given sample size. To avoid over- or underfitting, the smoothing parameter was estimated using restricted maximum likelihood. However, we found that for our shorter time series, the curves based on weekly estimates were less smooth than the three-monthly predictions. Therefore, we only used this procedure for the longer time series.

Missing values in the dependent variables were excluded on a case-by-case basis. Observations without information on sex or age were not included in the survey and were treated as non-responses. Missings in education were imputed in accordance with the weighting procedure (66) by assigning the most frequent value, a medium level of education.

The initial interpretation of the times series was descriptive by visual inspection. Conservative criteria such as confidence interval comparisons were not used to evaluate developments over time at this stage because the first aim was to explore the overall trajectory. In addition to visual inspection, we carried out statistical comparisons between different time periods (see section 2.4.2).

2.4.2. Statistical time period comparisons between survey years

For the longer depressive symptoms time series, we conducted statistical comparisons between the three survey years for two periods of months: (1) mid-March to mid-September [calendar week (CW) 11–37] 2019, 2020, 2021, mid-March to mid-June (CW 11–24) 2022, and (2) mid-September to end of December 2019, 2020, 2021 (CW 38–52). For the shorter time series of SRMH and anxiety symptoms, mid-March to mid-September 2021 (CW 11–37) and mid-March to mid-June (CW 11–24) 2022 were compared. These time periods were chosen based on (1) the declaration of a pandemic on March 11 from WHO (1), (2) data gaps for the initial months of each year, and (3) the turning point in the development of depressive symptoms at the end of the summer of 2020, as shown in Figure 3. Small gaps in some of these time periods could not be avoided; for example, there was no data from mid-March to the beginning of April 2019. We tested for two kinds of trends. First, we tested for differences in mean depressive or anxiety symptom score and proportions at or above PHQ-2/ GAD-2 cutoff between corresponding time periods across years for the overall population as well as within the different subgroups. For SRMH we tested for differences in mean and proportions with very good or excellent SRMH. Second, we tested for possible changes in differences in means or proportions between subgroups over the specified time periods.

To conduct these comparisons, we again used linear and logistic regression models to produce averaged predictions as described above. However, here we calculated estimates for the defined time periods by including a set of dummy variables indicating these periods in the survey year. Furthermore, all possible interactions of these dummies with age group, sex, and level of education were included. The specification of the linear and the logistic regression models again differed with regard to level of interaction. In the logistic regression only, three-way interactions were included, whereas the linear model also included four-way interactions. After model estimation, the standard population was used for prediction of the means of the specified time periods. Contrasts between the time periods and the differences between the subgroups between the time periods were estimated. We used Stata's "margins, contrast" command (105) for estimation and statistical testing using Wald tests, applying a significance level of ($p < 0.05$).

Before running these contrasts, we conducted joint tests or omnibus tests in order to control for multiple comparisons and reduce the likelihood of false significant results by using protected tests (106). We only performed pairwise comparisons between time periods if the hypothesis that all possible differences were zero could be rejected. To assess the permissibility of pairwise comparisons within subgroups, we jointly tested if the differences within all subgroups defined by sex, age group or level of education, respectively, were zero. To address the question of whether differences between subgroups changed over time, we conducted joint tests including all possible differences, i.e., a test for interaction of time and sociodemographic characteristic.

3. Results

Results of joint tests for differences between time periods in the general population were significant across indicators with the exception of proportions of positive PHQ-2 screen comparisons between years for the September-December time period (see Supplementary Table A1). Joint tests for differences in symptoms of depression in this same time period (CW 38–52) between years stratified by sex, age, and level of education were not significant for mean PHQ-2 scores, and only significant for age for proportion of positive screens. Because none of the joint tests for interactions between time periods and sociodemographic characteristics except for the interaction between mean anxiety score and age yielded significant results, we did not examine the question of changes in differences further. Results for individual pairwise comparisons are reported below only in case of significant joint test results.

3.1. Time trends of depressive symptoms in the adult general population

Symptoms of depression were observed from April 2019 to June 2022 and overall showed an initial decline followed by two increases in the observed pandemic time window (Figure 2, Tables 2–5):

Mean depressive symptom scores as well as the proportion of the population with a positive screen decreased during the first wave of the pandemic and the first summer plateau (March-September) in 2020, resulting in lower levels than in the same period in 2019.

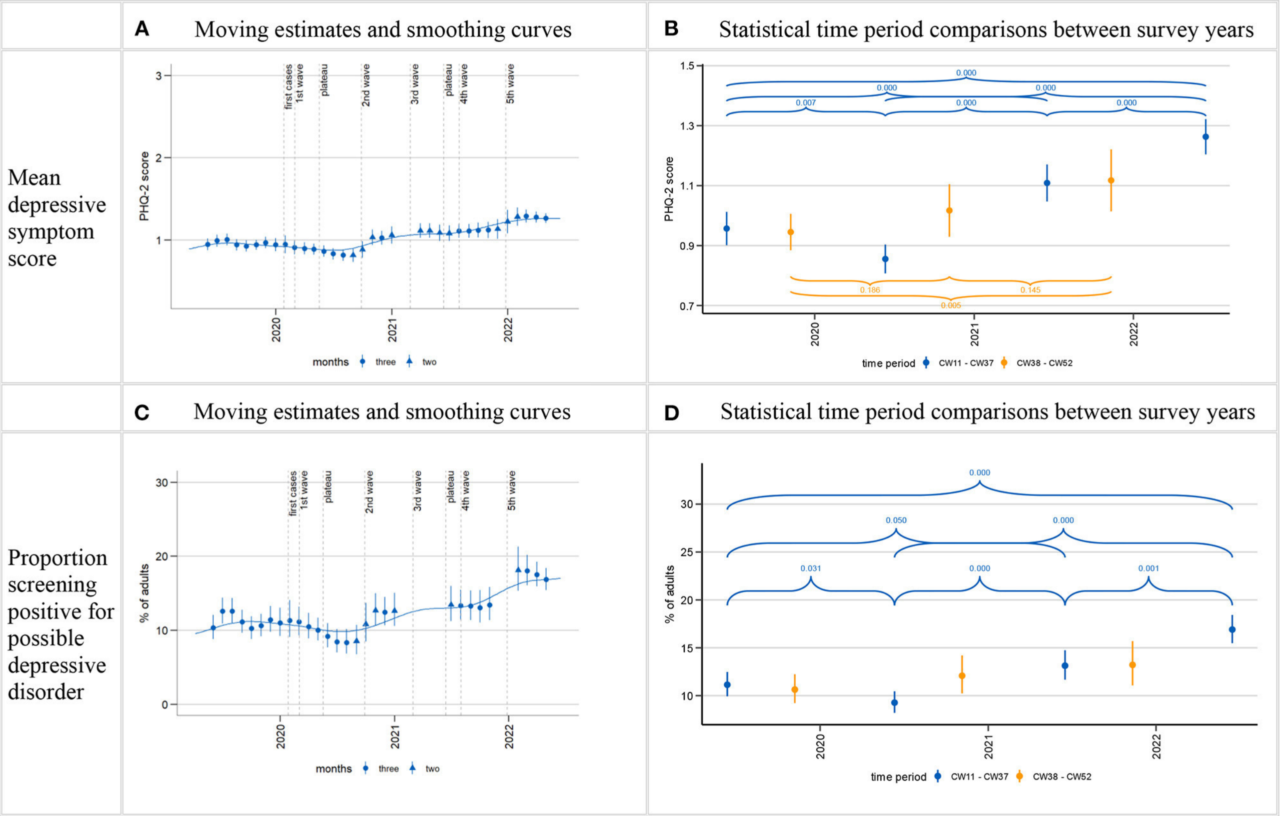

FIGURE 2
Time trends in depressive symptoms (PHQ-2). Time series starting from estimate centered on April/May 2019 and ending on estimate centered on April/May 2022. Calculation of three-month moving estimates and smoothing curves shown in **(A, C)** detailed in section 2.4.1 in Methods. Calculation of estimates for CW11-37 (mid-March to mid-September; CW11-24 in 2022) and CW38-CW52 (mid-September to end December) as well as *p*-values for comparisons between time periods shown in **(B, D)** detailed in section 2.4.2 in Methods. Gaps in the time series shown in **(A, C)** are due to data gaps. Larger gaps arise in the time series for proportion of positive screens **(C)** due to empty cells (absence of positive screens within certain sex, age, and level of education interaction cells in the regression model). *p*-values for comparisons between CW38-52 time period between years not shown for proportion of positive screens **(D)** due to non-significant joint tests, see Supplementary Table A1.

After the first summer plateau, the time series are characterized by two increases: Both PHQ-2 measures (means and positive screens) first increased between the beginning of the second wave in autumn 2020 and the beginning of the third wave in spring 2021. They reached relatively steady levels above those of 2019 from spring 2021 (*p*-values for comparisons of CW 38–52 period cannot be reported for proportions of positive screens due to non-significant joint tests). Both then showed further increases from late 2021 to early 2022 and remained elevated until the end of the observation period. March-June 2022 depressive symptom levels were significantly higher than in March-September in all three previous years.

This overall trajectory manifests in the following development of time period estimates for the spring/summer months over the 4 years observed (Tables 2, 4): The mean depressive symptom score in the population first decreased from 0.96 in 2019 to 0.86 in 2020 and then increased to 1.11 in 2021 and to 1.26 in 2022. The proportion of the population with a positive screen first decreased from 11.1% in 2019 to 9.3% in 2020. It then increased to 13.1% in 2021 and 16.9% in 2022.

3.2. Time trends of depressive symptoms stratified by sociodemographic characteristics

The results reported below can be found in Figure 3 and Tables 2–5. The reported subgroup estimates are standardized values. They should not be taken as population estimates for these groups.

3.2.1. Time trends of depressive symptoms by sex

Time series plots suggest that throughout most of the observation period, mean depressive symptom scores were higher in women than in men (Figure 3A). Likewise, percentages of positive screens for possible depressive disorder appear to be higher in women than in men for the most part, although the overlap was greater than for mean scores (Figure 3B). The overall shape of the plotted time series stratified by sex roughly matches that of the whole population: initial symptom declines followed by two increases. However, women experienced less relief in the early phases of the pandemic and earlier symptom increases in the later phases:

Declines in both mean symptom scores and proportion of positive screens in the early phases of the pandemic are seen in both sexes, but limited to the summer plateau in women. Statistical comparisons between spring/summer 2019 and 2020 only show significant declines in men (Tables 2, 4). The plotted time series suggest two increases in both measures in both sexes, the first between autumn 2020 and spring 2021, the second at the end of 2021/beginning of 2022. Statistical comparisons reveal significant increases above 2019 levels in spring/summer 2021 for women but not for men (*p*-values for CW 38–52 cannot be reported due to non-significant joint tests). Men's depressive symptom levels surpass 2019 levels for the first time in 2022, also rising significantly above 2021 levels. In women, this second visible symptom level increase does not result in levels significantly above 2021 levels.

Over the course of the observation period, mean scores and the percentage of positive screens among women standardized by age and level of education increased by 0.33 points (from 1.00) and 5.9 percentage points (from 11%) between spring/summer 2019 and spring/summer 2022; among men, by 0.26 points (from 0.93) and 5.5 percentage points (from 11.5%) (Tables 2, 4).

3.2.2. Time trends of depressive symptoms by age

Time series plots show a tendency for lower mean symptom scores among those aged 65+ years and, less consistently, higher mean symptom scores among 18–29-year-olds compared to the other age groups in the observation period (all age groups standardized by sex and education; Figure 3C). This pattern is less pronounced in the proportions of positive screens time series (Figure 3D). Supplementary Figure A2 shows these time series in a separate plot for each age group.

While no declines in depressive symptom levels are visible among those aged 65+ for the early stages of the pandemic, plotted time series show decreasing means and proportions of positive screens from the beginning of the outbreak among the middle age groups and among the youngest in summer 2020. However, these declines resulted in a significant difference between means in spring/summer 2019 and 2020 only for those aged 45–64 years (Table 2).

At different times between the second wave and the end of the observation period, every age group then showed increases in depressive symptom levels beyond pre-pandemic levels:

Among 18- to 29-years-olds, means and positive screens rose very markedly compared to other groups from autumn 2021 to the end of the year. The standardized proportion of positive screens reached 18.6% in September-December 2021, representing an 8 percentage point-increase from the same period in 2019, and means rose from 1.01 to 1.57. However, statistical uncertainty is fairly high in this group, and this increase did not reach significance compared to pre-pandemic levels (Table 5; *p*-values for means cannot be reported due to non-significant joint tests). Following the sharp increase at the end of 2021, symptoms returned to lower levels numerically but not statistically significantly above 2019 levels in 2022.

30- to 44-year-olds showed a temporary increase in both PHQ-2 measures in spring/summer 2021. Standardized mean symptom scores increased significantly from 2019 in this time and markedly compared to other groups (from 0.89 in 2019 to 1.21 in 2021, Table 2). The temporary increase of 3.7 percentage points (from 11.5% in 2019) in the standardized proportion of positive screens did not reach statistical significance (Table 4). Mean symptom scores (but not proportions) again significantly surpassed 2019 levels in spring/summer 2022, but not 2021 levels. However, this increase does not stand out in magnitude.

45- to 64-year-olds exhibited an increase in depressive symptom levels above pre-pandemic levels later than the other age groups. The time series graphs show increases from about mid-2021. Both PHQ-2 measures significantly surpassed 2019 levels for the first time in 2022 (Tables 2, 4), also surpassing 2021 levels, resulting in a 5.9 percentage point increase (from 12.7%) in the standardized proportion of positive screens between spring/summer 2019 and the same period in 2022.

Smoothing curves suggest an overall continuous increase in symptoms of depression from autumn 2020 among 65+-year-olds. Statistical time period comparisons also point to a particularly steady

TABLE 2 Comparison of estimated mean depressive symptom scores (PHQ-2) for mid-March to mid-September 2019–2022.

Calendar weeks	cw 11-37 2019			cw 11-37 2020			cw 11-37 2019 vs. cw 11-37 2020	cw 11-37 2021			cw 11-37 2019 vs. cw 11-37 2021	cw 11-37 2020 vs. cw 11-37 2021	cw 11-24 2022			cw 11-37 2019 vs. cw 11-24 2022	cw 11-37 2020 vs. cw 11-24 2022	cw 11-37 2021 vs. cw 11-24 2022
Outcome	Mean	95%-CI		Mean	95%-CI		*P*-value	Mean	95%-CI		*P*-values		Mean	95%-CI		*P*-values		
Total	0.96	0.90	1.01	0.86	0.81	0.90	0.007	1.11	1.05	1.17	0.000	0.000	1.26	1.20	1.32	0.000	0.000	0.000
Sex																		
Male	0.93	0.85	1.01	0.78	0.71	0.85	0.006	1.00	0.92	1.09	0.181	0.000	1.19	1.10	1.28	0.000	0.000	0.003
Female	1.00	0.92	1.08	0.94	0.87	1.01	0.291	1.22	1.13	1.32	0.001	0.000	1.33	1.26	1.41	0.000	0.000	0.084
Age																		
18–29	1.12	0.91	1.33	1.10	0.95	1.26	0.917	1.30	1.06	1.54	0.256	0.172	1.35	1.18	1.52	0.089	0.034	0.733
30–44	0.89	0.75	1.03	0.77	0.64	0.89	0.205	1.21	1.02	1.40	0.007	0.000	1.09	0.95	1.23	0.044	0.001	0.302
45–64	1.09	0.98	1.19	0.91	0.82	1.00	0.011	1.07	0.96	1.17	0.797	0.026	1.37	1.26	1.47	0.000	0.000	0.000
65+	0.80	0.71	0.89	0.73	0.65	0.81	0.267	0.94	0.86	1.02	0.022	0.000	1.15	1.07	1.24	0.000	0.000	0.000
Level of education																		
Low	1.20	1.05	1.35	1.02	0.91	1.14	0.074	1.33	1.16	1.50	0.264	0.005	1.45	1.31	1.58	0.015	0.000	0.283
Middle	0.91	0.84	0.98	0.81	0.75	0.87	0.033	1.02	0.94	1.09	0.038	0.000	1.20	1.12	1.27	0.000	0.000	0.001
High	0.68	0.62	0.74	0.66	0.58	0.74	0.784	0.87	0.81	0.94	0.000	0.000	0.98	0.92	1.04	0.000	0.000	0.014

Time periods: mid-March to mid-September 2019–2021 (CW 11-37) and mid-March to mid-June (CW 11-24) 2022. Calculation of estimates as well as p-values for comparisons between time periods detailed in section 2.4.2 in Methods. Estimates for each sociodemographic characteristic subgroup are standardized for the respective other two characteristics (e.g., estimates for women standardized for age and level of education). p-values for pairwise comparisons only reported in case of significant joint tests (Supplementary Table A1).

TABLE 3 Comparison of estimated mean depressive symptom scores (PHQ-2) for mid-September to end-December 2019–2021.

Calendar weeks	cw 38-52 2019			cw 38-52 2020			cw 38-52 2019 vs. cw 38-52 2020	cw 38-52 2021			cw 38-52 2019 vs. cw 38-52 2021	cw 38-52 2020 vs. cw 38-52 2021
Outcome	Mean	95%-CI		Mean	95%-CI		*P*-value	Mean	95%-CI		*P*-values	
Total	0.95	0.88	1.01	1.02	0.93	1.10	0.186	1.12	1.01	1.22	0.005	0.145
Sex												
Male	0.92	0.83	1.01	0.95	0.83	1.08	—	1.01	0.87	1.16	—	—
Female	0.98	0.89	1.07	1.08	0.96	1.21	—	1.23	1.07	1.38	—	—
Age												
18–29	1.01	0.80	1.22	0.95	0.74	1.16	—	1.57	1.04	2.10	—	—
30–44	1.09	0.89	1.30	1.07	0.77	1.38	—	1.00	0.80	1.20	—	—
45–64	1.03	0.93	1.14	1.11	0.96	1.27	—	1.17	0.99	1.35	—	—
65+	0.69	0.61	0.77	0.86	0.73	0.99	—	0.86	0.72	1.00	—	—
Level of education												
Low	1.12	0.96	1.27	1.15	0.92	1.38	—	1.31	1.01	1.60	—	—
Middle	0.94	0.85	1.03	1.01	0.90	1.12	—	1.06	0.95	1.18	—	—
High	0.71	0.63	0.79	0.77	0.68	0.85	—	0.88	0.77	0.99	—	—

Calculation of estimates as well as p-values for comparisons between time periods detailed in section 2.4.2 in Methods. Estimates for each sociodemographic characteristic subgroup are standardized for the respective other two characteristics (e.g., estimates for women standardized for age and level of education). p-values for pairwise comparisons only reported in case of significant joint tests (Supplementary Table A1).

TABLE 4 Comparison of estimated percentages of positive screens for possible depression (PHQ-2 score > 2) for mid-March to mid-September 2019–2022.

Calendar weeks	cw 11-37 2019			cw 11-37 2020			cw 11-37 2019 vs. cw 11-37 2020	cw 11-37 2021			cw 11-37 2019 vs. cw 11-37 2021	cw 11-37 2020 vs. cw 11-37 2021	cw 11-24 2022			cw 11-37 2019 vs. cw 11-24 2022	cw 11-37 2020 vs. cw 11-24 2022	cw 11-37 2021 vs. cw 11-24 2022
Outcome	%	95%-CI		%	95%-CI		*P*-value	%	95%-CI		*P*-values		%	95%-CI		*P*-values		
Total	11.1%	9.9%	12.5%	9.3%	8.2%	10.5%	0.031	13.1%	11.7%	14.7%	0.050	0.000	16.9%	15.5%	18.4%	0.000	0.000	0.001
Sex																		
Male	11.5%	9.7%	13.4%	8.6%	7.2%	10.3%	0.019	11.6%	9.7%	13.9%	0.897	0.019	17.0%	14.9%	19.3%	0.000	0.000	0.001
Female	11.0%	9.3%	13.0%	10.0%	8.5%	11.8%	0.448	14.7%	12.6%	17.2%	0.013	0.001	16.9%	15.0%	18.9%	0.000	0.000	0.176
Age																		
18–29	14.1%	9.7%	20.0%	12.4%	8.7%	17.2%	0.612	13.1%	8.5%	19.5%	0.791	0.841	16.4%	12.2%	21.8%	0.506	0.209	0.361
30–44	11.5%	8.7%	15.0%	8.5%	5.9%	12.2%	0.194	15.2%	11.1%	20.5%	0.186	0.019	11.5%	8.5%	15.4%	0.996	0.213	0.200
45–64	12.7%	10.6%	15.1%	10.0%	8.3%	12.1%	0.084	12.9%	10.5%	15.7%	0.902	0.081	18.6%	16.0%	21.5%	0.001	0.000	0.003
65+	9.0%	7.2%	11.3%	7.9%	6.4%	9.8%	0.404	11.3%	9.5%	13.5%	0.115	0.011	18.0%	15.9%	20.2%	0.000	0.000	0.000
Level of education																		
Low	16.2%	13.1%	19.9%	13.3%	10.6%	16.6%	0.202	17.5%	13.8%	22.1%	0.632	0.102	21.0%	17.7%	24.9%	0.057	0.001	0.211
Middle	10.6%	9.0%	12.3%	8.2%	7.0%	9.6%	0.028	11.4%	9.8%	13.1%	0.512	0.004	15.2%	13.5%	17.1%	0.000	0.000	0.002
High	5.5%	4.5%	6.8%	5.2%	3.9%	6.9%	0.766	8.0%	6.5%	10.0%	0.017	0.015	10.7%	9.3%	12.4%	0.000	0.000	0.024

Time periods: mid-March to mid-September 2019–2021 (CW 11-37) and mid-March to mid-June (CW 11-24) 2022. Calculation of estimates as well as p-values for comparisons between time periods detailed in section 2.4.2 in Methods. Estimates for each sociodemographic characteristic subgroup are standardized for the respective other two characteristics (e.g., estimates for women standardized for age and level of education). p-values for pairwise comparisons only reported in case of significant joint tests (Supplementary Table A1).

TABLE 5 Comparison of estimated percentages of positive screens for possible depression (PHQ-2 score > 2) for mid-September to end-December 2019–2021.

Calendar weeks	cw 38-52 2019			cw 38-52 2020			cw 38-52 2019 vs. cw 38-52 2020	cw 38-52 2021			cw 38-52 2019 vs. cw 38-52 2021	cw 38-52 2020 vs. cw 38-52 2021
Outcome	%	95%-CI		%	95%-CI		*P*-value	%	95%-CI		*P*-values	
Total	10.6%	9.2%	12.2%	12.1%	10.2%	14.2%	—	13.2%	11.1%	15.7%	—	—
Sex												
Male	10.6%	8.7%	12.9%	11.7%	9.2%	14.9%	—	13.2%	10.3%	16.9%	—	—
Female	11.0%	8.9%	13.4%	12.4%	9.9%	15.5%	—	13.1%	10.1%	16.9%	—	—
Age												
18–29	10.6%	6.3%	17.2%	12.0%	6.8%	20.3%	0.746	18.6%	11.0%	29.7%	0.143	0.258
30–44	14.0%	9.9%	19.6%	13.4%	8.2%	21.0%	0.871	8.5%	5.4%	13.1%	0.075	0.191
45–64	12.5%	10.1%	15.3%	13.1%	10.1%	16.9%	0.760	13.6%	10.0%	18.3%	0.638	0.853
65+	6.5%	4.7%	8.9%	10.7%	8.0%	14.1%	0.028	12.1%	9.0%	16.0%	0.007	0.554
Level of education												
Low	13.9%	10.4%	18.3%	16.7%	12.0%	22.8%	—	14.5%	9.8%	21.0%	—	—
Middle	10.8%	8.9%	13.0%	11.4%	9.2%	14.1%	—	12.3%	9.8%	15.4%	—	—
High	6.1%	4.3%	8.5%	6.2%	4.6%	8.5%	—	11.6%	8.7%	15.2%	—	—

Calculation of estimates as well as p-values for comparisons between time periods detailed in section 2.4.2 in Methods. Estimates for each sociodemographic characteristic subgroup are standardized for the respective other two characteristics (e.g., estimates for women standardized for age and level of education). p-values for pairwise comparisons only reported in case of significant joint tests (Supplementary Table A1).

trend of increase in this age group, with significant differences compared to 2019 in proportion of positive screens as early as end of 2020 and again end of 2021 (Table 5; p-values for comparisons of means in CW 38–52 cannot be reported due to non-significant joint tests) and significant differences compared to 2019 levels in means from spring/summer 2021 (Table 2). The marked increase in symptom levels within 2022 (significantly surpassing 2021 levels) also stands out in this group. The standardized proportion of positive screens reached 18.0% in spring/summer 2022–A 9% point increase from the same period in 2019 (Table 4).

3.2.3. Time trends of depressive symptoms by level of education

A social gradient is apparent throughout the observation period, with higher mean scores and proportions of positive screens for possible depression in those with the lowest levels of education, followed by the middle and high-level groups (all standardized by sex and age; Figures 3E, F). Just like with stratification by sex, the overall shape of the plotted time series stratified by level of education roughly matches that of the whole population: initial symptom declines followed by two increases.

However, the declines in means and positive screens in the first pandemic spring and summer result in statistically significant differences between 2019 and 2020 only in the middle level of education group (Tables 2, 4).

Smoothing curves suggest that the subsequent increases between autumn 2020 and spring 2021 as well as end of 2021 to beginning of 2022 amount to a particularly steady increasing trend in the high level of education group. Indeed, statistical time period comparisons show significant increases beyond 2019 levels in spring/summer 2021 in the high level group but not in the other two groups (*p*-values for CW 38–52 cannot be reported due to non-significant joint tests). Comparisons between 2022 and corresponding 2019 and 2021 time windows show significant increases compared to both years in both the high and medium level of education groups. In the low level of education group, means also increased significantly beyond 2019 (but not 2021) levels in 2022, and a *p*-value of 0.057 suggests a possible increase in the proportion of positive screens as well.

Looking at the whole observation period, the standardized proportions of those with a positive screen rose by 5.2 percentage points (from 5.5%) in the high level of education group, 4.6 (from 10.6%) in the middle group, and 4.8 percentage points (from 16.2%) in the low level of education group (not significant) between spring/summer 2019 and 2022 (Table 4).

3.3. Time trends of symptoms of anxiety and self-rated mental health

Symptoms of anxiety were observed from March 2021 to June 2022 and overall increased in this time (Figure 4, Table 6). Looking only at 2021, the moving averages suggest a possible increase in mean anxiety score in the population from spring into autumn, flattening out by the end of the year. This development is hardly reflected in the proportion of those exceeding the cut-off value for possible anxiety disorder. However, empty cells (no positive screens within certain sex, age, and level of education interaction cells in the regression model) around the two data gaps made it impossible to calculate the first and last estimates of 2021, as well as a CW 38–52 estimate, for the categorical outcome (Figure 4, Table 6).

Both measures of anxiety then show a marked increase from the first estimates of 2022 and consistently elevated levels until the end of the observation period. Time period comparisons confirm an increase in symptoms of anxiety between spring/summer 2021 and 2022: the population mean score increased from 0.75 in 2021 to 0.96 in 2022, and the proportion of positive screens increased from 7.2% in 2021 to 11.1% in 2022. Increases between 2021 and 2022 are found in both females and males, all age groups except those aged 30–44 years (just as with depressive symptoms, plot shows strong anxiety symptom increase end of 2021 for 18–29-year-olds), and in the medium and high level of education groups, but does not quite reach statistical significance in the low level of education group (Supplementary Figures A3, A4, Supplementary Table A2).

SRMH was observed from March 2021 to June 2022 and overall declined in this time (Figure 4, Table 6): Mean SRMH declined steadily between spring and autumn 2021 and then remained at a fairly constant level for the rest of the observation period. The percentage of those with very good or excellent SRMH, on the other hand, continued to decline until the end of 2021 and then increased slightly in 2022. The overall declines in both means and percentages in the course of the observation period were confirmed by statistical comparisons between spring/summer 2021 (mean: 3.44; percentage very good or excellent SRMH: 44.3%) and spring/summer 2022 (mean: 3.35 and percentage: 39.6%). Declines between 2021 and 2022 were found in both females and males, in those aged 45 and older, and in those with a low or high level of education (Supplementary Figures A5, A6, Supplementary Table A3).

4. Discussion

4.1. Summary

The present study investigated how depressive symptoms developed month-by-month between April 2019 and June 2022 in the adult population in Germany and whether trajectories differ by sex, age, and level of education. Moreover, it explored how symptoms of anxiety and SRMH developed in the shorter time window of March 2021 to June 2022. We found:

(1) Mean population depressive symptom scores as well as proportions of the population screening positive for possible depressive disorder showed a decline in the first wave of the pandemic and into the first summer plateau compared to the same months the year prior. Percentages of positive screens declined from about 11% in spring/summer 2019 to 9% in 2020. During the second wave starting in October 2020, this proportion as well as mean scores increased and remained consistently elevated throughout most of 2021, even during the summer months. Late 2021 until early spring 2022 saw another increase in both measures and sustained higher levels until the end of the observation period. By spring/summer 2021, the prevalence of those screening positive increased to 13%, between March and June 2022, it reached ∼17%.

(2) The observed overall trends in the development of depressive symptoms are, for the most part, evident across the examined

TABLE 6 Anxiety symptoms and self-rated mental health in different time periods: mean values, percentages and *p*-values for statistical comparisons.

	cw 11-37 2021			cw 38-52 2021			cw 11-24 2022			cw 11-37 2021 vs. cw 11-24 2022
		95%-CI			95%-CI			95%-CI		*P*-value
Anxiety symptoms										
Mean symptom score (GAD-2)	0.75	0.70	0.81	0.81	0.72	0.89	0.96	0.91	1.02	0.000
Percentages of positive screens (GAD-2 score > 2)	7.2%	6.2%	8.5%				11.1%	9.9%	12.5%	0.000
Self-rated mental health										
Mean score	3.44	3.40	3.48	3.35	3.29	3.41	3.35	3.31	3.38	0.001
Percentages of very good/excellent SRMH	44.3%	42.3%	46.3%	38.4%	35.4%	41.5%	39.6%	37.9%	41.3%	0.000

Time periods: mid-March to mid-September 2021 (cw 11–37), mid-September to end-December 2021 (cw 38–52), and mid-March to mid-June 2022 (cw 11–24). Calculation of estimates as well as p-values for comparisons between time periods detailed in section 2.4.2 in Methods. p-values for pairwise comparisons only reported in case of significant joint tests (Supplementary Table A1). Estimates for percentages of positive screens for CW38-52 could not be calculated due to empty cells (absence of positive screens within certain sex, age, and level of education interaction cells in the regression model).

subgroups. However, declines and increases are more pronounced in some groups than in others and vary in time course. The reduction in depressive symptoms in 2020 is particularly pronounced in men, among the two middle age groups, and the middle level of education group. Increases in depressive symptoms from autumn 2020 onward were found in all groups. However, numerically striking or statistically significant increases compared to pre-pandemic periods in 2019 were reached at different times. Women showed earlier symptom level increases than men, the youngest experienced particularly marked increases in 2021, and the eldest adults as well as the high level of education group stand out for earlier and more continuous increases than found in their respective comparison groups. The social gradient in symptom levels by level of education remained unchanged by these developments. No significant interactions between sociodemographic characteristic and time period, i.e., no evidence for changes in differences between subgroups, were found in the observation period.

(3) In keeping with these developments in depressive symptoms, SRMH decreased and anxiety symptoms increased between spring/summer 2021 and 2022. While both symptoms of depression and anxiety showed marked increases between the final estimates of 2021 and the first estimates of 2022 and remained elevated, SRMH showed no marked changes at this time.

4.2. Reduction in symptoms of depression in the first phases of the pandemic

Contrary to warnings of a potential mental health crisis at the start of the pandemic (2–5), our depressive symptom time series using the PHQ-2 show an initial reduction in both mean depressive symptom scores and proportions of individuals with a positive screen among adults in Germany during a first wave of infections. This first wave was mild in Germany compared to some other countries (107), and in the first pandemic summer, restrictions were eased and case numbers very low (20, 25). Analyses using the longer PHQ-8 in the same GEDA-EHIS data also showed a temporary reduction in symptoms of depression in the population between April 2020 and August 2020 in a month-by-month time series of the proportion of positive screens (108).

Findings on mental health in the early pandemic from other data sources and other countries are very mixed. This might be due to heterogeneity in observation and comparison periods and national contextual differences [e.g., 38, 43]. In contrast to our results, international reviews and meta-analyses conclude that many studies did find increases in psychological distress and symptoms of mental illness in the earliest phases of the pandemic (37, 38, 40, 109, 110), including symptoms of depression (40, 109, 111). While many studies with longer observation periods reported a decline back to or almost back to pre-pandemic levels in the summer months of 2020 (38, 40, 110), symptoms of depression were sometimes found to remain elevated for longer than symptoms of anxiety (40, 111). Also contradicting our results, a large population-based cohort study in Germany found an intra-individual increase in PHQ-9 scores during the first wave of the pandemic among those under the age of 60 (61) and in population-level means and proportions of positive PHQ-9

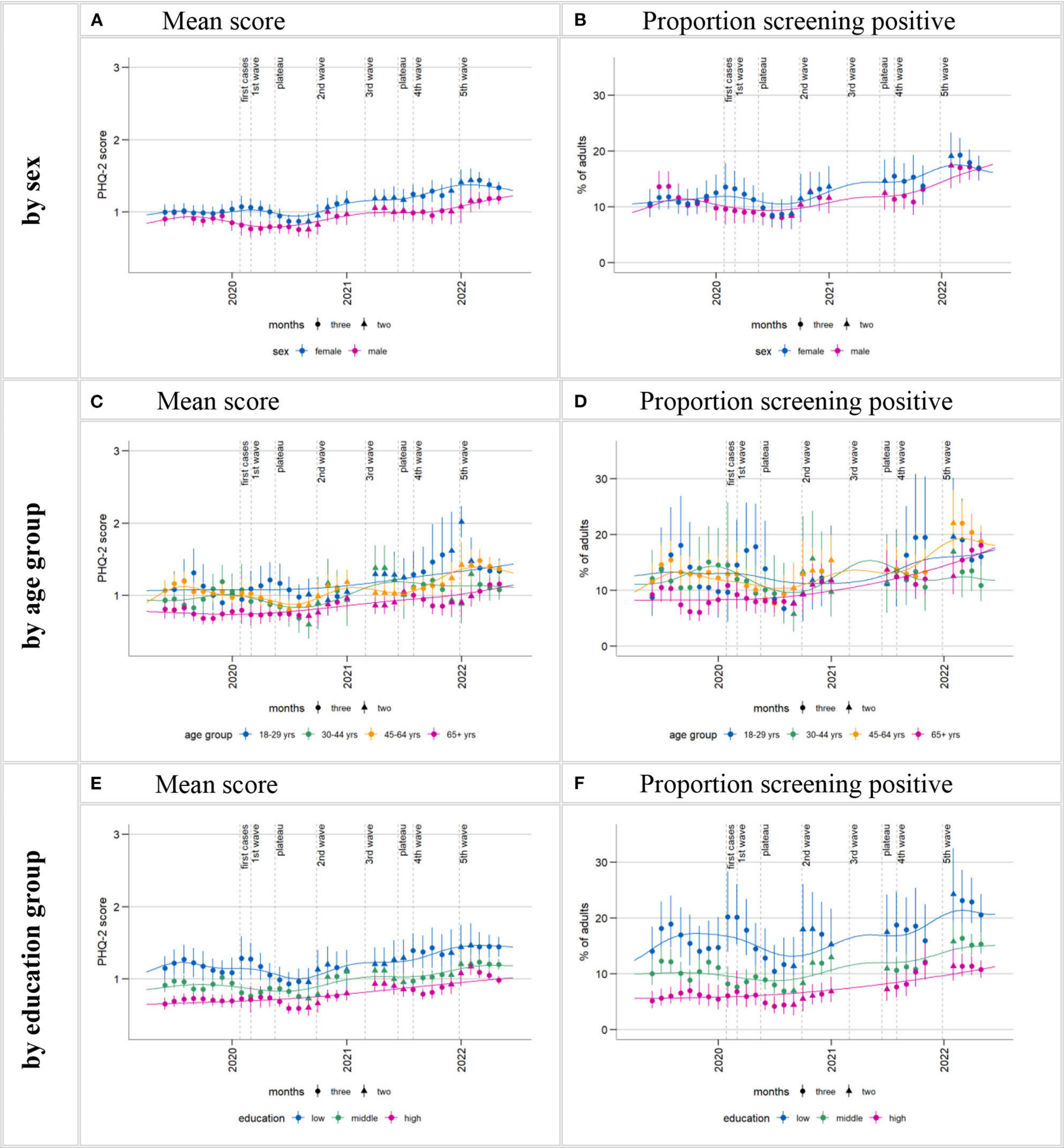

FIGURE 3
Time trends in depressive symptoms (PHQ-2) by subgroups. Time series starting from estimate centered on April/May 2019 and ending on estimate centered on April/May 2022. Calculation of three-month moving estimates and smoothing curves detailed in section 2.4.1 in Methods. Estimates for each sociodemographic characteristic subgroup are standardized for the respective other two characteristics (e.g., estimates for women standardized for age and level of education). Gaps in the time series are due to data gaps. Larger gaps arise in the time series for proportion of positive screens **(B, D, F)** due to empty cells (absence of positive screens within certain sex, age, and level of education interaction cells in the regression model). Supplementary Figure A2 shows these time series in a separate plot for each age group.

screens from 7.1% at baseline to 9.5% between May and November 2020 (46). Likewise, a longitudinal study based on representative household panel data found an increase in proportions of positive PHQ-2 screens from April to June 2020 (13.8%) compared to the year 2019 (9.6%) (45). These differences in findings may be due to differences in survey design such as the panel structure in the other studies in contrast to the monthly random samples in the present study and switches in survey mode from face-to-face to telephone interviews during the pandemic in one of the surveys (45). Differences in overall survey focus and framing (e.g., general

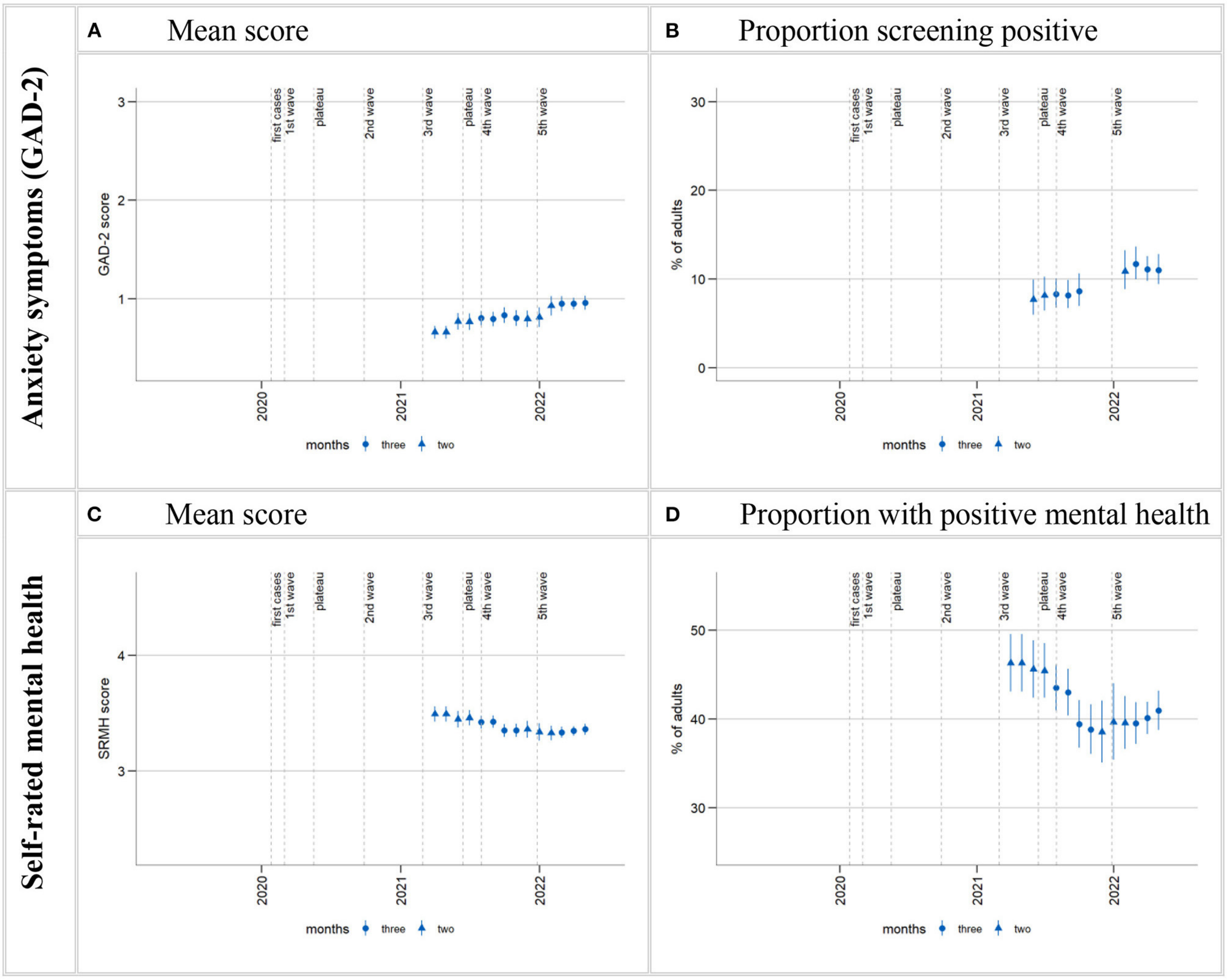

FIGURE 4
Time trends in anxiety symptoms and SRMH in the total population. Time series starting from estimate centered on March/April 2021 and ending on estimate centered on April/May 2022. Calculation of 3-month moving estimates detailed in section 2.4.1 in Methods. Gaps in the time series in **(B)** (including two missing estimates at the start of the time series) are due to empty cells (absence of positive screens within certain sex, age, and level of education interaction cells in the regression model) arising from data gaps. "Proportion with positive mental health" **(D)** is the proportion who rated their mental health as "very good" or "excellent".

health survey vs. surveys with a special focus on the pandemic) as well as the institutions conducting the survey also cannot be ruled out as contributing factors. A representative regional study also using single-stage random sampling found no changes in psychopathological symptoms during the first wave compared to a pre-pandemic baseline (112), and another nationwide study found no changes within the weeks of the first lockdown compared to the weeks before (113). Further in keeping with a picture of resilient populations in the first wave, continuous reductions in symptoms of depression within the first months of the pandemic were reported in a large-scale study in the UK (114), and an Irish population-based study found a significantly lower proportion of positive screens for depression in March to April 2020 than in February 2019 (115).

Our analyses do not permit conclusions about causal associations between pandemic developments and mental health developments, much less on possible reasons for any putative associations between the two. However, the context within which mental health developments take place and their temporal coincidence with societal developments warrant discussion. Possible benefits of a general and novel deceleration of life during lockdown in the relatively mild first wave and relief from a relatively quick return to near-normalcy in the first pandemic summer could be taken into consideration as potential factors playing into the dynamics we find. Benefits of deceleration as a potential explanation is supported by the fact that analyses based on the same data examining all depressive symptoms included in the PHQ-8 found a particular reduction in fatigue, loss of energy, and concentration difficulties, which are all closely linked to chronic stress (87, 108).

Stratification by subgroups shows that while there is evidence of symptom reduction in the first pandemic summer in all groups except adults aged 65 years and older, lower symptom levels in the first wave and statistically significant reductions in spring/summer 2020 compared with spring/summer 2019 were found in groups that may have experienced a particular deceleration of life: the middle-aged, who are typically particularly busy with the demands of paid and unpaid work, and men, who, for example, took on less additional childcare than women when childcare facilities closed, particularly in high-income countries (53). The middle level of education group and, somewhat less markedly, the low level of education group also exhibit this pattern. Several workplace-related factors may have played a mediating role in a possible association between educational attainment and mental health, e.g., significantly reduced working hours with or without financial compensation vs. increased working hours or job loss and working from home (46).

4.3. Declines in mental health from the second wave onward

4.3.1. Declines in mental health from the second wave onward in the general population

While most studies on mental health in the COVID-19 pandemic in Germany examine its first months only (43), our results shed light on the development of symptoms of depression in the adult population until June 2022 and reveal two increases. Consistent with our finding of increased mean depressive symptom scores as well as positive screens between the last months of 2020 and spring 2021, i.e., during the second wave of infections, a German study reports lower subjective psychological wellbeing measured using a screening tool for depression in December 2020 compared to May and September 2020 (116). Also in keeping with our findings, a representative survey of the German resident adult population showed that a far larger percentage of the population found the overall situation "depressing" in the second lockdown than in the first (47).

A significantly higher proportion of positive PHQ-2 screens (45) and mean symptoms scores (59) in early 2021 compared to 2019 were also found in the German representative panel study (the "Socio-Economic Panel"). However, in contrast to our finding that symptoms of depression first increased in the second wave following an initial decline in the first pandemic months, scores and percentages were actually found to be lower in January/February 2021 than in April through June 2020 in the SOEP. Despite this discrepancy, the January/February 2021 proportion of positive screens in this other study is 12%, very similar to the September-December 2020 levels (12.1%) in our study (we do not have data from January and February 2021).

While we have no data on symptoms of anxiety and SRMH from before the pandemic or in its early stages, our findings of a potential increase in symptoms of anxiety and a clear decrease in SRMH between March 2021 and the end of 2021 are in keeping with the picture of worsening mental health following the onset of the second wave.

These changes occurred in the context of a second wave of infections much larger than the first, followed very quickly by a third wave and a fourth, very severe wave with only short periods of lower infection rates in between. Although vaccinations began at the end of 2020, measures to slow transmission were in place for much of this time, mortality rates were high, and hospitals were reported to have come dangerously close to their limits (20, 21, 23–25). While, again, our results do not allow for conclusions on causal relationships between infection rates, mortality, NPIs, or other pandemic factors and mental health, associations between mean PHQ-4 scores and "pandemic intensity" have been reported in a meta-analysis (117).

The sheer increased duration of the cumulative pandemic stressors may also explain potential pandemic-related changes in mental health later on **(author?)** (19). A resilient response is more likely in the face of brief stressors than in the face of more chronic stress (18). In general, longer-term experiences of lack of control and helplessness threaten mental health and may be particularly related to depressive symptoms (16). Reductions in protective factors such as social contact, leisure activities (19), and access to the full spectrum of health services (16) may also grow more harmful with longer durations. Finally, most mental disorders take time to develop and manifest with a prodromal phase (118, 119). While our study does not address the prevalence of any mental disorders, the individual symptoms that comprise these disorders might be subject to the same dynamics.

Our findings of a further increase in symptoms of depression and symptoms of anxiety between late 2021 and early 2022 resulting in by far the highest levels in our over three-year observation period lend further support to the assumption of a potential build-up of pressure on mental health. The pandemic context at this time was a fifth wave of infections driven by the omicron variant immediately following the fourth wave and reaching the largest ever peak in new infections in April 2022 (21, 22), and yet a suspension of most NPIs from the beginning of April (35). Another major and acute population-wide stressor in the final 4 months of our observation period was the war in the Ukraine beginning on February 24th, 2022. It is of note that symptoms of depression and anxiety increased rather markedly in the January/February-centered estimate of 2022, which includes data until mid-March 2022, suggesting potential mental health impacts of the war (120) and emerging economic developments (11, 18). The fact that subsequent estimates remained elevated raises the possibility of developments beyond a short-lived reaction to a discrete event.

The absence of a decline in SRMH between late 2021 and early 2022 following its decline within 2021 suggests that increases in depressive and anxiety symptoms did not translate to people reporting worse overall mental health within this specific time window. Importantly, the temporal reference frame of these measures is very different: while the PHQ-2 and GAD-2 ask about the previous 2 weeks, SRMH has no reference time. Perhaps SRMH shows different dynamics in this particular time window as a more global and less acute measure. Also, mental health problems are known not to necessarily translate into poor SRMH in general (121). The present observation period is too short for conclusions about differences in dynamics between these indicators, but this would be interesting to analyze in longer time series.

4.3.2. Declines in mental health from the second wave onward by subgroup

Turning to subgroups, stratification by sex, age, and level of education in our uniquely long and continuous time series revealed increases in depressive symptom levels at different times after the onset of the second wave of infections in all groups. Increases in symptom levels were more pronounced in women than in men until the end of 2021. This finding is as expected based on previous literature [e.g., 41, 52, 53, 109] and considering factors such as a greater burden from increased care work among women (53) and increases in domestic violence (14, 16, 53). In 2022, however, men also showed a significant increase above 2019 levels, as well as above 2020 and 2021 levels (and, just like women, also increases in anxiety and declines in SRMH). This later increase may be due to new stressors or simply a delay in negative mental health developments.

While the sexes and the level of education groups all showed relatively similar overall trajectories, age groups differ in the shape of their time series after the onset of the second wave, suggesting that stressors and protective factors may differ by age in particular. In keeping with previous findings of mental health vulnerabilities among young adults in the pandemic (41, 49, 54–57), the youngest age group stands out in our study for its steep increase in depressive symptoms (and also symptoms of anxiety) at the end of 2021. Vulnerabilities in this group could be related to the transitional nature of young adulthood, the particularly great importance of social contact with peers when leaving the parental home (19, 51), and an overall greater disruption of life in this group (58) during the pandemic. On the other end of the age spectrum, those aged 65+ years stand out for early significant increases beyond pre-pandemic levels and a particularly constant trend of increase throughout the observation period from 9% positive screens in spring/summer 2019 to 18% in 2022 (standardized estimates). While most studies highlight risks among younger adults, a German study using primary care data found early increases of mental health diagnoses among those aged 80 and over (122), consistent with our results. A greater risk of severe disease and death from COVID-19 (16) may have resulted in greater stress and isolation throughout the pandemic (19) in this age group, with less relief from temporary suspensions of NPIs. While 45-64-year-olds do show worsening mental health, but only late 2021/early 2022, 30-44-years-olds stand out for somewhat steadier levels across indicators (except for one temporary increase in depressive symptoms), suggesting they may have been more resilient in the observation period.

The feared widening of disparities in mental health (16, 19, 50) by SES in the pandemic was not evident in our study, which looks at educational differences as one of the dimensions of SES. We found a similar overall trend in all education level groups, with an increase of about five percentage points in each group between spring/summer 2019 and spring/summer 2022. The high level of education group stands out for the greatest relative increase given baseline levels and in terms of how early and continuous increases are across the observation period. Previous international studies from other countries in the Organization for Economic Co-operation and Development (OECD) have also found greater increases in psychological distress in higher SES groups (52, 56, 69, 70). In Germany, for example, greater declines in life satisfaction during the pandemic have been reported for higher income individuals (57, 123). Discussed reasons include more working from home in this group (124), which has been shown to be linked to mental health declines in the pandemic (46). Moreover, this group may have experienced a more substantial change in lifestyle more generally (56), perhaps with concomitant greater expectations for the constant availability of resources (70). However, a complex set of risk factors is likely to be at play in all education groups. Occupational and financial difficulties were identified as particularly crucial for an increase in depressive and anxiety symptoms in Germany (46). Importantly, the established social gradient in the risk of depressive symptoms remains unchanged until the end of the observation period in our study, with twice the percentage of positive screens in the low as in the high level of education group in spring/summer 2022.

4.4. Strengths and limitations

4.4.1. Strengths

Three features of the study should be highlighted as strengths: (1) Continuous, representative data spanning 1 year before the outbreak of COVID-19 and over 2 years of the pandemic: While most of the existing literature on mental health developments during the COVID-19 pandemic in Germany covers limited time periods and focuses on the early phases of the pandemic only, we present results on the whole course of the pandemic until June 2022, including pre-pandemic data for depressive symptoms. (2) Development of a method for assessing trends at higher temporal resolution: A method for deriving robust month-by-month results from relatively small samples was developed. Using graphical representations of monthly moving estimates, multiple adjustments of the sample, and smoothing spline curves, we were able to produce graphic time series for the visual identification of trends which were nearly all verified by statistical time period comparisons. This demonstrates the feasibility of this approach to high-frequency mental health surveillance. (3) Examining developments over time both in mean scores and using scale cutoffs: The relevance of population means for public mental health in connection to Geoffrey Rose's ideas about prevention and health promotion at the population level has been previously discussed (84). Changes in the population symptom level are of interest irrespective of whether they result in more positive screens. The additional examination of positive screens permits conclusions on whether changes manifest in increases or reductions in cases of potential immediate clinical significance.

4.4.2. Limitations

Limitations in the interpretation and evaluation of our findings include: (1) Time periods of observation and comparison: Because the time series on anxiety symptoms and SRMH span only about 16 calendar months during the pandemic and include no pre-pandemic data, observed developments cannot be contextualized temporarily and are more difficult to interpret than the longer time series for depressive symptoms (11 months pre-pandemic, 27 months during the pandemic). However, even for depressive symptoms, 11 months of pre-pandemic data are not sufficient to control for seasonal trends and long-term secular trends. By providing more context, longer time series would also facilitate our understanding of how meaningful the observed magnitudes of change are. (2) Gaps in data collection: Data collection was interrupted four times for depressive symptoms and twice for anxiety symptoms and SRMH. Also, for some months the number of observations was low. These monthly periods with fewer than 1,000 observations were minimized by using months ranging from the middle of one calendar month to the following calendar month. Additionally, predictions on a three-month window were still made when only 2 months were included. Thus, results assigned to the central months might be biased toward the first or the third months in the window or just averages of the first and the third month. Also, one gap in the GEDA study was filled with data from the COVIMO study, which had a comparable design but a different overall framing and focus. However, we checked for and did not find systematic, study-related differences. (3) Representativity of the sample for the general population and statistical power for subgroups: The response to population-based telephone surveys typically varies systematically by sociodemographic factors (125). In particular, younger individuals and those with lower levels of education are underrepresented in our study. We used weighting factors to account for population structure, but the small number of cases in these groups may mean that possible changes over time within a group and differences from other groups might not be detected. In order to reliably achieve statistical significance in the subgroup analyses, larger sample sizes within certain subgroups would be required. Mentally ill and especially severely mentally ill individuals may also be less likely to participate (126, 127), a bias for which we cannot correct. Similarly, we cannot rule out the possibility that willingness to participate in a survey conducted by a governmental public health institute during the pandemic was related to subjective pandemic-related psychological distress. (4) Measurement and scaling: Using short versions of screeners to measure depressive and anxiety symptoms results in a restricted range of scores compared to the full questionnaires. This might have decreased the likelihood of detecting changes compared to the respective long versions with more items. Additionally, the PHQ-2 and the GAD-2 as well as its long versions PHQ-8, PHQ-9, and GAD-7 measure the severity of depressive and anxiety symptoms on an ordinal scale. However, validation supports the interpretation as a metric scale (86, 128). According to this assumption, distributions of PHQ-based measures are commonly described by means of sum scores [e.g., 46, 57, 73, 114]. Furthermore, information based on self-report can be subject to recall-bias and social desirability (129). While telephone surveys have the advantage of not limiting the sample to those who are able to complete a survey online or *via* an app, social desirability may represent more of a confound with this survey mode (130).

4.5. Conclusion and implications

The main implications of our findings derive from the observation of a two-stage substantial decline in mental health in later phases of the pandemic. While the clinical significance of the changes observed in population mean depressive symptom scores is unclear, the increase in depressive symptoms cannot solely be attributed to elevated symptom levels below the clinical screening threshold. Instead, it resulted in an increase in the proportion of the population screening positive for possible depressive disorder by ∼5–6% points when comparing estimates for CW 11–37 in 2019 with almost the same weeks (CW 11–24) in 2022. Our findings of increasing symptoms of anxiety and decreasing SRMH between 2021 and 2022 are consistent with this picture of a deterioration of mental health in the population. Continued surveillance will show whether this deterioration was temporary or part of a more sustained development. Research using more extensive screening instruments and diagnostic tools as well as research looking at trajectories of mental healthcare needs is also required for a full assessment of longer-term changes and their clinical meaning. However, our results as they stand call for vigilance with regard to possible changes in mental healthcare needs ranging from an increased need for diagnostic clarification and sub-clinical prevention measures to a greater need for secondary prevention. In addition, they point to a great need for mental health promotion and health in all policies approaches (131).

Evidence on vulnerable groups can provide guidance in the allocation of measures of mental health promotion and prevention. Overall, none of the examined sociodemographic groups prove to be consistently resilient. An effective public health response thus faces the challenge of addressing the entire population and cannot target clearly identifiable risk groups. However, in keeping with many other studies, a particular focus on women and young adults, but also the eldest adults, may be warranted. The final months in our time series, which saw the introduction of a new major societal-level stressor, indicates that mental health developments of men and adults in later middle age should also be observed closely. They show that vulnerabilities may be subject to change over time, demanding continued observation and reporting to increase awareness and flexibility in public health policy and mental health practitioners. As was the case before the pandemic, there is still a high need for mental health support for individuals of low socioeconomic status. Despite our finding of particularly early and continued increases in depressive symptoms among the high level of education group, the social gradient of lower mental health in the low level of education groups clearly persists across our time series.

Particularly with regard to current circumstances, mental health trends in the population should be observed and evaluated continuously and systematically. Further temporal dynamics in mental health seem very likely in view of a wide range of potential contributing factors and ongoing crises. These include the continued dynamic development of the pandemic and public health measures in response (132), the risk of chronification of stress reactions due to the persistence of stressors or loss of resources (16, 19), and the emergence of further mental health risk factors such as a long-term economic recession (11, 18) as well as other crises not related to the pandemic. It is possible that recent events such as the war in the Ukraine may have contributed to 2022 mental health declines (120). The exacerbation of the global climate crisis (133, 134) represents another major ongoing contextual factor. All of these crises taken together might also contribute to increased experiences of multiple disasters, which can exert a specific impact on public health (135). Fundamentally, the psychological impact of crises is likely to vary over time. For the pandemic, we can assume overlapping effects of immediate fear, followed by responses to adversities, consequences of insufficient mental health support, and long-term implications of recession or uncertainty (110). Because mental disorders frequently develop over a longer period of time during which multiple stressors exceed individual resources and interact with individual vulnerability, the possibility of delayed and substantial rises in the prevalence of mental disorders cannot be ruled out.

A continuation of mental health surveillance made possible by uninterrupted data collection is also needed in less tumultuous times to safeguard crisis preparedness. Our results show that mental health trends in the general population can change suddenly, supporting the utility of an early warning system. Sufficiently long time series of mental health indicators are required in order for high-frequency surveillance to help inform public health policy by identifying changes, assessing their significance and relevance against the backdrop of previous dynamics, and evaluating the impact of public health interventions effectively. In addition to this fundamental need for continuous mental health data, future studies should expand findings to the whole life span by including the observation of children and adolescents. Moreover, they should go beyond the use of screening instruments to measure symptoms in assessing the prevalence of mental disorders and include longitudinal designs in order to better understand mechanisms of vulnerability and resilience in the face of individual as well as collective determinants of mental health.

Data availability statement

The data set cannot be made publicly available because informed consent from study participants did not cover public deposition of data. The population-based data from the German health monitoring program that was used in this study is available from the Robert Koch Institute (RKI) but restrictions apply to the availability of this data, which was used under license for the current study. A minimal data set is archived in the Health Monitoring Research Data Centre at the RKI and can be accessed by all interested researchers. On-site access to the data set is possible at the Secure Data Centre of the RKI's Health Monitoring Research Data Centre. Requests should be submitted to the Health Monitoring Research Data Centre, Robert Koch Institute, Berlin, Germany (Email: fdz@rki.de).

Ethics statement

GEDA and COVIMO are 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). Participation in the study was voluntary. The participants were informed about the aims and contents of the study and about data protection. Informed consent was obtained verbally. In the case of GEDA 2019/2020, the Ethics Committee of the Charité–Universitätsmedizin Berlin assessed the ethics of the study and approved the implementation of the study (application number EA2/070/19).

Author contributions

EM and LW wrote most sections of the manuscript, integrating drafts for specific sections from co-authors. EM developed the main conceptual ideas and coordinated the research process as a senior researcher. EM, LW, SJ, SD, CK, and SM developed the specific research questions and discussed the analytical approach. SJ performed the statistical analyses, worked with SD to develop the statistical methods, and produced the results graphs. Together they drafted the analysis section of the manuscript. LW and EM interpreted the results. CK primarily contributed to the interpretation of educational disparities, assisted by SM as senior researcher in the area of health inequalities. JT, as project leader of the Mental Health Surveillance, contributed to all content discussions and by drafting some sections of the Introduction and Discussion. SE contributed information on the existing relevant literature for Germany. DP and SS contributed to the manuscript with comments and suggestions, as did HH as the head of the Unit of Mental Health at the RKI. All authors gave crucial input on drafts of the manuscript and read and approved the final version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The handling editor WR declared a shared affiliation with the author SS at the time of review.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2023.1065938/full#supplementary-material

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Trans-diagnostic determinants of psychotherapeutic treatment response: The pressing need and new opportunities for a more systematic way of selecting psychotherapeutic treatment in the age of virtual service delivery

Barna Konkolÿ Thege [1,2]*, Talia Emmanuel [1], Julie Callanan[3] and Kathleen D. Askland [4,5]

[1]Waypoint Research Institute, Waypoint Centre for Mental Health Care, Penetanguishene, ON, Canada, [2]Department of Psychiatry, University of Toronto, Toronto, ON, Canada, [3]Adult Psychiatric Services, Mashpee, MA, United States, [4]Askland Medicine Professional Corporation, Midland, ON, Canada, [5]Department of Psychiatry and Behavioural Neurosciences, McMaster University, Hamilton, ON, Canada

Numerous forms of psychotherapy have demonstrated effectiveness for individuals with specific mental disorders. It is, therefore, the task of the clinician to choose the most appropriate therapeutic approach for any given client to maximize effectiveness. This can prove to be a difficult task due to at least three considerations: (1) there is no treatment approach, method or model that works well on all patients, even within a particular diagnostic class; (2) several treatments are equally efficacious (i.e., more likely to be effective than no treatment at all) when considered only in terms of the patient's diagnosis; and (3) effectiveness in the real-world therapeutic setting is determined by a host of non-diagnostic factors. Typically, consideration of these latter, trans-diagnostic factors is unmethodical or altogether excluded from treatment planning – often resulting in suboptimal patient care, inappropriate clinic resource utilization, patient dissatisfaction with care, patient demoralization/hopelessness, and treatment failure. In this perspective article, we argue that a more systematic research on and clinical consideration of trans-diagnostic factors determining psychotherapeutic treatment outcome (i.e., treatment moderators) would be beneficial and – with the seismic shift toward online service delivery – is more feasible than it used to be. Such a transition toward more client-centered care – systematically considering variables such as sociodemographic characteristics, patient motivation for change, self-efficacy, illness acuity, character pathology, trauma history when making treatment choices – would result in not only decreased symptom burden and improved quality of life but also better resource utilization in mental health care and improved staff morale reducing staff burnout and turnover.

KEYWORDS

psychotherapy, treatment selection, moderator, guideline development, tele-mental health

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EDITED BY
Wulf Rössler,
Charité Universitätsmedizin Berlin, Germany

REVIEWED BY
Dilaram Acharya,
Université de Montréal, Canada
Eric Martin Plakun,
Austen Riggs Center, United States

*CORRESPONDENCE
Barna Konkolÿ Thege
✉ konkoly.thege.barna@gmail.com

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The status quo: Psychotherapeutic treatment selection in current clinical practice

Despite the large variety of factors influencing psychotherapeutic treatment outcomes, when making treatment choices, diagnostic factors are usually prioritized when following clinical practice guidelines published by internationally recognized consortiums such as the National Institute for Health and Care Excellence (United Kingdom) (1), the Canadian Network for Mood and Anxiety Treatments (Canada) (2), and the American Psychiatric Association (United States) (3). These guidelines are disorder-specific, with most providing 1st, 2nd, and 3rd-tier treatment recommendations based on the amount of high-quality research evidence supporting the use of each individual psychotherapy modality.

Some guidelines/algorithms reference a small number of non-diagnostic factors such as severity of illness and patient preference, but to the best of our knowledge, none provide explicit direction or recommendations related to (a) how to choose from amongst treatment modalities within a single tier, (b) how to assess for and weigh non-diagnostic factors when selecting within (or across) tiers (e.g., how heavily to weigh patient preference when it opposes first-line treatment recommendations), and c) the relative importance of non-diagnostic factors in relation to treatment outcomes [cf. (4)].

Without this more detailed guidance, consideration of non-diagnostic factors is most often unmethodical, superficial, or altogether excluded from treatment plan decision-making. In the limited number of cases where these factors are indeed considered, they are typically evaluated only once a patient has been deemed "treatment-refractory" or "treatment-resistant" (5) and, therefore, at a considerable delay relative to psychotherapeutic treatment initiation. Consequences of this delay include suboptimal quality of patient care, inappropriate clinic resource utilization, patient dissatisfaction with care, patient demoralization/hopelessness, and ultimately, treatment failure.

Beyond the limitations of current, diagnosis-centered treatment guidelines, the small number of available treatment options at clinics or individual service providers has also limited the practical relevance of the question of treatment selection. Namely, in everyday clinical practice, most clinicians and (private or government-funded) mental health clinics have been able to provide a single or a very limited number of treatment approaches (6) decreasing the practical relevance of the question of how to select the best psychotherapeutic modality for their clients. That said, more careful investigation of the relative value of various treatment modalities for various patient groups may reveal that frequent practical "compromises" (e.g., offering only a single modality of treatment within a clinical setting) has the potential to be wasteful or even harmful. While common wisdom may suggest that "something is better than nothing", this may not be the case. For example, not only do some patients become demoralized when repeatedly offered "standard" treatments but clinical staff can likewise become frustrated with patients who do not get better, contributing to potentially inappropriate discharge from care, stigmatization and safety risk.

How did we get here? The limitations of existing treatment guidelines and their evidence base

This state of the matters presents the intriguing possibility that the very foundation of clinical practice guideline development and their use in everyday clinical practice may have a disorienting influence on treatment selection. That is, orienting practitioners to use diagnosis as the primary determinant in differential psychotherapeutic treatment consideration and selection implicitly assumes (but provides no empirical justification for) that diagnosis is the fundamental determinant of treatment response and, accordingly, should be the primary guide to psychotherapeutic treatment selection.

However, a large array of non-diagnostic factors have been proposed and/or evaluated as potential determinants (predictors, moderators and mediators) of optimal psychotherapeutic treatment selection and response [e.g., (7–10)]. Many such studies provide evidence that several non-diagnostic factors may be equally or more useful for predicting treatment response than diagnosis itself (11–22). Moreover, some of this research suggests that reliance upon diagnosis as the primary or sole basis for treatment selection may increase the probability of ineffective, inefficient, or failed treatment. Therapies that are somewhat effective under the current conditions might have significantly larger beneficial effects in terms of both specific symptom reduction and overall quality of life if matched with service users who are most responsive to the given therapeutic modality. The process of matching psychotherapeutic treatment to patient (or, for that matter, the choice of pharmacologic agents or the choice between pharmacologic and psychotherapeutic treatment approaches) involves a complex set of considerations that have been explored by various investigators over time. However, this literature is fairly siloed (23), and there appears to be little agreed-upon language that would permit this body of literature to be readily accessed and utilized by most clinicians, administrators or healthcare policy makers.

Importantly, it has also been noted that most psychotherapeutic research of the last three decades has been focused on outcomes, rather than mechanisms of action (24). This focus has the effect of reducing complex and multifactorial treatments to their labels and, in effect, entails an assumption that, for example, "cognitive behavioral therapy for panic disorder" is the same treatment across institutions, practitioners, patients, cultural contexts and time [see (20) for a more extensive discussion of this problem].

Further, the diagnosis-oriented nature of treatment guidelines is strongly influenced by the literature upon which such guideline recommendations are based: the vast majority of studies assessed when constructing clinical practice guidelines are randomized controlled trials comparing a single treatment (whether pharmacologic or psychological) to placebo or treatment-as-usual in a diagnostically homogeneous sample. Thus, there are only very few studies that could be used by guideline developers to substantiate recommendations as to the relative probability of effectiveness of one active treatment over another. Moreover, because of the difficulty in accessing (and therefore evaluating, synthesizing, and comparing) the literature on non-diagnostic factors, it is not surprising that this literature is rarely cited or systematically considered in the development of treatment guidelines and algorithms.

A better alternative: Psychotherapeutic treatment selection systematically considering trans-diagnostic factors

Research has identified a large array of non-diagnostic factors that have been evaluated as potential determinants (predictors and moderators) of optimal psychotherapeutic treatment selection/response. When choosing among psychotherapeutic modalities, practitioners ideally should consider all or at least several of these patient-, clinician- and clinic-specific factors that can potentially impact treatment outcomes. These include – among others – sociodemographic characteristics (e.g., age, level of education, race and ethnicity), patient motivation or readiness for change, patient self-efficacy, illness acuity, specific comorbid illnesses (especially character or personality pathology), overall amount of psychopathology [cf. the p-factor (25)], trauma history, previous treatment history and outcomes, client's and clinician's preferred therapy delivery style, and clinic environment/resources.

In cases where these non-diagnosis-related factors are assessed and taken into consideration at clinic intake, patients may be more responsive to treatment (due to treatment personalization and patient engagement in treatment planning) and motivated to initiate change in emotion regulation, cognitions and behaviors. In the most ideal situation, instead of treatment assignment based on diagnoses, implicit clinician preference/bias or immediate resource availability (i.e., the typical elements influencing classic treatment selection), a set of evidence-informed predictors of treatment acceptability and response is to be used to perform personalized and holistic treatment recommendation/selection.

We anticipate that mental health treatment recipients could benefit considerably from such an evidence-based/informed systematic process for treatment selection, which would permit treatment recommendation(s) to be tailored to the individual's goals and broader characteristics predictive of treatment response. Even if no factors clearly predict a single best treatment modality (26), patients could still benefit from learning about the set of treatment modalities that are more vs. less optimal fits for their case. Moreover, a standardized (evidence-based/-informed) protocol for psychotherapeutic treatment selection could assure that the right treatment is delivered to patients who will most benefit from them (27–30), allowing for conservation of staff, clinic, and other vital mental health resources, which could also lead to improved staff morale, satisfaction with work and thus reduced staff turnover (26).

Where do we go from here? Next steps toward more client-centered treatment selection

To remedy the suboptimal status quo, there is increased interest in applying concepts of stratified medicine in psychotherapeutic treatment selection. Stratified medicine (31) specifically seeks to refine treatment selection procedures based on identifiable moderators of differential treatment response. While the necessity of a more personalized psychotherapeutic treatment selection has likely been evident for numerous clinicians and researchers for some time (32), the large number of potential moderators compared to the relatively low number of study participants involved in efficacy and effectiveness research significantly hinders effective examination of this important issue (33).

The process of identifying and validating moderators of treatment response in mental health should ideally begin with a comprehensive and rigorous evaluation (i.e., systematic review and meta-analysis) of studies with direct comparisons of active psychological interventions in order to identify candidate factors with the best evidence as trait- or state- (34) moderators of differential treatment response (23). While there is some progress in this regard (33, 35), the conclusions of these review studies suggest that we do not yet have enough good-quality original data to inform psychotherapeutic treatment selection both because of the suboptimal investigation of moderators and the narrow range of therapeutic modalities considered in the original literature. Therefore, the allocation of dedicated resources would be essential to undertake prospective trials rigorously evaluating potential moderators that could best predict optimal treatment selection. The consideration of more psychotherapeutic approaches – including middle- and longer-term treatments as well, which have been understudied in research in the previous decades in comparison to brief, easy-to-standardize interventions – would also be necessary to make progress with the agenda of systematic treatment selection. Investigating the effectiveness of psychotherapeutic interventions on the middle and long term would also be essential to reach more reliable conclusions on which therapy should be recommended to whom (36). Comparing the effectiveness of the same therapeutic approach with matched (non-diagnostic factors also considered) vs. non-matched (only diagnosis considered) clients could help us better understand the magnitude of the difference in treatment effect (both in terms of specific psychopathological symptoms and overall quality of life) we can expect from a more systematic way of treatment selection [cf. (37)]. Finally, based on the reviewed and newly created evidence, the identified moderators should be considered when developing clinical practice guidelines and decision-aiding algorithms for systematic treatment selection in psychotherapeutic practice.

We believe that the seismic shift toward virtual psychotherapeutic service delivery due to the COVID pandemic – despite the numerous challenges – offers a huge opportunity to move toward more systematic treatment selection; both in terms of generating research evidence and allowing a more client-centered clinical practice. With virtual service delivery, the limitations of a given clinician or particular clinic now pose significantly smaller barriers than in the past as more distant service providers with a better match to client characteristics have recently become realistic alternatives. While it may be true that certain client populations [most likely those with more severe pathology cf. (38)] are less suitable for online service delivery, we believe that the vast majority of psychotherapy recipients with mild to moderate level of functional difficulties can benefit similarly from virtual/online vs. face-to-face psychotherapy (39, 40).

We argue that the shift toward virtual service delivery could also bring new opportunities *via* (1) online services that offer help to treatment seeking individuals in finding mental health service providers[1] and (2) platforms offering online outcome monitoring services to a large number of diverse mental health clinicians[2] (this could also work in conjunction with traditional, face-to-face therapy delivery). These organizations – which already collect a large amount of client data, including both real-life outcome data and potentially relevant moderator variables – in collaboration with researchers, could easily collect and analyze a vast amount of data on client characteristics and treatment outcomes. These data, in turn, could facilitate the development of algorithms to support more optimal treatment selection, improving the chance of success for each client (and their treatment provider).

Further, mid-sized or large mental health care organizations could now expand the range of therapeutic approaches available within their systems in a financially feasible way and match clients to the most promising treatment approach regardless of the physical distance between client and therapist. While investing in the training of staff in therapeutic modalities ideal to less (but still a significant number of) clients was not feasible in the past, the current landscape of online service delivery allows organizations or clinician networks to assess and diversify the therapeutic modalities available within their systems and use them in an economic way for the benefits of all (not just the assumed or actual majority of) clients, therapists, and the mental health care system as a whole.

Conclusion

Psychotherapeutic treatment selection is a largely neglected topic within the mental health care literature. Given that diagnosis alone is insufficiently predictive of psychotherapeutic treatment outcome, it is clear that non-diagnostic factors contribute to differential effectiveness and efficiency. Despite this fact, clinical practice guidelines are organized entirely around diagnosis and rarely reference non-diagnostic factors in recommending or prioritizing treatment options. We propose that this diagnostically-oriented framework for psychotherapeutic treatment selection omits critical patient-, therapist- and clinic/contextual factors that could help increase the overall effectiveness of psychotherapy, which – some argue – are much more limited (36, 41) or actually, more harmful [cf. (42, 43)] in the real-life setting than many strictly controlled trials indicate. Moreover, failure to account for non-diagnostic factors likely contributes to treatment misapplication, clinical waste and, perhaps, avoidable harm to patients and staff morale. We propose that a systematic, research-based consideration of non-diagnostic factors in psychotherapeutic treatment selection is desirable and possible. The COVID pandemic has facilitated the use of and comfort with online service delivery both in treatment recipients and providers. Thus, while geographic proximity had long been a limiting factor in patient access to best-matching psychotherapeutic care, it should no longer serve as a justification for a "one-size-fits all" approach to psychotherapeutic treatment availability and selection.

Data availability statement

No datasets were generated for this study.

Author contributions

KA developed the concept of the paper. KA and BKT wrote the first draft of the manuscript. All authors contributed to reviewing and interpreting the extant literature, final version as well as read, and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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[1] For example: https://www.betterhelp.com or https://www.psychologytoday.com/ca/therapists. Please note that these are simply examples to allow readers to consider the authors' argumentation more in-depth. Mentioning these services means no endorsement of these companies by the authors for any reason.

[2] For example: https://www.myoutcomes.com or https://www.greenspacehealth.com/en-ca/. Please note that these are simply examples to allow readers to consider the authors' argumentation more in-depth. Mentioning these services means no endorsement of these companies by the authors for any reason.

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Wulf Rössler,
Charité Universitätsmedizin Berlin, Germany

REVIEWED BY
Marjan Mardani-Hamooleh,
Iran University of Medical Sciences, Iran
Jose Antonio Ponce Blandón,
Cruz Roja Espanola, Spain

*CORRESPONDENCE
Leonor Rivera Rivera
✉ lrivera@insp.mx

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Psychological distress, intimate partner violence and substance use in a representative sample from Mexico: A structural equation model

Paola Adanari Ortega Ceballos[1], Leonor Rivera Rivera[2]*, Luz Myriam Reynales Shigematsu[2], Fernando Austria Corrales[3], Filiberto Toledano-Toledano[4,5] and Berenice Pérez Amezcua[6]

[1]Facultad de Enfermería, Universidad Autónoma del Estado de Morelos, Cuernavaca, Morelos, Mexico, [2]Centro de Investigación en Salud Poblacional, Instituto Nacional de Salud Pública, Cuernavaca, Morelos, Mexico, [3]Comisión Nacional para la Mejora Continua de la Educación (MEJOREDU), Mexico City, Mexico, [4]Unidad de Investigación en Medicina Basada en Evidencias, Hospital Infantil de México Federico Gómez, Mexico City, Mexico, [5]Unidad de Investigación Sociomédica, Instituto Nacional de Rehabilitación Luis Guillermo Ibarra Ibarra, Mexico City, Mexico, [6]Centro de Investigación Transdisciplinar en Psicología, Universidad Autónoma del Estado de Morelos, Cuernavaca, Morelos, Mexico

Introduction: Intimate Partner Violence (IPV) is a public health concern associated with multiple adverse health outcomes, including psychological distress (PD).

Objective: To assess the association of IPV and psychological distress, and the mediation of tobacco and alcohol consumption in a national representative sample from Mexico.

Material and methods: Data from the Encuesta Nacional de Consumo de Drogas, Tabaco y Alcohol (ENCODAT) were analyzed. The sample included 34,864 people between the ages of 12 and 65 with a partner. Using Structural Equation Modeling (SEM), the association between IPV, use alcohol, tobacco and psychological distress was measured.

Results: The population was composed of women (51.9%) and men (48.1%); 15.1% (women = 18.2% and men = 11.9%) reported IPV in the last year. The prevalence of psychological distress in the last year was 3.3%, being 3.8% in women, and 2.7% in men. Results from the SEM in women indicated a direct positive effect of the IPV construct on psychological distress ($\beta = 0.298$, $p < 0.01$); these findings confirmed that IPV tended to systematically increase psychological distress. Likewise, the presence of IPV increased the consumption of tobacco ($\beta = 0.077$, $p < 0.01$) and alcohol ($\beta = 0.072$, $p < 0.01$). The SEM results in men showed that alcohol and tobacco consumption tended to increase in the presence of IPV ($\beta = 0.121$, $p < 0.01$, and $\beta = 0.086$, $p < 0.01$, respectively), and in turn, alcohol consumption and tobacco tended to increase psychological distress ($\beta = 0.024$, $p < 0.01$, and $\beta = 0.025$, $p < 0.01$, respectively).

Conclusion: This study indicated that in women, IPV had a direct effect on psychological distress and on alcohol and tobacco consumption. Meanwhile in men, alcohol and tobacco consumption had a mediating effect between IPV and psychological distress. The empirical findings of this study will contribute toward the design of public health policies for the prevention and attention of IPV, alcohol and tobacco consumption, and consequently address the mental health consequences derived from these problems.

KEYWORDS

psychological distress, intimate partner violence, alcohol, tobacco, SEM, Mexico

1. Introduction

Psychological distress (PD) refers to maladaptive psychological functioning in the face of stressful life events (1). Characteristics attributed to psychological distress include perceived inability to cope effectively, change in emotional state, discomfort, communication of discomfort, and harm (2).

Various studies conducted in the United States have detected that the prevalence of psychological distress is between 2.9 and 3.9% (3–6). In another study, it was found that the prevalence of psychological distress among African-Americans was 2.1%, in Mexican-Americans 2.0%, and in Latinos 2.6% (7). In Canada, the prevalence of psychological distress was reportedly 8.3%, in women 9.0% and, in men 7.0% (8). A study carried out in Mexico, which used a different version of the psychological distress scale (Kessler 10), found a high prevalence at 67.0% (9).

The relationship between psychological distress and physical and psychological Intimate Violence Partner (IPV) has been documented, mainly in women (6, 10–13). People who reported physical and sexual violence were more likely than those without a history of IPV to report psychological distress. However, when stratified by sex, the risk of psychological distress was higher among women who reported experiencing both physical and sexual IPV. In the United States, 19.9% of women have reportedly experienced IPV compared to 10.9% of men; it has also been reported that women were significantly more likely than men to be classified with PD (3.7 vs. 2.1%) (6).

In a systematic review, 74.0% of the articles investigating the impact of IPV on mental health came from the United States, with the rest of the studies coming from Asia, New Zealand, and Europe; six studies measured the association between the IPV and psychological distress (11). In India, the rate of IPV was reportedly 31.0%. A gradient could be observed between IPV and psychological distress scores; women who reported higher IPV exposure had higher psychological distress scores, while the participants who suffered psychological violence presented an increase of 32.0% in the symptoms of psychological distress (10). Both women and men are at risk of suffering mental health damage associated with IPV; however, these damages can differ according to gender, women present more significant symptoms of depression and post-traumatic stress disorder, and men tend to present anxiety (11).

A study in Spain, carried out with people between the ages of 17 and 23 reported that the coercive behavior of couples weakens the psychological defenses of the victim, with which they can manage to manipulate attitudes and behaviors with the sole purpose of exercising control over the victim (12). In Canada, a study with couples between the ages of 18 and 30 with fewer than five years of relationship, concluded that as women experience more psychological violence, they had higher levels of psychological distress. Regarding physical aggression, it was not significantly correlated with psychological distress; meanwhile men were more likely to report higher levels of psychological distress if they received more psychological or physical violence (13).

IPV is a dysfunctional behavior in which the victim has to adopt coping strategies focused on cognitive, behavioral, or emotional efforts to save themselves from stressors (14, 15). Victims of IPV, in an effort to manage the stressful demands to some coping strategies, turn to coping mechanisms that result in negative health behaviors, such as current smoking and binge drinking (16, 17).

Likewise, it has been found that people with a higher prevalence of current smoking are more likely to have psychological distress compared to non-smokers (5, 16–21). It has also been shown numerous times that binge drinking is significantly associated with increased psychological distress (5, 15, 16, 22, 23). Both current smoking and binge drinking have been associated with psychological distress and therefore could act as mediators between the association of IPV and psychological distress.

People who suffer from IPV (both men and women) can present psychological distress, therefore it is important to identify in a timely manner the main characteristics or factors to define adequate interventions that help people cope positively with IPV and prevent the development of psychological distress.

1.1. Current study

The objective of the present study was to estimate the association of IPV and psychological distress, and the mediation of tobacco and alcohol consumption in a representative sample of the Mexican population.

2. Material and methods

2.1. Sampling and study procedures

The ENCODAT (24) is a household Survey with a complex design (probabilistic, multi-stage, and stratified sampling by sex, age group, and locality -rural, urban, and metropolitan populations). Households were selected through random sampling; within each household, an adult from 18 to 65 and an adolescent from 12 to 17 were selected. Informed consent was requested from adults, parents, and guardians of minors who participated in the survey. The ENCODAT questionnaire was applied through a face-to-face interview. The sections on IPV and substance use were applied through a computerized self-administered interview strategy (ACASI) (24). The response time for these sections was 20–30 min. The survey had a standardized methodology; the interviewers had experience applying national health surveys and were trained and supervised throughout the fieldwork. The global response rate was 73.64% (24). For the present study, the sample included a population with a history of a partner (n = 34,864). Of these, 3,799 were women, and 1,647 were men (Figure 1). The study was approved by the ethics committees of the National Institute of Psychiatry RFM and the National Institute of Public Health (Conbioética: 17CEI00120130424; Cofepris:13 CEI 17 007 36; FWA: 00015605) (24).

2.2. Measures

2.2.1. Psychological distress

The Kessler Psychological Distress Scale-6 (K6), was used to measure the extent and the severity of generalized distress in the preceding month (25). This scale has been validated in the Mexican

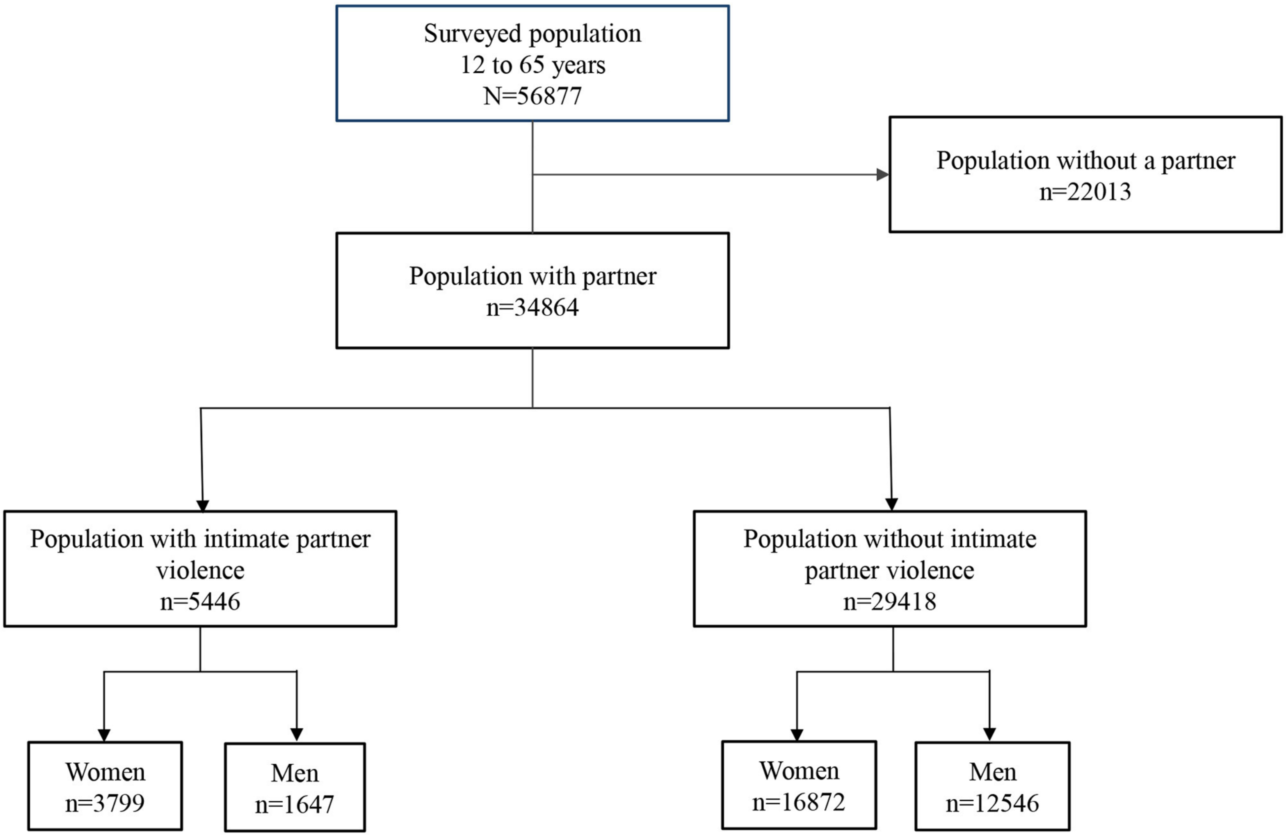

FIGURE 1
Study population of psychological distress and intimate partner violence. Encuesta Nacional de Consumo de Drogas, Tabaco y Alcohol.

population (Cronbach's alpha = 0.83) (26). The scale contains six items: (a) how often did you feel nervous (Nrv)?, (b) how often did you feel hopeless (Hop)?, (c) how often did you feel restless or fidgety (Rst)?, (d) how often did you feel so sad that nothing could cheer you up (Chr)?, (e) how often did you feel that everything was an effort (Eff)?, and (f) how often did you feel worthless (Ngd)? (27). Each item of the K6 is ranged on a 5-point Likert-type intensity scale: None of the time; A little of the time; Some of the time; Most of the time, and All of the time. The items of the K6 are scored from 0 to 4 and the total score is the sum of these responses which ranges from 0 to 24. Respondents were classified as having severe psychological distress if they scored 13 or greater. For the purposes of this study, the scale was validated and Cronbach's alpha = 0.87 was obtained.

2.2.2. Intimate partner violence scale

The variable of partner violence was constructed during the last 12 months, considering eight items: (a) has your partner shouted at you, insulted you, or humiliated you (Sh); (b) has threatened to beat you (Thb); (c) has beaten you (Bt); (d) has forced you to have sexual intercourse (Sx); (e) controls or has controlled most of your activities (Cn); (f) manifests his/her jealousy by beating (Jl), (g) has threatened to commit suicide or has attempted it (Sc); (h) "has controlled you by not giving you money for household expenses or by taking it away from you?" (Mn) (28). Each item of IPV had a dichotomous response (no = 0; yes = 1). Subsequently, the items were added, obtaining a discrete variable, the total score of the sum of these responses ranged from 0 to 7. Respondents were classified as having Intimate Partner Violence if they scored 1 or greater, and finally, there was a dichotomous variable for IPV (0 = without violence and 1 = with violence). This scale has been previously validated by Natera et al. (28) (Alfa de Cronbach= 0.76).

2.2.3. Binge drinking

This variable was defined as alcohol consumption of five drinks or more on a single occasion for men and four drinks or more on a single occasion for women in the last month (29).

2.2.4. Current smoking in the last year

The variable of tobacco consumption was constructed with the following questions: when was the last time you smoked a cigarette? Do you currently smoke tobacco every day, some days, or do you currently not smoke? People who had smoked tobacco in the last year were categorized as smokers and the population that had not smoked tobacco in the last year as non-smokers (30).

2.2.5. Age

Categorized in 14–17, 18–28, 29–39, 40–59, and 60 and over years of age.

2.2.6. Education

Categorized into no formal education, primary, secondary, high school, and college.

2.2.7. Socioeconomic status

It was estimated by constructing an index of household assets, in which the first quintile corresponds to the lowest socioeconomic level and the fifth to the highest (24).

2.3. Statistical analysis

The interest of the study was to analyze the mediating role of alcohol and tobacco consumption in the association between IPV and PD (31); therefore, an approach based on structural equation modeling was used. Other alternatives, such as multivariate regression, do not allow the modeling of the covariance structure matrix with the necessary flexibility to estimate the direct and indirect effects of the variables involved in the proposed theoretical model, given that one of the basic assumptions of multivariate regression is the absence of collinearity between the independent variables. In the present study, such assumption would not be fulfilled. Additionally, structural equation modeling allows modeling variances and covariances of latent variables or factors. In the present study, these are present in the variables of IPV and psychological distress, which further explain the covariance matrix of other manifest variables in the model.

Considering the above, the covariance matrix between IPV, PD, Bd, Cs, Age, Edu, and SES was analyzed using the maximum likelihood method. Four fit indices were used to assess the model: Comparative Fit Index (CFI) takes possible values between 0 and 1, considering a value of at least 0.90 denotes an adequate fit of the model, while a value $\geq$0.95 shows a very good fit. The Tucker – Lewis Index (TLI) and the Bentler-Bonnet Normed Fit Index (NFI) both with a range between 0 and 1 with interpretation values like the CFI, the Root Mean Square Error Approximation (RMSEA) should ideally have values less than 0.06, however, values of 0.08 are also considered acceptable (32, 33).

Initially, the IPV and psychological distress constructs were adjusted using CFA, then two structural equation models were built, one for women and the other for men, associating IPV with psychological distress and using Bd and Cs as mediating variables and Age, Edu, and SES as covariates. Finally, the two models were compared.

3. Results

3.1. Sample's characteristics

In the sample, 51.9% were women and 48.1% men. Of the participants, 35.6% were between 40 and 59 years old, and 9.9% with university studies. More than 20.0% of the population was found in the highest quintile of socioeconomic status. The prevalence of psychological distress in the last year was 3.3%, being 3.8% in women and 2.7% in men, showing a significant difference by sex ($p < 0.05$, Chi-squared test). Of the population, 15.1% presented IPV in the last year (women = 18.2% and men = 11.9%, $p < 0.001$). The percentage of the population that reported tobacco consumption in the last year was 22.3%, presenting a higher prevalence in men with 34.4% ($p < 0.001$, Chi-squared test). Regarding alcohol consumption, 9.8% mentioned excessive consumption in the last year, with a consumption in men of 16.5% ($p < 0.001$, Chi-squared test) (Table 1).

Those who reported psychological distress in the last year, 60.4% were women, 38.4% belonged to the age group of 40 to 59 years (women = 40.7% vs. men = 35.0%), 26.4% were located in the second quintile of SES, women with 27.1% and men with 25.2%, 45.0% reported IPV in the last year (women = 50.9% and men = 33.8%, $p < 0.05$), 30.7% used tobacco (women = 19.0% and men = 48.4%, $p < 0.001$) and 18.6% mentioned binge drinking (women = 8.2% and men = 34.4%, $p < 0.001$; Table 2).

3.1.1. Structural equation model between IPV and PD mediated by Bd and Cs: Women

The results showed an absolute fit of $X^2 = 4137.89$, $p < 0.001$ and the following fit indices: CFI = 0.961, TLI = 0.953, NFI = 0.960, and RMSEA = 0.03 (0.036–0.038), such that the model was considered to have a good fit and there were no significant differences between the theoretical model and the empirical data. The standardized parameters obtained in the model are shown in Table 3.

In the resulting model it was possible to appreciate the direct positive effect that the IPV construct has on psychological distress ($\beta = 0.298$, $p < 0.01$), which suggests that IPV systematically tends to increase psychological distress in women. Likewise, it was observed that the presence of IPV tended to increase the consumption of tobacco ($\beta = 0.077$, $p < 0.01$) and alcohol ($\beta = 0.072$, $p < 0.01$); these effects, although of small magnitude, they were statistically significant. In the case of tobacco consumption, it was possible to confirm that there was a mediating effect between IPV and psychological distress ($\beta = 0.052$, $p < 0.001$), while alcohol consumption had no significant effect on psychological distress ($\beta = 0.014$, $p < 0.0548$).

3.1.2. Structural equation model between IPV and psychological distress mediated by Bd and Cs: Men

The theoretical model and corresponding estimates that were hypothesized for women were also used for men. The absolute fit of $X^2 = 2350.07$, $p < 0.001$ and the following fit indices, CFI = 0.963, TLI = 0.955, NFI = 0.961 and an RMSEA = 0.03 (0.032–0.034), therefore it was considered a model with good fit, and it was possible to infer that there were no significant differences between the theoretical model and the data. The standardized parameters are shown in Table 4.

These results were similar to the findings obtained in the women group; however, the magnitude of the regression between

TABLE 1 Study population characteristics.

Characteristics	Women $n = 20{,}671$		Men $n = 14{,}193$		Chi^2
	%	CI 95%[b]	%	CI 95%	*p*
Psychological distress					
No	96.2	(95.7–96.6)	97.3	(96.3–98)	0.044
Yes	3.8	(3.4–4.3)	2.7	(2–3.7)	
Age (years)					
14–17	5.5	(5–6)	5.4	(5–5.9)	<0.001
18–28	27.8	(26.6–29.1)	24.6	(23.2–25.9)	
29–39	26.9	(25.9–27.9)	24.0	(22.9–25.2)	
40–59	34.1	(33–35.3)	37.1	(35.7–38.5)	
60 y más	5.7	(5.2–6.2)	8.9	(7.9–10)	
Education					
No formal education	2.7	(2.3–3.1)	2.5	(2.1–3)	<0.001
Primary	30.5	(29.3–31.7)	29.6	(28.3–31.1)	
Secondary	36.9	(35.8–38)	33.4	(31.9–34.9)	
High school	21.4	(20.3–22.6)	23.1	(21.8–24.5)	
College or more	8.5	(7.8–9.3)	11.4	(10.4–12.5)	
Socioeconomic status					
First	16.7	(15.8–17.6)	16.5	(15.5–17.6)	<0.001
Second	21.5	(20.6–22.5)	19.6	(18.5–20.7)	
Third	20.1	(19.2–21.1)	18.4	(17.2–19.6)	
Fourth	21.0	(19.9–22.1)	20.7	(19.5–21.8)	
Fifth	20.8	(19.5–22.1)	24.9	(23.3–26.6)	
Intimate partner violence					
No	81.8	(80.9–82.8)	88.1	(87.2–89)	<0.001
Yes	18.2	(17.2–19.1)	11.9	(11–12.8)	
Current smoking in the last year					
No	88.9	(88–89.6)	65.6	(64.2–67)	<0.001
Yes	11.2	(10.4–12)	34.4	(33–35.8)	
Binge drinking					
No	96.3	(95.8–96.8)	83.5	(82.3–84.7)	<0.001
Yes	3.7	(3.2–4.2)	16.5	(15.3–17.7)	

ENCODAT[a] México.

[a] Encuesta Nacional de Consumo de Drogas, Tabaco y Alcohol (ENCODAT).

[b] CI 95%, Confidence interval.

IPV and psychological distress was smaller in contrast to the parameter estimated in women ($\beta = 0.228$, $p < 0.01$ in men vs. $\beta = 0.298$, $p < 0.01$ in women), suggesting that, in women, IPV systematically increases the risk of psychological distress more than in men. Likewise, it is possible to observe that, in the group of men, tobacco and alcohol consumption mediate a small portion of the covariance between IPV and psychological distress.

In the present study, alcohol consumption tended to increase in the presence of IPV ($\beta = 0.121$, $p < 0.01$), as well as tobacco consumption ($\beta = 0.086$, $p < 0.01$) and, in turn, alcohol consumption tended to increase psychological distress ($\beta = 0.024$, $p < 0.01$) similarly to the case of tobacco ($\beta = 0.025$, $p < 0.01$). The effects identified in both models were controlled by age, SES, and education, suggesting that these direct and indirect effects could be accurate in the construction of predictive models.

4. Discussion

This study, based on data from a representative sample of Mexico, confirmed a relationship between IPV and psychological distress. Additionally, it was confirmed that the consumption of

TABLE 2 Study population psychological distress.

	Women $n = 20{,}671$		Men $n = 14{,}193$		Chi^2
Characteristics	%	IC 95%^{b}	%	IC 95%	p
Age (years)					
14–17	10.2	(6.5–15.7)	7.4	(4.2–12.7)	0.1995
18–28	21.1	(16.6–26.4)	26.3	(15.5–40.8)	
29–39	21.4	(16.3–27.5)	13.8	(8.2–22.3)	
40–59	40.7	(35.4–46.2)	35.0	(23.4–48.7)	
60 years and over	6.7	(4.3–10.2)	17.5	(4.4–49.7)	
Education					
No forma3.1l education	4.0	(2.5–6.4)	3.9	(1.8–8.1)	0.6645
Primary	44.2	(38.7–49.8)	49.8	(33.9–65.7)	
Secondary	32.4	(27.6–37.7)	32.2	(20.5–46.6)	
High school	15.6	(10.6–22.4)	12.6	(7.2–21.2)	
College or more	3.7	(2–6.9)	1.5	(0.7–3.3)	
Socioeconomic status					
First	21.4	(17.7–25.7)	20.5	(13.4–30.1)	0.3922
Second	27.1	(21.4–33.7)	25.2	(14.9–39.4)	
Third	18.7	(14.8–23.4)	29.9	(14.1–52.5)	
Fourth	20.9	(16.3–26.5)	12.8	(7.2–21.6)	
Fifth	11.8	(8.3–16.5)	11.7	(6.1–21.3)	
Intimate partner violence					
No	48.4	(42.4–54.3)	65.2	(51.4–76.9)	0.0294
Yes	51.6	(45.7–57.6)	34.8	(23.1–48.7)	
Current smoking in the last year					
No	81.0	(73.8–86.6)	51.6	(36.1–66.8)	<0.001
Yes	19.0	(13.4–26.2)	48.4	(33.3–63.9)	
Binge drinking					
No	91.8	(86–95.4)	65.6	(44.9–81.7)	<0.001
Yes	8.2	(4.6–14)	34.4	(18.3–55.2)	

ENCODAT[a] México.

[a] Encuesta Nacional de Consumo de Drogas, Tabaco y Alcohol (ENCODAT).

[b] CI 95% -Confidence interval.

tobacco and/or alcohol has a mediating effect between IPV and psychological distress, mainly in men.

The results of the present study demonstrated the direct effect of IPV on psychological distress, these data are consistent with Lagdon et al. where they found that women with IPV were more likely to report higher psychological distress compared to those who did not experience violence (11). This effect has been studied in different populations, in which they confirm the direct relationship between these two variables (6, 10, 12, 13). The increasing adverse effects of IPV on the mental health of victims, compared to those who have never experienced IPV have been widely documented. IPV has been associated with anxiety, depression, substance abuse (34), and post-traumatic stress disorder (34, 35). It has been shown that IPV is positively associated with the severity of posttraumatic stress disorder symptoms, finding a greater association in women who reported having been victims of psychological violence. A plausible explanation for these findings could be that the experience of psychological IPV can provoke unique response patterns that exacerbate emotional dysregulation, generating psychological distress (36). Although the damage caused by IPV can occur in anyone with IPV, it has been documented that the damage is greater in women than in men.

According to the results of the present study, it was confirmed that IPV has a direct and mediating effect by tobacco and/or alcohol consumption toward psychological distress, although the mediating effects were not of great magnitude, they were significant. The consumption of alcohol or tobacco tends to increase the psychological distress; these results are consistent with

TABLE 3 Structural equation model between IPV and PD mediated by Bd and Cs: standardized parameters in women.

Factor loadings	Estimation	Wald Z	Prob > |Z|
IPV → Sh	1	.	.
IPV → Thb	0.671	78.137895	<0.0001
IPV → Bt	0.553	64.319071	<0.0001
IPV → Sx	0.434	52.214899	<0.0001
IPV → Cn	0.622	70.775402	<0.0001
IPV → Jl	0.702	76.533969	<0.0001
IPV → Sc	0.343	42.463643	<0.0001
IPV → Mn	0.568	66.448215	<0.0001
PD → Nrv	1	.	.
PD → Hop	0.728	78.553436	<0.0001
PD → Rst	0.691	92.916392	<0.0001
PD → Chr	0.809	81.12735	<0.0001
PD → Eff	0.785	79.829017	<0.0001
PD → Ngd	0.709	74.67298	<0.0001
Regressions	**Estimation**	**Wald Z**	**Prob > |Z|**
IPV → PD	0.298	33.184217	<0.0001
IPV → Bd	0.072	9.2616639	<0.0001
IPV → Cs	0.077	9.8763654	<0.0001
Bd → PD	0.014	1.9204759	0.0548
Cs → PD	0.052	6.994088	<0.0001
Age → IPV	0.009	1.1773236	0.2391
Age → PD	0.016	2.2114943	0.0270
Edu → IPV	0.016	1.8202702	0.0687
Edu → PD	0.128	16.021357	<0.0001
SES → IPV	0.067	7.9967447	<0.0001
SES → PD	0.023	2.9872334	0.0028

SES, Socioeconomic status; Edu, Education; PD, Psychological distress; Bd, Binge drinking; Cs, Current smoking; IPV, Intimate partner violence; Sh, Shout; Thb, threatened to beat; Bt, Beat to you; Sx, Force sex intercourse; Ji, Jealousy; Sc, Suicidal ideation; Mn, Money control.

the literature, which reports that people with IPV can develop coping skills (37), such as tobacco and alcohol consumption (17); however, these behaviors have been associated with psychological distress (16).

The consumption of tobacco and alcohol, as a consequence of IPV, reflects the importance of considering sex as a category of analysis (38). Women are socially allowed to express their emotions more, while in men, there is no recognition of these emotions, leading to the consumption of alcohol and tobacco (39). The results obtained are similar to those in other studies, which report that people who experience psychological distress are more likely to have a higher prevalence of smoking than the general population (5, 18–21).

Another study Sung et al. conducted in the United States population found an association between tobacco use and psychological distress. They concluded that people with psychological disorders were more likely to be current smokers and tended to be heavy smokers once they started smoking (5). Thus, they detected a significant increase in psychological distress among current smokers; they also observed a higher prevalence of psychological distress among younger smokers with less formal education and lower annual family income. It has been documented that reduced rates of psychological distress among ex-smokers may suggest that smoking played a role in the maintenance of psychological distress and the increased likelihood of remission after a successful quit attempt (19). Hagman et al. found that adults with psychological distress were more likely to use tobacco in their lifetime than those without psychological distress (21). Likewise, in the Australian population, it was observed that current smokers, especially those who smoked daily, presented higher levels of psychological distress (20). In the Japanese population (40), when carrying out the analysis stratified by sex, a significant positive association was found in women between tobacco use and psychological distress but not in men.

Our results show that the effect of IPV on alcohol consumption tends to be greater in men than in women, Nakagawa et al.

TABLE 4 Structural equation model between IPV and PD mediated by Bd and Cs: standardized parameters in men.

Factor loadings	Estimation	Wald Z	Prob > |Z|
IPV → Sh	1	.	.
IPV → Thb	0.615	51.873574	<0.0001
IPV → Bt	0.545	45.528168	<0.0001
IPV → Sx	0.315	29.76013	<0.0001
IPV → Cn	0.541	45.940913	<0.0001
IPV → Jl	0.626	49.851903	<0.0001
IPV → Sc	0.332	31.140388	<0.0001
IPV → Mn	0.397	36.602369	<0.0001
PD → Nrv	1	.	.
PD → Hop	0.736	65.135725	<0.0001
PD → Rst	0.665	75.417528	<0.0001
PD → Chr	0.808	66.523551	<0.0001
PD → Eff	0.769	64.857219	<0.0001
PD → Ngd	0.707	61.198114	<0.0001
Regressions	**Estimation**	**Wald Z**	**Prob > |Z|**
IPV → PD	0.228	20.461203	<0.0001
IPV → Bd	0.121	12.253285	<0.0001
IPV → Cs	0.086	8.7365848	<0.0001
Bd → PD	0.024	2.6089394	0.0091
Cs → PD	0.025	2.750778	0.0059
Age → IPV	−0.021	−2.116186	0.0343
Age → PD	−0.04	−4.48178	<0.0001
Edu → IPV	−0.027	−2.478551	0.0132
Edu → PD	0.131	13.217565	<0.0001
SES → IPV	0.041	3.8164241	0.0001
SES → PD	0.03	3.1179137	0.0018

SES, Socioeconomic status; Edu, Education; PD, Psychological distress; Bd, Binge drinking; Cs, Current smoking; IPV, Intimate partner violence; Sh, Shout; Thb, threatened to beat; Bt, Beat to you; Sx, Force sex intercourse; Ji, Jealousy; Sc, Suicidal ideation; Mn, Money control.

(41) reported results that coincide with ours, in which men who consume alcohol presented a higher risk of psychological distress compared to women. However, these results differ from what was reported by Øverup, in which the coefficient indicated that the effect was stronger for women than for men (42). Various studies have reported a positive association between binge drinking and psychological distress. A study in the United States (23), reported a significant association between binge drinking and higher levels of psychological distress. In Japan, Nakagawa et al. (41) the same trend was observed, the greater the consumption of alcohol, the greater the presence of psychological distress, which coincides with the empirical findings in the present study.

Although this study makes valuable contributions to understand the role of IPV in psychological distress among women and men experiencing IPV, the findings must be interpreted in the context of certain limitations. First, the cross-sectional nature of the data includes determining the nature and not attributing causality in the direction of the relationships examined. Further studies are needed to investigate these relationships through prospective and longitudinal investigations. A second limitation is the use of a secondary database, in which the instrument did not measure the severity of IPV; although we assume that all violent practices have health consequences. Third, this study relied on people's self-report of psychological distress symptoms, which may have been influenced by their ability or willingness to report accurately.

Another limitation is that the ENCODAT did not include information about abuse in childhood. Previous research suggests childhood abuse is associated with an increased risk of psychological distress as it has been observed to affect gender attitudes and power in sexual relations since it is a crucial determinant of adverse outcomes in adult life. This is consistent with the literature showing that men who were abused as children are more likely to have witnessed parental violence and have been socialized into unequal gender norms that lead to the use of violence in their intimate relationships. Therefore, it is vital to account for childhood abuse as a crucial area of action to prevent mental health issues, the development of negative attitudes, and the intergenerational transmission of violence (43).

Machisa et al. (44), with a South African population, observed that child abuse had direct effects on post-traumatic stress disorder symptoms and depression, as well as indirect effects on excessive alcohol consumption, showing that exposure to violence during childhood can have adverse effects. In mental health, it promotes the intergenerational transmission of this behavior to adult life (44). It would also be essential to have information on victims and perpetrators, both female and male.

Future research should be longitudinal, through cohort studies, the temporality between the appearance of psychological distress and exposure to various variables could be observed, being certain that the exposure preceded the event.

A notable strength of the study is the representativeness of the Mexican population. The process of data collection has advantages for the generalizability of results, due to the control in the research setting for various demographic characteristics. Moreover, these results are consistent with other investigations; therefore, it can be inferred that they have internal and external validity.

The results from this study provide evidence to strengthen the existing information on the relevance of directing preventive strategies that promote the mental health of women and men who have been victims of IPV. It also underscores the importance of using sex as a category of analysis with the purpose of reducing the consumption of alcohol and tobacco, providing adequate tools to avoid risks that threaten health outcomes.

It is essential that IPV be dismantled through actions that transform the context of inequality between women and men (45) through the creation of spaces free of violence that promote equity, justice, and good treatment. This is vital to avoid negative consequences on mental health and the excessive consumption of alcohol and tobacco in the population.

The pattern of IPV reported in this study reveals a worrying panorama that requires a multidisciplinary approach considering social, economic, and intercultural differences in Mexico. A potential move forward would be the implementation of psychological distress screenings within healthcare centers, workplaces, and schools to identify the population at risk and to provide timely care.

5. Conclusion

The findings of this study have important public health implications. It provides helpful information to further identify and understand the effects of IPV on women's and men's mental health. These findings further emphasize the need for programing and public health policies for IPV prevention.

Knowledge about the effects of excessive alcohol consumption and tobacco use, and their relationship with psychological distress, provides information to healthcare personnel to identify people who are at risk. In turn, this allows them to develop comprehensive care interventions (i.e., mental health and substance use prevention). More broadly, this information serves to sensitize the general population regarding the need to prioritize and position these problem in the public agenda.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by Conbioética: 17CEI00120130424; Cofepris:13 CEI 17 007 36. The patients/participants provided their written informed consent to participate in this study.

Author contributions

LRe, LRi, and PO: conceptualization and methodology. LRe, LRi, FA, and PO: software. FA: validation and formal analysis. LRe, LRi, PO, and FT-T: investigation. FA and PO: data curation. LRe, LRi, BP, and PO: writing—original draft preparation. LRe, PO, and FT-T: writing—review and editing. All authors have read and agreed to the published version of the manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Indigenous mental healthcare and human rights abuses in Nigeria: The role of cultural syntonicity and stigmatization

Adegboyega Ogunwale[1,2]*, Babatunde Fadipe[3] and Oladayo Bifarin[4,5]

[1]Neuropsychiatric Hospital, Aro, Abeokuta, Abeokuta, Nigeria, [2]Institute of Psychiatry, Psychology & Neuroscience, King's College London, London, United Kingdom, [3]Lagos University Teaching Hospital, Lagos, Nigeria, [4]School of Nursing and Advanced Practice, Faculty of Health, Liverpool John Moores University, Liverpool, North West England, United Kingdom, [5]Mersey Care NHS Foundation Trust, Liverpool, United Kingdom

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Wulf Rössler,
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United Kingdom
Suhas Chandran,
St. John's Medical College Hospital,
India

*CORRESPONDENCE
Adegboyega Ogunwale
✉ monaolapo@yahoo.co.uk

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Background: Indigenous mental healthcare using traditional non-western methods termed "unorthodox approaches" has been observed in Nigeria historically. This has been largely due to a cultural preference for spiritual or mystical rather than biomedical formulations of mental disorder. Yet, there have been recent concerns about human rights abuses within such treatment settings as well as their tendency to perpetuate stigmatization.

Aim: The aim of this review was to examine the cultural framework for indigenous mental healthcare in Nigeria, the role of stigmatization in its utilization and interrogate the issues of human rights abuses within a public mental health context.

Methods: This is a non-systematic narrative review of published literature on mental disorders, mental health service utilization, cultural issues, stigma, and indigenous mental healthcare. Media and advocacy reports related to human rights abuses in indigenous mental health treatment settings were also examined. International conventions on human rights and torture, national criminal legislation, constitutional provisions on fundamental rights and medical ethics guidelines relevant to patient care within the country were examined in order to highlight provisions regarding human rights abuses within the context of care.

Results: Indigenous mental healthcare in Nigeria is culturally syntonic, has a complex interaction with stigmatization and is associated with incidents of human rights abuses especially torture of different variants. Three systemic responses to indigenous mental healthcare in Nigeria include: orthodox dichotomization, interactive dimensionalization, and collaborative shared care. Conclusions: Indigenous mental healthcare is endemic in Nigeria. Orthodox dichotomization is unlikely to produce a meaningful care response. Interactive dimensionalization provides a realistic psychosocial explanation for the utilization of indigenous mental healthcare. Collaborative shared care involving measured collaboration between orthodox mental health practitioners and indigenous mental health systems offers an effective as well as cost-effective intervention strategy. It reduces harmful effects of indigenous mental healthcare including human rights abuses and offers patients a culturally appropriate response to their problems

KEYWORDS

indigenous, mental, healthcare, Nigeria, human rights

1. Introduction

Mental disorders appear to be on the rise all over the world and will cost the global economy up to $16 trillion in 20 years (2010–2030) if urgent steps are not taken (1). Psychosocial problems of COVID-19 (present and future) have complicated the mix. About $147 billion in investment is required to scale up treatments such as psychosocial counseling and antidepressant medication (2). In addressing the critical concern presented by these disorders, a multi-faceted approach to healthcare must be adopted.

Mental healthcare using traditional non-western methods termed “unorthodox approaches” has been observed in Nigeria and elsewhere for decades (3–7). This has been largely due to a cultural preference for spiritual rather than biomedical formulations of mental disorder (7–10). Other factors driving this tendency have included lack of access to care, out-of-pocket healthcare payments, poverty, poorly planned services, shortage of healthcare personnel and other resources, nearness of these facilities to the community and their shared belief with patients regarding the cause and treatment of mental disorder (4, 11–13) as well as stigma associated with mental illness. The existence and impact of stigma on the mentally ill in particular has been well studied (14, 15).

However, recent developments in Nigeria have signposted significant human rights abuses in non-orthodox mental healthcare settings in Nigeria (16). These facilities have been termed, variously, as “torture homes,” owing to victims’ accounts of physical, sexual and psychological abuse (17). Many of such facilities are run by faith and traditional healers with some adopting eclectic or syncretic approaches. Syncretic approaches refer to those who combine cultural methods with faith-based treatments.

Yet, research done in Nigeria and elsewhere indicates that these facilities are not just endemic but culturally syntonic. A recent study surveying complementary and alternative mental health treatment providers indicated their ubiquity in African settings with their capacity to provide admission services sometimes above the capacity of conventional hospitals (18). As well, the harmony of complementary and traditional medicine with cultural practices has long been recognized globally (19).

Given this background, this paper highlights three observable responses to this multi-faceted phenomenon. An initial response to the problem is that of outright prohibition of non-orthodox practice or a dichotomization between the orthodox and the non-orthodox. A second response is that of interactive dimensionalization where both forms of care occur in a cultural continuum. A third dimension is collaboration which has now been termed “collaborative shared care” (4).

This paper examines these constructs of public mental healthcare from a human rights and medico-legal perspective. This inquiry is crucial for a number of reasons. First, it critically examines the western versus indigenous approaches and the dangers of the gulf between them as a matter of patients’ safety in treatment and rehabilitation. Second, it contributes to practice and policy by highlighting pragmatic responses to the problem which may require new practice and policy directions. Third, given the role of lack of access to and affordability of mental health care in the problem, it serves as a narrative on Nigeria’s level of commitment to sustainable development (1). Sustainable development goal 3 focuses on ensuring healthy lives and promoting well-being for all at all ages (20). In specific terms, it addresses mental health promotion (target 3.4) and treatment of mental disorders including substance use disorders (target 3.5). It also focuses on universal health coverage with an emphasis on financial risk protection as well as access to quality healthcare and affordability of medication. Notably, the indicators for universal health coverage would include essential health services coverage and proportion of household income expended on health. These two elements – care access and funding – are crucial considerations in mental health service planning and have a role to play in the utilization of indigenous mental health care in the country. Therefore, the current review examines the prospects and challenges in indigenous mental healthcare in Nigeria from a patient’s rights perspective while highlighting the role of culture and stigma in its utilization.

2. Framing the cultural syntonicity of indigenous mental health interventions

Culture refers to a complex aggregate of knowledge, belief, art, morals, law, custom and other social capabilities of a defined society. It is the shared knowledge required to function effectively in a given social system (21). Its significance in the clinical context is its relevance to the expression of distress and its explanatory function in illness causation, search for treatment and hope for recovery. Spirituality is a central feature of most non-western cultures (22) and Nigeria is not an exception. The dominance of western-style approaches to mental health may not be helpful in the appropriate conceptualization of indigenous methods of illness diagnosis and treatment in the long run in deeply cultural societies.

Cultural competence is central to navigating the critical junction between culture and mental illness as well as its treatment. A culturally competent approach to understanding the role of indigenous mental health care approaches within Nigeria will aim at situating them correctly in the realities of the patient. Cultural competence may be regarded as having the cultural knowledge and skills of a particular culture. Its aim is to ensure the delivery of effective interventions to members of that cultural group or identity (23). It basically comprises three essential skills: (i) scientific mindedness, (ii) dynamic sizing, and (iii) culture-specific expertise (23, 24).

Scientific mindedness describes the clinician’s capacity for developing hypotheses about the conditions of individuals from diverse cultural backgrounds. This prevents the clinician from drawing premature (and sometimes, wrong) conclusions about persons from different cultural backgrounds. With this perspective, scientific mindedness also helps the clinician to avoid the ‘myth of sameness’ (25). By testing hypotheses framed by existing cultural meanings attached to mental symptoms and available treatments, suitable inferences may be drawn by the “orthodox” practitioner about the patient’s view of their illness as well as their preferred indigenous approach to treatment in some instances. This systematic appreciation of the patient’s reality will help to form a partnership which will aid the patient to weigh the pros and cons of the preferred treatment narrative.

Dynamic sizing helps the clinician to know when generalization and inclusivity are relevant to members of a particular culture and when it is more appropriate to treat the patient as an individual who may be exclusive within his culture (23). Dynamic sizing seeks to prevent the emergence of stereotypes which directly or indirectly become the lenses through which the clinician views the individual and unconsciously ascribes to them the characteristics of their group of origin.

Culture-specific expertise essentially involves being aware of one's worldview as well as having specific knowledge about the cultural groups to which the patients belong. It includes the ability of the clinician to adopt culturally-based or culturally appropriate approaches in treating patients.

Without paying due attention to cultural competence, our understanding of mental illnesses as well as their treatments may be unconsciously open to cross-cultural biases. A good example of such bias is seen in the African construct of mental disorder as being of a spiritual origin or supernatural intervention, which is in contrast to western biomedical conceptualizations of health (8, 10, 14, 26, 27). While the indigenous patient wishes to provide explanations for the disorder and its treatment using such spiritual perspectives, the clinician who is orthodox in their practice would conclude that such explanations are neither scientific nor helpful to the patient.

Within this context, there are two positions that practitioners can take in their appreciation of mental health interventions conceivable to the patient – a culture-blind approach or a culture-sensitive perspective. This culture-blind approach has been referred to as an 'etic perspective' (26) defined as the observing scientist's conceptualization of a problem. The second position is attempting to examine the validity of the causation framework and treatment preference of the patient within a perspective of cultural relativity. This is the 'emic perspective' and it recognizes local cultural criteria for determining normative cultural expression.

The conceptualization of the cultural understanding of the personality of the African which is critically important in the cultural approach to mental illness and its treatment suggests that the African collective unconscious entails the self, spirit agency and social agency (28). The self includes the physical person, shadow, their clothing, as well as body fluids, amongst others. Spirit agency refers to multiple equal gods in the frame of polytheism in addition to ancestral and other spirits. The social agency comprises the extended family as well as the wider community.

Qualitative studies of mental health service users and non-orthodox treatment providers in African settings suggest that there is a prevailing perception of mental illness as being multifactorial with a dense interconnectivity between spiritual, biomedical and psychosocial etiologies (29, 30). Some of these causal ontologies may lead to stigmatizing attitudes (27). The existing perception leads to a form of help-seeking which combines these three approaches without mutual exclusivity since the different causal factors are deemed to require distinct but combinable treatments (30). A series of focus groups discussions among traditional healers in South Africa suggested that these indigenous healers demonstrate multiple explanatory models for mental disorders (31). While they view psychotic disorders as being prototypical of mental illness, they did not regard non-psychotic depression, panic disorder or somatization as mental disorders. There also appears to be a contemporary tendency among them of combining both traditional herbs and orthodox medicines in their indigenous interventions.

Against such a background, a preference for a spiritual formulation of mental disorders in an exclusive frame or within an eclectic combination (12) with biomedical causation would appear almost inevitable in deeply cultural settings. Due to such cultural predilections for an alternative formulation of mental illness apart from the biomedical explanation, patients and relatives may utilize indigenous services which may range from so-called 'rehabilitation' centers to spiritual homes and "trado-medical" healers. These centers are seen as treatment facilities for mental disorder or 'correctional'/'rehabilitation' centers for drug addiction.

In these settings, the concept of mental disorder is not biomedical and is essentially related to moral and religious concepts of illness (27, 29). Under this rubric, practitioners of indigenous treatment methods usually institute ascetic approaches with spiritual undertones, e.g., fasting, beating with different 'spiritually empowered' objects, etc. in order to achieve physical restraint, symptom management or even cure.

3. The role of stigma

Stigmatization is a complex process which involves elements such as labeling, othering ("we vs. them"), discrimination and devaluation (32). It has also been constructed as a continuum from stereotypes through prejudice to discrimination (33). It may occur as public (33, 34), institutional (32, 35, 36) or internalized (15, 37) variants. Research in Nigeria has shown a considerable degree of both public and internalized stigmatization toward mental disorders (14, 15). Public stigma toward the mentally ill in the country has been found to be impelled by their perceived dangerousness, a spiritual view of causation of mental illness and social distance toward the mentally ill (14, 38).

Stigma may negatively affect treatment seeking, decisions regarding treatment as well as outcomes (39, 40). It may broadly affect access to and continuity of care thereby negatively impacting outcome. Catalano and colleagues have shown through structural equation modelling that patients' awareness of negative stereotypes could influence them to agree with these stereotypes and self-apply them. This internalization may then lead to loss of self-esteem and poorer recovery attitudes. Fadipe et al. (40) and Adewuya et al. (41) have equally observed that self-stigmatization may be associated with poorer medication use.

The need to avoid stigmatization could lead to the utilization of indigenous or religious mental health services which are driven by a spiritual causation model – e.g. "spiritual attack" – which could make mental illness less stigmatizing (42). This is because the supposed attack is potentially curable by spiritual exorcism, propitiation or any other mystical means while the biomedical formulation may imply life-long manageable conditions which may not be amenable to cure making them more stigmatizing. Further, people may be reluctant to seek orthodox mental health care in order to avoid being labeled with a diagnosis of mental illness or due to a lack of trust in orthodox medicine (43).

Dealing with stigma will improve timely access to the right kind of treatment and result in better outcomes. A three-prong approach for dealing with stigma has been proposed by Corrigan & Watson (33, 37). These include education, contact and protest. Education is underpinned by public enlightenment to increase knowledge and 'burst myths.' Contact provides a link to the voices of sufferers with testimonies of their lived experience. This serves to disconfirm stereotypes, diminish anxiety, heighten empathy, create personal connections and improves our understanding of recovery. Protest is essentially advocacy which highlights and brings to the fore the challenges of those who live with mental illness and how society must show responsibility in looking after them while respecting their human rights.

4. Mental health treatment gap in Nigeria

The treatment gap for mental disorders in low and middle-income countries including Nigeria is up to 80% (18). Only 20% of those with severe mental illness in Nigeria have received any treatment in the preceding year and only 10% of those who received any treatment received minimally adequate treatment (4). Health expenditure toward mental health in Nigeria is about 3% as opposed to the recommended level of about 10% (44). Within the expenditure for mental health, a little over 90% is committed to eight specialist psychiatric hospitals which currently provide over 80% of the total number of psychiatric beds in the country which stands at 3.99 beds per 100,000. The remaining 9% of the provision for mental health is spent on other psychiatric services (university departments of psychiatry, other tertiary hospital settings, amongst others) (45). In terms of manpower, the World Health Organisation's estimates of mental healthcare manpower for Nigeria reveals figures of 0.10/100,000 for psychiatrists, 0.70/100,000 for psychiatric nurses and 0.02/100,000 for psychologists, 0.04/100,000 for social workers and 0.01/100,000 for occupational therapists (46).

Within the context of the gaps in treatment occasioned by poor service planning, lack of manpower, and inadequate funding, traditional and faith healers are patronized for reasons of accessibility, affordability, and availability. Flexibility of the services, cultural acceptability as well as responsivity to cultural preference (42) may also play a role. Additionally, the absence of formal documentation may tap into the informality of confidentiality in African cultures. This helps to anonymize the patient to an extent and provide a sense of secrecy. The lack of such secrecy in orthodox settings where different aspects of the patient's history must be documented by several members of the multidisciplinary team structure could result in institutional stigmatization within such settings (32, 36). Moreso, mental disorders unlike most physical health conditions do not have a clear-cut etiological agent or pathogenesis. This may feed the culturally acceptable stereotypes that mental illnesses are a product of divinity, witchcraft, immorality, and the influence of ancestral forces (47). It is therefore unsurprising that to tackle these spiritual forces, people may seek spiritual/indigenous care as part of their pathway to receiving treatment.

5. Three approaches of orthodox systems to indigenous mental health care

5.1. Orthodox dichotomization

Dichomotization is operationally described in this paper as the outright prohibition of non-orthodox practice or a dichotomization between the orthodox and the non-orthodox. This approach does not appear to be culturally sensitive in that it patently denies the emic perspective of the African patient in favor of an etic viewpoint that may not be sufficiently explanatory in dealing with psychological illness in the deeply cultural African patient (26). The idioms of distress are culturally framed (48–50) and provide a more accurate understanding of the patient's psychological condition, especially as there are cultural beliefs around spiritual causes of mental health disorders (51).

Furthermore, while it may be argued that with increasing levels of literacy, the individual patient could have a personal preference for orthodox care, the communitarian ethos of Nigerian societies make it unlikely for the form of treatment for mental disorder to be decided by the individual alone but rather by the family within a communal consultative framework. Another key factor that influences the decision regarding the mode of treatment that patients receive is poor financial coverage for healthcare including mental healthcare in Nigeria with out-of-pocket being the commonest payment method (about 70.5% in 2019) (44, 52). Further, majority of patients are likely to depend on their relatives considering their relatively low socioeconomic status (53). Thus, they may have little or no say in deciding where and/or what type of care they access.

5.2. Interactive dimensionalization

A second response is that of interactive dimensionalization. This operationally refers to both forms of care occurring in a cultural continuum in which milder forms are treated in indigenous (unorthodox) settings while more severe cases are managed in psychiatric facilities. An inversion of the continuum seems to occur in rehabilitation. In that instance, those with acute "treatable" conditions are treated in orthodox settings while chronically ill patients are "rehabilitated" in these unorthodox settings. This raises the question as to whether this normative response is a psychosocial adjustment to shortages in healthcare planning and provision. This normative response is not unique to Nigeria, but also evident in the Western part of the world where indigenous treatment settings are not particularly prominent. Both clinicians and lay persons' health and illness beliefs are influenced by knowledge, beliefs and attitudes (54). As such, causal ontologies of distress will be ingrained within individual and collective cultural values, which would have implications on decision making process and ethical principles with regards to patients' autonomy, justice, beneficence, and non-maleficence (55–57). Therefore, interactive dimensionalization presents an opportunity for stakeholders, i.e., orthodox, and unorthodox practitioners, by moving mental health discourse away from dichotomization to exploring potential benefits of preventative and/or rehabilitative work, which would stem from paying closer attention to "existing assumptions about truth, validity and reality" [(58), p. 930]. Such exploration would for instance, accommodate patients' preference for traditional healing (patient values and/or family members) or co-opt best empirical evidence available with clinical expertise of orthodox practitioners. Such operationalization of evidence-based practice could provide patients with much needed psychological safety at such a crucial time of their lives, which could be paramount for their personal recovery and ultimately, reduce stigma associated with mental health care pathways. It has been argued that patients in orthodox settings sometimes do not feel that their spiritual needs in treatment are recognized or met (18).

5.3. Collaborative shared care

A third dimension is collaboration which has now been termed "collaborative shared care" (4). This has been found to be associated with reduction in harmful practices in those non-orthodox healthcare systems while also resulting in improved clinical outcomes, reduction in disability as well as aiding reintegration (4). Further the evidence that traditional and faith healers may be willing to collaborate with orthodox practitioners is a strength of this dimension of care (4).

This potential collaboration between orthodox and unorthodox approaches in Nigeria demonstrates a preference for traditional and Christian religion-based healing (51). In this context, Wieringa et al. (58) argued that stakeholders would need to overcome the "philosophical problem of induction" by generally taking positive risks and making inferences that are context-driven even though, outcome might not always be positive. In the Nigerian context, this dimension allows stakeholders to showcase their knowledge and preferences, which will consolidate the idea that "bias is in a dual, complex, necessary, unproductive as well as a productive conjunction with truth" [(58), p. 936]. This philosophical stance therefore embraces a culture-conscious ideology, which requires a shift from solely acknowledging the dominant bio-medical model as the "truth," to working in collaboration with interpersonal, socio-political, psychological, moral, and traditional frameworks.

Not acknowledging the inseverable link between truth and bias has contributed to dichotomization of orthodox and unorthodox practices. Therefore, this collaborative shared care dimension is of necessity for a country with over 300 ethnic communities as it would help recognize the value of indigenous approaches and interventions and by so doing, mitigate one form of exclusion from mental health care arising from the false distinction of what the "truth" is. For instance, it is often said that patients undergoing psychotic episodes "are not in touch with reality." Taking this stance, such patients and/or family members' needs, and preferences would likely be missed, resulting in iatrogenic harm. Treating patients who would likely pose serious risks to themselves, and others as *risky objects* would contribute to hermeneutical injustices, where subject (patients) would not be in the right frame of mind to adequately comprehend key components of what is being experienced, could be marginalized based on what is assumed by *others* not to be a reality and in turn, aggravating distress for subject (59). Mitigating hermeneutic and epistemic injustices on patients, a collaborative shared care dimension embedded within mental health care pathway has the propensity to mitigate defensive practices and promote defensible approaches, which would aid genuine "openness toward alternative horizons of possibility" [(59), p. 244]. Ultimately, this approach would help the ambition of World Health Organization (WHO) in delivering preventative work, restructuring and scaling up mental health care beyond inpatient clinical environments (60).

Nevertheless, it is crucial to examine the reciprocal perception between orthodox (biomedical) practitioners and indigenous treatment providers which may serve as barriers to collaboration. Recent qualitative research conducted in selected African countries indicates that there is mutual mistrust and undue competition between these two categories of carers (61, 62). While the traditional and religious healers have indicated a willingness to collaborate with orthodox practitioners in some cases, it would appear that the latter do not appreciate the skills/expertise of the former although this perceived superiority complex may be improved by dialogue and training (63). Where the orthodox practitioners have been willing to collaborate in a limited manner, they have often sought to impose supervision and control as well as training in biomedical paradigms on the indigenous treatment providers to their dissatisfaction (62).

In spite of the foregoing, it has been recognized that indigenous treatment practices tend to demonstrate inherent harmful effects such as shackling, beating, scarification (with the risk of serious infections), sexual abuse and adverse reactions from herbs which have hardly been pharmacologically tested for safety or adverse effect profiles (4). Any form of collaborative shared care involving indigenous practitioners must therefore clearly define how instances of harmful practices will be prevented, curtailed, or reported when they cross certain legal thresholds (e.g., sexual abuse) (4). Certainly, how this sort of safeguarding approach will affect such collaborative efforts remains to be seen.

6. Human rights in indigenous treatment settings

In non-orthodox treatment settings where the causation of mental disorder is regarded as being spiritual or moral, religious and/or moral as well as other cultural approaches are utilized for the purpose of treating the mentally ill. There may be a perceived need to introduce "disciplinary" methods or moral instruction coupled with punishment as part of the treatment. Ascetic methods including prolonged fasting, binding people in chains, sometimes in open spaces such as bushes. Such harsh treatments have been backed by relatives in some cases. It is within such environments that human rights abuses seem to occur.

Media reports from September to November 2019 in Nigeria revealed successive discoveries of such treatment centers across the country with troubling stories of torture and other forms of abuse [(17, 64); The Guardian Editorial (65)]. Those facilities were variously branded "torture houses" or "torture homes." These reports indicated that some of these facilities were actually operating as religious centers which were then found to be housing several individuals with mental and substance use disorders admitted there for "treatment." Over 1,200 persons were rescued from these facilities based on the intervention of law enforcement agencies. Another 200 individuals had been recorded as escapees from such treatment centers (see Table 1).

Graphic images released by the media at the point of rescuing the victims indicated unsanitary conditions, physical health debilitation, and evidence of mechanical restraints used in crude and harmful ways (17). The Human Rights Watch had equally reported that patients within such settings have been prone to being shackled or chained [Human Rights (16)].

6.1. Indigenous mental health treatment and torture: A medico-legal viewpoint

6.1.1. Legal perspective

Torture has been globally defined as an act by which severe physical or mental pain or suffering is intentionally and unlawfully inflicted on a person by or at the instigation of public officials or others acting in any official capacity for such purposes as obtaining a

TABLE 1 Reported cases of individuals rescued from indigenous treatment settings in Nigeria.

Location	Number rescued	Year
Zaria, Kaduna	11	2019
Rigasa, Kaduna	Approx. 300	2019
Daura, Katsina	360 + 200 escapees	2019
Rigasa, Kaduna	147	2019
Gaa-Odota, Kwara	108	2019
Yola, Adamawa	15	2019
Ibadan	259	2019

Authors' compilation from media reports in Nigeria from September 30, 2019 to November 3, 2019.

confession, intimidation, punishment, undue coercion and other reasons based on discrimination of any kind (66). The Nigerian Medical community has equally described torture as a systematic infliction of physical and/or mental injury which is harmful on a person by others for any reason which undermines personal dignity (67). Section 2 of the Nigerian legislation against torture also defines it in similar terms [Anti-torture (68)].

Physical torture involves beating, punching or slapping, suspension of body frames in unusual positions, sexual torture, rape, forceful insertion of objects into body orifices, tearing, torching or burning or exercises other than usual training procedures, and climate stress such as application of extremes of heat or cold, amongst others. Biological and chemical torture may be pharmacological, which is misuse of indicated and unapproved drugs; forced urine and excrement usage, and application, sleep deprivation, starvation, insect or animal aggression, in addition to other forms. Psychological torture could involve threats to self and loved ones, sexual violations, deprivation of healthcare comfort to either the victim or his family, and forced witnessing of the torture of others. According to media reports of victims' accounts, forms of torture in these indigenous centers included starvation, beating, the use of chains or shackles, hanging, sexual abuse including rape and sodomy as well as other forms of abuse, exploitation or degrading treatment.

A number of important legal instruments are relevant to torture in any context. Article 3 of the Universal Declaration of Human Rights (UNDHR) (69) and article 6 of the African Charter on Human and Peoples' Rights (ACHPR) (70) clearly state that everyone has the right to life, liberty and security of person while Article 5 prohibits a person being subjected to torture or to cruel, inhuman or degrading treatment or punishment. Similarly, article 12 of the ACHPR (1986) and article 13 of the UNDHR (1948) guarantee freedom of movement which is consistent with section 35 of the Nigerian constitution.

In the same vein, criminal law sanctions exist against torture within the shores of Nigeria. Section 8 of Anti-torture Act (68) makes participation in torture a crime and it would appear that this may make the relations of torture victims liable as conspirators or accessories after the fact when they become aware that their wards are being tortured and they fail to report it. Section 9(1) of the Anti-torture Act (68) imposes a jail term not exceeding 25 years on offender convicted for torture of any form/kind while section 9(2) of the same act prefers a charge of murder against an individual who tortures a person to death. Instructively, section 9(3) of the Anti-torture Act (68) provides for civil suit (human rights) against the perpetrator regardless of criminal proceedings. This will be helpful for recovering necessary damages in cases of torture thereby further assuaging the victim's sense of loss.

6.1.2. Ethical perspective

From an ethics point of view, it is important to stress the divergent ethical positioning of orthodox mental health practitioners from those of indigenous treatment providers. While the physician has the professional ethical as well as moral duty to be beneficent, non-maleficent, just and respectful of individual autonomy (67, 72), these loosely regulated alternative treatment centers have no such professional ethics. They espouse the ethos of power over the vulnerable for his/her own benefit which is essentially a patent mix of paternalistic and humanitarian tendencies. Within the African collective unconscious, they frequently recognize the role of the spiritual in disease causation. They thus see the need to wield spiritual power over etiological demons/evil spirits and such powers can be exercised in whatever way is randomly possible without recourse to the patient's human rights or personal dignity. It is noteworthy that some of these unethical practices have surprisingly been reported in orthodox treatment settings (12). This may not be unrelated to the absence, for many years, of enabling laws that protect persons with mental-ill health thus necessitating a need for prompt review of the obsolete mental health laws that currently exist in Nigeria in order to stem these unwholesome practices. A new legislation has now been passed and it substantially promotes the rights of persons with mental disorders (77).

Furthermore, the doctor must not be party to torture [(67); rule 66.0]. While this should guide the physician against engaging torture techniques in treatment, it also raises concerns when one considers that in a collaborative shared mode of care, there will be a need to form a partnership of a sort with indigenous treatment providers. This remains an ethical concern which must be addressed transparently in any shared care arrangements with non-orthodox practitioners (4). Overall, a decent society has a moral duty to prevent torture and to protect its citizens from harm in a broad sense since, in the Nigerian context, 'welfare and security' is regarded as the primary purpose of government [(71); s. 14(2) (b)].

6.1.3. Addressing the biopsychosocial impact of torture in indigenous mental healthcare

The effects of torture and social isolation in unregulated indigenous treatment centers are multi-faceted. The physical effects include malnutrition, infections (TB, HIV/AIDS/STIs, Hepatitis B, etc.), as well as untreated medical conditions such as hypertension, diabetes mellitus, asthma, dermatological conditions, etc. and in extreme instances, death may occur. The psychological sequelae of torture could potentially include mood disorders, psychosis, PTSD, generalized anxiety disorder, phobias, enduring personality change, sleep disorders, organic psychotic disorders from head injuries, persisting substance use disorders given the lack of effective treatment for years, later substance use disorders in order to cope with the effects of the trauma, adjustment disorders, shame, low self-esteem, and suicide, amongst many others. On the social level, the adverse effects of social isolation include loss of social and occupational skills, loss or lack of accommodation, loss of employment, marital difficulties, disruption of family ties, etc.

In rehabilitating torture victims or persons rescued from poorly managed indigenous treatment facilities, there should be a clear focus on physical health and psychosocial well-being. Victim assistance will include screening for physical health problems, e.g., HIV, Hepatitis, etc., post-trauma psychological intervention, e.g., counseling and perhaps relevant treatment for mental health problems/drug addiction which brought the individuals into such facilities in the first place. These rehabilitation objectives will require adequate reintegration of these persons into society including a focus on occupational rehabilitation. This will involve adequate inter-sectoral collaboration comprising the ministries of health, women and social welfare and justice. The involvement of their family members will always be critical. In order to ensure the success of such rehabilitation and reintegration strategies, a multi-disciplinary approach should be adopted. Responsible media coverage/reportage is equally important in ensuring the informational/spatial integrity of victims/patients in order not to further stigmatize them.

7. Managing the treatment gap as a means of dealing with harmful forms of indigenous care

Addressing the treatment gap in Nigeria will ensure a reduction of patients' reliance on some indigenous forms of care which are harmful as well as lead to improvement in resources to collaborate more effectively with complementary and traditional care approaches that are beneficial. To achieve this treatment gap intervention, a number of initiatives must be taken. First, there must be better funding for healthcare with a focus on allocative efficiency. Second, community mental healthcare must be strengthened as a way of improving access, affordability, availability and responsivity to the preferences of patients. Within the community model of care, the integration of mental health into primary health care presents one of the most cost-effective approaches to care in low and middle-income countries. Early experiences in Nigeria show that its uptake is quite significant and its benefits are demonstrable (73). It reduces the social distance toward the mentally ill and mental health generally. It is to be noted that primary mental health care is likely to work best when broad structural barriers to health such as low levels of education, unemployment, poverty and key infrastructural deficits, e.g., transportation, are addressed (74).

Additionally, attempts must be made, through public enlightenment and other stigma-reduction strategies, to present a more positive view of already "stigmatized" psychiatric hospitals which continue to provide over 80% of the mental health beds in the country. There may come a time when most services will be decentralized to smaller, more community-based centers which could be more cost-effective (75) but at the moment, the specialist psychiatric services still offer the much needed care which the populace requires. Beyond the de-stigmatization of the stand-alone psychiatric hospitals, there is also a need for public enlightenment regarding the cause, symptoms and course of mental disorders which will serve to combat self- and public-stigma as well as social distance toward persons with mental illness (38). The role of advocacy in this regard by both governmental and non-governmental actors cannot be over-emphasized (33). The current mental health policy in the country is geared, among other things, toward the elimination of stigma related to mental illness by improving community awareness of mental health issues through evidence-based messages in the media and leveraging community support systems (76). The latest mental health legislation also addresses stigma and discrimination toward persons with mental disorders through a robust institutional framework [National Mental Health Act 2021 (77)].

Political will on the part of government is central to achieving these initiatives. Government must have the vision of increasing funding for mental health care from the paltry average of about 1% seen in LMICs (about 3.3% in Nigeria) to levels closer to the recommended level of about 10% of government health expenditure (44, 78) Currently, less than 5% of mental health research funding is made available to Low Middle Income Counties (LMICs) (60). Going forward, there needs to be an increase in clinical and applied research outputs from LMICs which would inform conceptual or theoretical models of care and underpinned by the understanding of interdependence self-construals.

Furthermore, there is a need to ensure the investigation and prosecution of offending indigenous treatment 'facilities' who abuse patients' rights and jeopardize their safety (4). In this connection, the effective implementation of the recently enacted of the National Mental Health Act (77) which has provisions for the registration, licensing and accreditation of mental healthcare facilities is critical to exercising appropriate oversight in mental health care in the country. The force of statute will further strengthen law enforcement agents to apprehend indigenous mental health care providers going beyond the remit of providing culturally appropriate and acceptable care to operating as unlicensed psychiatric centers where the rights of patients are frequently abused.

In a more nuanced view of the role of spirituality and culture in mental health treatment, reliable research evidence reviewed in this paper suggests that there is demonstrable benefit in collaborating with traditional/faith healers/alternative mental health service providers within an appropriate framework while denouncing/addressing some of their harmful practices. This approach would aid a paradigm shift, with a focus on knowledge creation with psychotic patients for instance, being active agents, who are making sense of their reality (79) as supposed to discounting meanings associated to their experiences, which often result into restrictive and unethical practices. Future research needs to explore the application of phenomenological psychopathology within collectivist societies like Nigeria, where the construct of selfhood lays emphasis on relationships with others and are concerned with what their social groups think of them (80, 81). This has implications on day-to-day practices and would present itself when unwell. In the context of schizophrenia and related psychoses for instance, it is important to understanding stressors and coping strategies adopted by patients and their family members with the view of denouncing the convenience of dichomotization, which tends to oversimplify non-orthodox but evidence-based health practices. Additionally, knowledge sharing and on-going dialogue between orthodox and indigenous mental healthcare providers will go a long way to ease the tension between them and create greater opportunities for collaboration (62, 63).

Despite the important issues raised in this review, it is necessary to highlight a few notable limitations to our narrative approach. Since this was not a systematic review of the literature, it is likely that some important studies on the critical intersection between indigenous mental healthcare, cultural factors and stigmatization as a psychosocial response to mental illness in Nigeria could have been missed. Additionally, the media reports on inhumane treatment of the residents of some of the traditional or religious treatment facilities were selectively based on facilities that had attracted the attention of law enforcement agents. Generalization of the nature and severity of such human rights abuse to all traditional or religious mental health treatment settings must be done with caution. Evidently, the international conventions, criminal law legislations and medical ethics code referenced in this narrative review were those deemed by the authors to be most relevant to our discourse and cannot be said to be exhaustive. Future reviews could address these limitations by adopting a systematic review methodology using more streamlined research questions derivable from our narrative review. Finally, the authors being of an orthodox persuasion, may not be entirely value-free or neutral in the evaluation of the literature or the arguments proposed.

8. Conclusion

Indigenous mental healthcare is endemic in Nigeria with its complex underpinnings of stigma and cultural syntonicity as well as its inherent proclivity for human rights deprivations. Be that as it may, orthodox dichotomization as a dominant systemic response to it is unlikely to produce a meaningful care response. While interactive dimensionalization provides orthodox practitioners and policy makers with a realistic psychosocial explanation for the utilization of this variant of mental healthcare, collaborative shared care involving measured collaboration between orthodox mental health practitioners and indigenous mental health systems offers an effective as well as cost-effective intervention strategy. It reduces harmful effects of indigenous mental healthcare including human rights abuses and offers patients a culturally appropriate response to their problems (12). Overall, practical considerations suggest that indigenous mental health treatment providers have larger capacity for residential care (18), are perceived to be effective (82), and not likely to 'go away' (83). Although these complementary/alternative mental health service providers fall short of certain ethical and/or moral standards and could be more prone to the patients' human rights abuses, they cannot be ignored and ought to be harnessed responsibly within this collaborative shared care framework. This does not only provide a pragmatic response to resource constraints within the mental healthcare environment in Nigeria but offers a cost-effective approach to safely meeting the health needs of the populace in meeting sustainable development targets in the frame of universal health coverage.

Author contributions

AO conceptualized the review and wrote the first draft of the manuscript. BF contributed critical content on the aspects of stigma, indigenous mental healthcare utilization, and collaborative shared care. OB contributed critical content in elucidating the philosophical/ethical basis of interactive dimensionalization and collaborative shared care. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The Columbia-suicide severity rating scale: validity and psychometric properties of an online Spanish-language version in a Mexican population sample

Fernando Austria-Corrales[1†], Alberto Jiménez-Tapia[2†], Claudia Iveth Astudillo-García[2]*, Paulina Arenas-Landgrave[3], Tonatiuh Xochihua-Tlecuitl[4], Copytzy Cruz-Cruz[5], Leonor Rivera-Rivera[1], José Alberto Gómez-García[6], Bruma Palacios-Hernández[7], Berenice Pérez-Amezcua[7], Filiberto Toledano-Toledano[8,9,10], Jenelle Richards[11] and Igor Galynker[12]

[1]Centro de Investigación en Salud Poblacional, Instituto Nacional de Salud Pública (INSP), Cuernavaca, Morelos, Mexico, [2]Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz (INPRFM), Mexico City, Mexico, [3]Facultad de Psicología, Universidad Nacional Autónoma de México, Mexico City, Mexico, [4]Facultad de Ciencias, Universidad Nacional Autónoma de México, Mexico City, Mexico, [5]Servicios de Atención Psiquiátrica (SAP). Secretaría de Salud, Mexico City, Mexico, [6]Independent Researcher, Mexico City, Mexico, [7]Centro de Investigación Transdisciplinar en Psicología, Universidad Autónoma del Estado de Morelos, Cuernavaca, Morelos, Mexico, [8]Unidad de Investigación en Medicina Basada en Evidencias, Hospital Infantil de México Federico Gómez, Mexico City, Mexico, [9]Unidad de Investigación Sociomédica, Instituto Nacional de Rehabilitación Luis Guillermo Ibarra Ibarra, Mexico City, Mexico, [10]Dirección de Investigación y Diseminación del Conocimiento, Instituto Nacional de Ciencias e Innovación para la Formación de Comunidad Científica, INDEHUS, Mexico City, Mexico, [11]Department of Psychology, Texas State University, San Marcos, TX, United States, [12]Icahn School of Medicine at Mount Sinai, New York, NY, United States

EDITED BY
Wulf Rössler,
Charité University Medicine Berlin, Germany

REVIEWED BY
Ezequiel Teixeira Andreotti,
Federal University of Health Sciences of Porto Alegre, Brazil
José Nahum Rangel Villafaña,
Centros de Integración Juvenil, Mexico

*CORRESPONDENCE
Claudia Iveth Astudillo-García
✉ claudiaiveth.astudillo@gmail.com

†These authors have contributed equally to this work and share first authorship

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The aim of this study was to evaluate the validity and psychometric properties in a Mexican sample of a Spanish-language online version of the Columbia-Suicide Severity Rating Scale (C-SSRS). Data were collected between May and October 2021 from 3,645 participants aged 18 years and over, who agreed to complete the questionnaire. Reliability analysis, confirmatory factor analysis (CFA), and psychometric properties were calculated using a two-parameter model. The results showed a reasonable level of reliability with a Cronbach's alpha of 0.814, and evidence of unidimensionality, and construct validity for suicide risk at three risk levels: low, medium, and high. Analysis of the items suggests that they are consistent with the proposed theoretical model. Our results also demonstrate that the parameters are stable and able to efficiently discriminate individuals at high risk of suicide. We propose the use of this version of the C-SSRS in the Spanish-speaking population, since it is a multifactorial assessment of suicide risk and the inclusion of other clinical and risk factor assessments for a more comprehensive evaluation.

KEYWORDS

suicidal behavior, suicide risk, C-SSRS, validation study, risk assessment

1. Introduction

Suicide is a global public mental health problem. Data show that 703,000 people died by suicide in 2019, making it one of the world's leading causes of mortality; it produces more deaths than causes such as malaria, HIV/AIDS, breast cancer, wars, and homicide (1). The global age-standardized suicide rate is about 9 per 100,000 population, with variation among countries ranging from 2 to 80 deaths per 100,000 population, and it occurs mainly in low– and middle-income countries, where most of the world's population lives. Data also show that suicide mortality in the Americas increased by 17% between 2000 and 2019 (1). In Mexico, the mortality rate from suicide in 2022 was 6.5 per 100,000 population, with the 15–29 age group having the highest risk (a rate of 16.2), making suicide the fourth leading cause of death in this group, exceeded only by violence, accidents, and COVID-19 (2).

The effects of the COVID-19 pandemic, while permeating the mental health of the entire population, have not had a uniform effect worldwide. For example, a study of suicide data recorded 9 to 15 months after the onset of the pandemic in 33 countries reported no evidence of an increase in the number of suicides in most of them; however, in middle- and low-income countries the data showed evidence of an increase (3). In the 32 states of Mexico, there was a differential impact on suicide deaths, suggesting that higher population density was associated with the increase in suicides in 2019, which highlights a need to improve access to primary care and mental health services to meet the needs of the population in emergency situations (4).

Every suicide represents an individual tragedy and has far-reaching effects on families and communities, so suicide must be approached from a public health perspective. This perspective should: (a) assess the magnitude of the problem, (b) examine differences in rates among groups and geographic regions, and (c) establish local, provincial/state, and national health priorities (5). The public health approach provides an understanding of the characteristics and interactions among factors that could contribute to improved surveillance, monitoring, and timely clinical care (6). Thus, early identification and timely intervention is critical for individuals at suicide risk, and a systematic screening process should be established (7).

In the context of monitoring and surveillance of health indicators, many tools are available for detecting suicidality and determining the level of risk, but their scope, advantages, and disadvantages are controversial. A systematic review found that there is no strong evidence that any tool is accurate enough to predict suicide with a sensitivity of 80% and a specificity of 50% (8). Given the current limitations in identifying individuals who may die by suicide, the bases of prevention are universal strategies combined with expertise in psychiatry and risk assessment (9). Although it has been reported that self-reported suicidal ideation (SI) may be a poor predictor of suicidal behavior (10–12), it remains the core of risk assessment, so research on culturally appropriate and reliable scales, such as the Columbia-Suicide Severity Rating Scale (C-SSRS), is essential.

The C-SSRS was developed as a semi-structured assessment instrument based on a clinical interview (13), and evaluates the presence, severity and frequency of suicide ideation and behavior; includes questions to explore the presence of ideation, the intensity of ideation, and suicidal behavior (including information on preparatory actions, as well as actual, interrupted, and aborted attempts). The CSSRS is a widely used method for screening and assessing suicide risk in clinical and research settings and for that reason requires proper validation. Still, aspects of the scale design and measurement model have received scant empirical investigation (14, 15). Knowledge about the construct validity of suicidal ideation severity is insufficient, particularly about the intrinsic properties of the items as consecutive indicators of suicide risk severity (14), and although the scale is available in more than 100 languages, there have been few evaluations outside of English-speaking populations (15). A literature search up to 2022 identified only two validation studies of the psychometric properties of the Spanish version of the C-SSRS, one study conducted with adult psychiatric outpatients, whose results showed weak internal consistency and convergent validity, but strong discriminant validity (16), and another study conducted with college students that reported evidence of validity and reliability (17). Both examined the multidimensional version of the 21-item interview.

In the present study we focus on the assessment of suicide risk severity as an important step for prevention, considering suicidal behavior as a unidimensional construct and considering the relative importance of each item as a measure of the underlying latent construct. The main objective of this study was thus to evaluate the validity and psychometric properties of an online Spanish-language version of the C-SSRS in a sample of Mexican adults aged 18 years and over.

2. Materials and methods

2.1. Method

This study was part of the multinational cross-sectional study "Effects of Quarantine on Degree of Emotional Distress During the COVID-19 Outbreak" (study no. GCO: 20–03543 IF: IF2644172), registered with the Mount Sinai Health System, United States. The study in Mexico was entitled "Evaluation of the Suicidal Crisis Syndrome (SCS) during the COVID-19 Pandemic, "and was approved by the Research Ethics Committee of the Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz (study no. CEI/C/059/2020).

2.2. Participants and procedure

Data for the study were collected using an electronic questionnaire distributed through the Qualtrics platform to a sample of adults from the general population. Invitations to participate were posted on social media (Facebook, Instagram, WhatsApp, Twitter), by email, and on the websites of various health and educational institutions. Participants were provided with a directory of support resources to which they could turn if required, both in the announcement inviting them to participate, and when they completed the instruments. The sample included 3,645 participants of both genders, who answered the questionnaire between May and October 2021. Ages ranged from 18 to 84 years ($M = 35.51$, $SD = 12.24$), and the majority were female (71%), single (55%), had a bachelor's degree (62%), were health care personnel (50%), and were employed full-time (51%).

2.3. Study variables

2.3.1. Columbia – suicide severity rating scale screener

The C-SSRS (13) assesses the severity and intensity of suicidal ideation and the occurrence of suicidal behavior during the person's lifetime. This version of the scale is used on admission to clinical settings and in research to inquire about the respondent's suicidal thoughts and behaviors in a face-to-face session. In the present study, a version of the scale with 12 items that can be answered dichotomously (yes/no) was used. In this version, two time periods are examined: once in a lifetime and in the last month.

The analysis included a conceptual review of the 12 items of the C-SSRS from the original protocol to adapt the short, self-administered version. The conceptual review involved two judges with expertise in mental health and suicide who independently analyzed each item on the scale. We selected six of the twelve items that best represented the spectrum of suicidal construct: ideation, suicide planning, and suicide attempt. Agreement on relevance, appropriateness, and severity was unanimous. These items are similar to those in the Spanish version of the C-SSRS, "Exploratory version – since last visit" (13), but in our version all items are used regardless of the response to the first two. Table 1 shows the comparisons between the two versions in terms of what was experienced in the last month. The Spanish version of the scale is included in the Supplementary Table S1.

2.4. Data analysis

Psychometric testing was performed using a reliability analysis that included Cronbach's alpha. A tetrachoric covariance matrix was then analyzed since the variables are dichotomous (18). Confirmation of unidimensionality assumptions and construct validity was performed with confirmatory factor analysis (CFA), using the Satorra-Bentler correction because the data lacked multivariate normality (19). The evaluation of the model included four fit indices: (I) the Comparative Fit Index (CFI), whose values range from 0 to 1 (a value of 0.90 indicates adequate fit and a value greater than or equal to 0.95 indicates very good fit), (II) the Bollen Index (BFI), which also takes values between 0 and 1 (values greater than 0. 90 are considered adequate and values greater than 0.95 are considered very good), (III) the McDonald index (with similar interpretations as CFI and IFI), and (IV) the root mean square error (RMSEA), which should have values less than or equal to 0.06 to indicate very good fit (20).

We used an item response theory (IRT) model *via* a two-parameter model ("a" and "b"), in which "a" indicates the discrimination index, the ability of items to discriminate efficiently between at-risk and non-at-risk individuals, and "b" indicates the difficulty index when it comes to latent variables that measure performance. In this case, this index is interpreted as a measure of the relative position of the severity of suicide risk (21). The aim of this analysis was to confirm the theoretically proposed severity index, which is important evidence of validity (Figure 1). Psychometric analysis was performed using XCalibre 4.2.2 software (22), and CFA was performed using EQS 6.2 software (23).

3. Results

3.1. Reliability and dimensionality analysis

The initial analysis yielded a Cronbach's alpha coefficient of 0.81. Table 2 shows the tetrachoric correlation matrix, which shows high correlations among the items. Figure 1 shows the high factor loadings (0.88–0.94) obtained in the CFA; this indicates high unidimensionality, indicating construct validity for the severity of suicide risk, which includes three specific attributes: Ideation, Planning, and Attempt. The indices showed good model fit (CFI = 0.995; IFI = 0.995, MFI = 0.990, and RMSEA = 0.047,95% CI [0.038–0.056]); this fit was achieved by all additional parameters.

3.2. Discrimination analysis and item difficulty

The results indicate that the proposed theoretical model was confirmed (Table 1). Column I of Table 3 shows the classical *p* and *R* indices, which represent the proportion of cases that answered the questions affirmatively and the biserial correlation between the answers and the total score of the questionnaire. Indices *a* and *b* correspond to the discrimination parameter and the position parameter calculated in IRT; parameter *b* in this case represents the severity of suicide risk. The discrimination values are generally between 0.4 and 1.5, and the values obtained indicate high discrimination power in all cases. The same table shows that the Z Resid and *p*-values are not significant, indicating that there are no significant differences between the theoretical and empirical models, so it can be assumed that the parameters are stable and able to efficiently discriminate individuals at higher risk.

Table 3, column II in shows each item and the empirically estimated severity. It also shows that the values of *b* increase gradually, as do the theoretical severities suggested by the judges, so this relationship provides evidence of content validity.

Figure 2 shows the conditional relationship between the increase in symptoms and the probability of answering a larger number of items. The graph shows that as the severity of suicide risk increases (x-axis), the probability (y-axis) of subjects answering "yes" to the questions in the questionnaire increases. The lower the subjects' suicide risk, the lower the probability that they will answer the questions in the affirmative. This indicates that the questionnaire is effective in distinguishing between highly suicidal and non-suicidal subjects.

4. Discussion

The results of the psychometric analyses conducted with this electronic Spanish-language version of the C-SSRS demonstrate a reasonable level of reliability, construct validity, and unidimensionality in the assessment of suicide risk. The analysis of the items indicates that they follow the proposed theoretical model and demonstrate the validity of the risk levels proposed in the six-item version, so we can assume that this version of the C-SSRS is able to efficiently discriminate individuals at higher suicide risk.

These results favor use of this scale and respond to some of the criticisms of its performance (24): its contribution to identifying

TABLE 1 Comparison of the C-SSRS-exploratory version-recent (2008) and the items included in the current study.

C-SSRS-Exploratory Version-Recent			Current Study		
	Past month			Past month	
Ask questions 1 and 2	Yes	No	Answer all the questions	Yes	No
1. Have you wished you were dead or wished you could go to sleep and not wake up?	🟨		1. Have you thought (even momentarily) that you would be better off dead, wished you were dead, or felt like you needed to die?	🟨	
2. Have you actually had any thoughts of killing yourself?	🟨		2. Have you thought (even momentarily) about harming, hurting, or injuring yourself with at least some intent or awareness that you may die as a result?	🟨	
If YES to 2, ask questions 3, 4, 5, and 6. If NO to 2, go directly to question 6.					
3. Have you been thinking about how you might do this?	🟧		3. Have you had a plan (i.e., a place/date/timeframe) in mind to attempt suicide?	🟧	
4. Have you had these thoughts and had some intention of acting on them?	🟧		4. Have you taken any active steps to prepare for a suicide attempt in which you expected or intended to die?	🟧	
5. Have you started to work out or worked out the details of how to kill yourself? Do you intend to carry out this plan?	🟥		5. Have you started a suicide attempt, but then decided on your own to stop and did not finish the attempt?	🟥	
6. Have you ever done anything, started to do anything, or prepared to do anything to end your life?	🟥		6. Have you started a suicide attempt, but then you were interrupted by someone else and did not finish the attempt?	🟥	

🟨 Low Risk. 🟧 Medium Risk. 🟥 High Risk.

severity is clear and the wording of the items was understandable to the Mexican participants. The verification of the unidimensionality of the construct is another important contribution, consistent with the findings of a meta-analysis (25), which showed that suicidal ideation and behaviors (understood as the presence of self-injury, attempt, or suicidal behavior) are moderately associated with suicide; that is, no conclusive evidence was found that suicidal behaviors are more strongly related to suicide than suicidal ideation. Thus, the recommendation to staff who provide clinical care and follow-up for people with suicidal behavior is not to privilege suicidal behavior over suicidal ideation, since the assessment of suicide risk is a unidimensional construct.

The results of this study also provide an opportunity to resolve some difficulties identified with the items, namely that the lower-level items (generally the items on suicidal ideation) captured less information about suicidal risk than the upper-level items (on

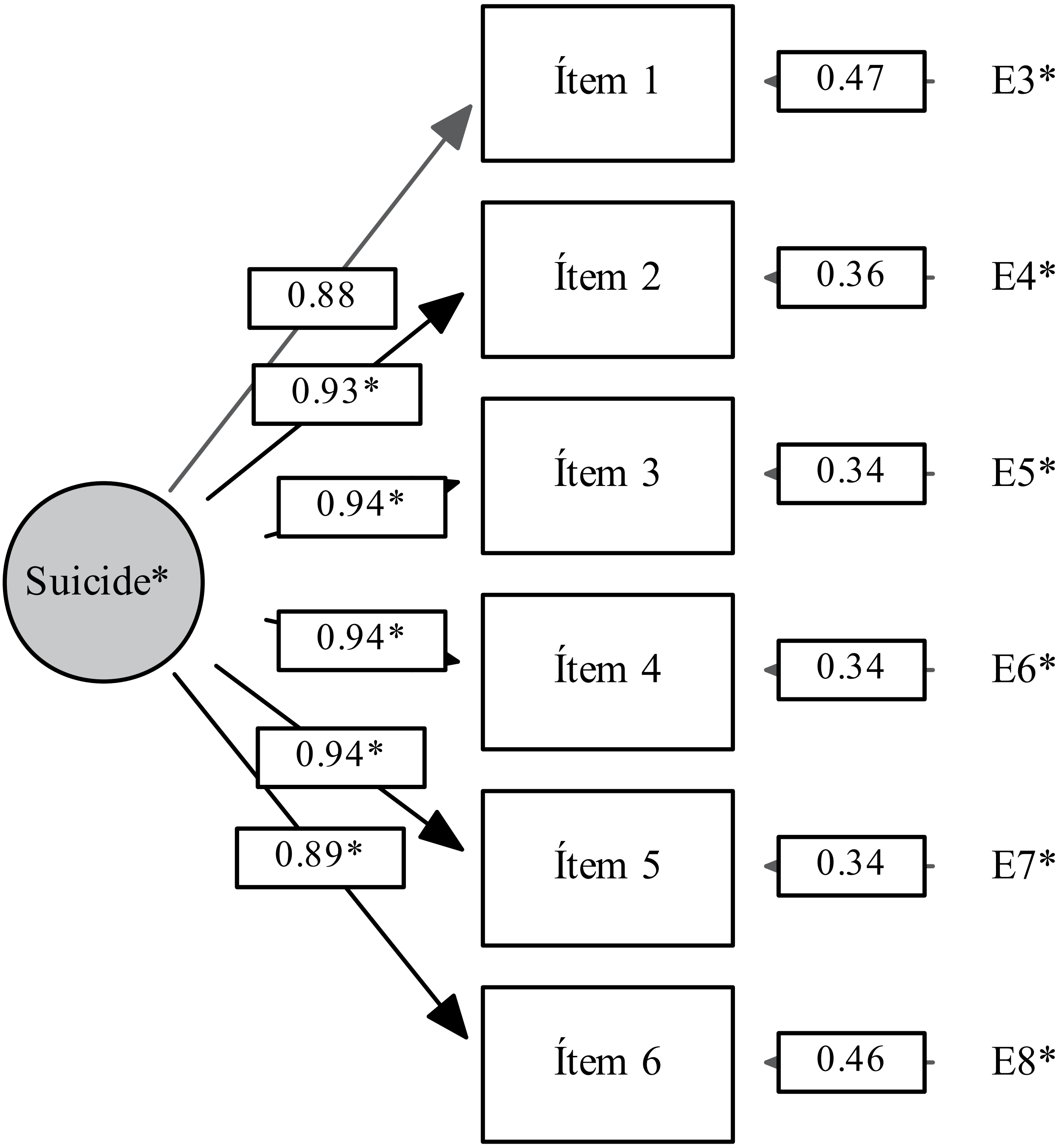

FIGURE 1
Confirmatory factor analysis of the C-SSRS suicide risk construct in the spanish online questionnaire. Chi-squared = 5010.10, $p < 0.001$, CFI = 0.99, RMSEA = 0.05.

planning and attempt), and that variation between individuals at the lower end of the scale was more error-prone than variation at the upper end. That is, items in the "once in a lifetime" time window (which is usually the first screening for all respondents) were the most problematic (14). This could be due to ambiguous wording leading to different interpretations and a large range of responses among respondents, such that the lower-level items provide less useful information about suicide risk than the upper-level items. Because the C-SSRS uses a conditional response design in which the higher-level items are presented only when the lower-level items are answered in the affirmative, the results suggest that the scale may lead to greater measurement error than expected when rating individuals (14). However, this is not the case in the version we present, as the questionnaire can be configured to answer all questions when used online.

4.1. Recommendations for the use of the scale

Some authors contend that the predictive value of suicide risk assessment tools is limited and counterproductive, primarily because classification as high, moderate, or low risk could be used to misallocate care by denying necessary treatment to some and providing unnecessary and restrictive treatment to others (26, 27), especially for those classified as high risk (28). With this in mind, it should be considered that as a first step toward timely and comprehensive suicidality care, public mental health services should use tools to identify high-risk individuals who are at imminent risk whether or not they report suicidal ideation (29), require more detailed assessment and follow-up, whether in the form of hospitalization or intensive support in the community (26). Thus, a shift from traditional risk stratification to a more clinically meaningful learning-based model is recommended (30). Such a model should be based on needs assessment rather than risk assessment and should allow the identification of the development, maintenance, and generalization of suicidal behavior, which would be useful for the assignment of subsequent clinical care aimed at achieving autonomy in individuals and thereby preventing suicides (31, 32). Similarly, the application of therapeutic approaches with clinical and scientific evidence for the assessment and management of suicide risk will allow effective support for suicidal individuals (33) and provide healthcare professionals with confidence in clinical practice (34). Along these lines, positive experiences have been documented with up to 35% reductions in suicide attempt recidivism after a shift to collaborative risk assessment that is more person-centered, along with safety planning, psychoeducation of at-risk individuals and their caregivers, and assertive follow-up (34, 35). This implies highlighting the importance of reforming suicide risk assessment practices in health services, which should not be based solely on the use of suicide risk screening.

TABLE 2 Tetrachoric correlation matrix.

	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6
Item 1	1					
Item 2	0.934	1				
Item 3	0.859	0.896	1			
Item 4	0.781	0.853	0.899	1		
Item 5	0.802	0.856	0.866	0.9	1	
Item 6	0.685	0.782	0.797	0.878	0.916	1
M	0.1386	0.0873	0.04	0.0298	0.0285	0.0194
SD	0.3455	0.2824	0.1959	0.1702	0.1664	0.1381

Aspects of implementing a screening strategy must also be considered. These include the training and awareness needed to promote empathy and safety among field staff using the tool. It is known that comfort in initiating a suicide interview is greater when information is provided on how to help a person in this situation or when tools are used that provide guidance on questions to ask and strategies for proceeding (6). Other helpful measures include improving clinical education, improving the identification of at-risk individuals who visit a health care facility, developing clinical and safety pathways for patients who are considered at-risk, and increasing the availability of individuals who can serve as trusted contacts for individuals in suicide crisis (5).

Clinical decisions should be made with caution and should not be based solely on the severity of risk from the C-SSRS, because people with different scores may have similar suicide risk and people with the same score may have markedly different risk (14). Scores should be considered with caution. On the other hand, it is important to have scoring systems that are useful for clinical research in suicide risk. For example, clinical trials that seek to test the effect of interventions to reduce suicide risk need a measure that (a) accurately captures suicide risk, (b) is sensitive to change, (c) can distinguish between a therapeutic intervention and a placebo, and (d) has sufficient granularity so that a reduction in suicidal ideation can be translated into suicide risk (i.e., presence or absence of a plan and presence of suicide). In addition, the ideal instruments would reduce participant burden and study costs (36) and would be invariant for relevant variables such as age, gender, and schooling. This is revealing because in Mexico, adolescents are an at-risk group (under 18 years of age), and as in other parts of the world, suicide rates are higher among men (10.9 suicides per 100,000) than among women (2.4 per 100,000) (2), and 63.4 of reported deaths by suicide in 2019 occurred in the population with basic education (primary and secondary) (37).

4.2. Public mental health implications of appropriate measurement of suicide risk

Public mental health interventions target two main areas, prevention, and promotion, and are recommended for preferential targeting to groups at higher risk for mental disorders and distress over the general population (38, 39). Given the relative rarity of suicide deaths and the clinical and scientific challenges associated with screening, screening may not accurately identify individuals at risk (26). However, if screening tools are available, quick, easy

TABLE 3 Values derived from the psychometric and severity analyses of the items.

	(I) Psychometric results of the test items						(II) Severity analysis	
Item	*p*	*R*	a	b	Z Resid	*p*	Severity	b
1	0.139	0.589	1.843	1.756	1.5325	0.1254	Low	1.756
2	0.087	0.716	2.890	2.118	1.648	0.0993	Low	2.118
3	0.040	0.658	1.664	2.889	0.7781	0.4365	Medium	2.889
4	0.030	0.620	1.492	3.175	0.6252	0.5318	Medium	3.175
5	0.028	0.620	1.505	3.206	0.6217	0.5342	High	3.206
6	0.019	0.501	1.161	3.704	0.5193	0.6035	High	3.704

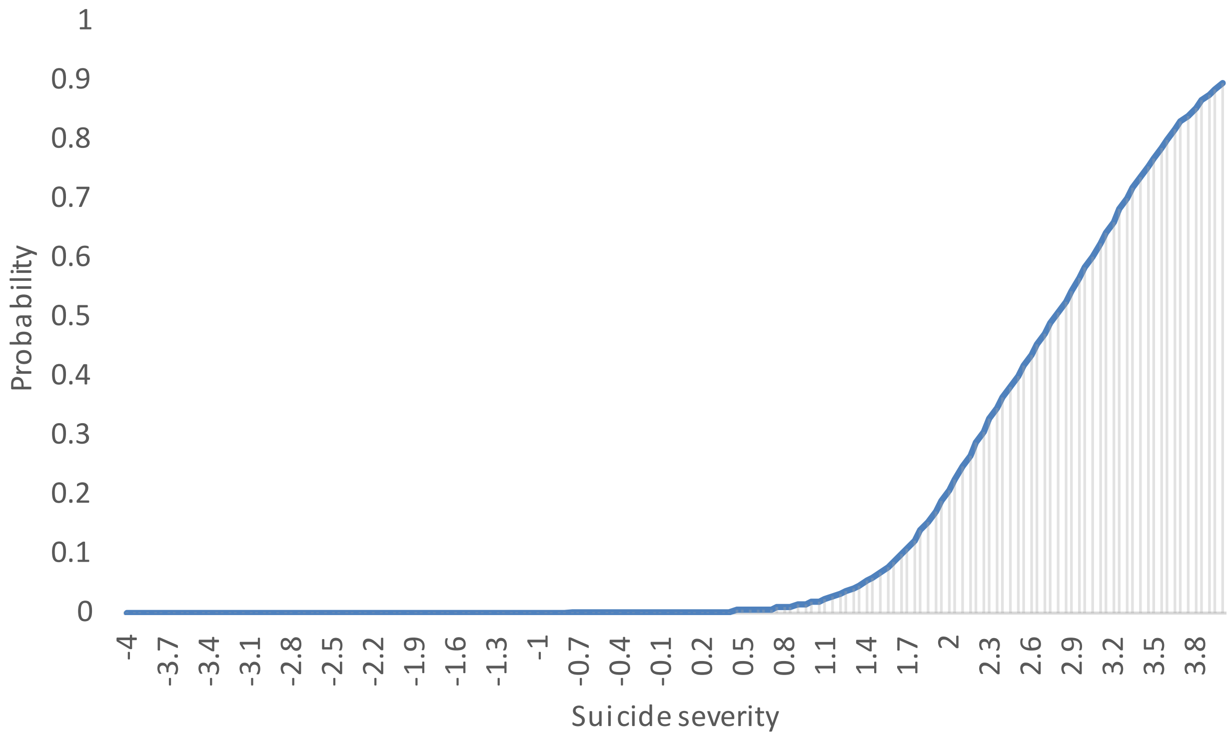

FIGURE 2
C-SSRS test response function.

to use, economically feasible, reliable, and valid, they may form the basis for prevention strategies that could focus on combining universal interventions with selective and indicated interventions that consider identification of high-risk individuals and assessment and evaluation for more specific psychological or psychiatric interventions.

Real-time monitoring of specific groups could also be used to reach different geographic areas and obtain differentiated snapshots for targeted and localized actions (27). Currently, there is more reliance on statistical surveys, which do not provide the same opportunities for a timely and tailored response (3).

The promotion of strategies aimed at reducing exposure to modifiable risk factors is essential to the provision of effective interventions for selected subpopulations and for unselected clinical populations (40). Thus, care and treatment should be provided not only in clinical settings, because there are other variables (sex, age, sociodemographic context) that are more likely to be related to access to formal general health and mental health services than to death by suicide. Evidence shows that many people who die by suicide did not have access to needed mental health care, did not report previous suicidal behavior, and their methods were more likely to be lethal, so screening tools in different settings might be a good strategy, especially among at-risk groups (33).

It should be noted that suicide risk assessment is not the same as risk management, so mere assessment without the development of a management plan according to the magnitude and nature of the risk is unlikely to improve outcomes for individuals; therefore, risk scales should not replace comprehensive psychosocial assessment (31). The goal of mental health policy should be to move mental health out of its current professional, organizational, and even political isolation and place it within a broader framework, that is, to shift the focus from the individual level to strengthening the population mental health approach (41). Public health approaches to suicide prevention must incorporate social and cultural frameworks to develop strategies that save the most lives in an effective and measurable way (41). Selective prevention strategies that focus on high-risk groups is important from an ethical perspective because it could reduce the suffering of individuals and their families. Its combination with universal approaches could help prevent a greater number of deaths (41).

4.3. Limitations

Our study includes limitations inherent in the design and nature of the sample, since the population that participated in the online questionnaire was the one that learned about the survey and had access to electronic devices and an internet connection to answer the survey, however, in Mexico, the percentage of internet access is 70.1% (42). On the other hand, there is only one measurement, it is not possible to assess predictive power, but it is important to note that given the dynamic nature of suicide risk, the focus of the assessment should be on modifiable factors and safety planning rather than just predicting risk (26).

Finally, it should be noted that the version analyzed does not investigate whether a suicide attempt is currently being considered, which is essential for identifying the at-risk population. A question to this effect should be added in future applications of the scale, as well as in different Spanish-speaking populations and in different application modalities.

5. Conclusion

The six-item Spanish online version of the C-SSRS showed adequate psychometric properties in a sample of the Mexican population. Although we believe that a risk assessment tool is not a substitute for a clinical approach, it is a tool that helps to identify the population at risk and refer them to care according to the level of risk identified. The assessment is fundamental in determining a person's level of risk and influences the way the case is approached, helping health care professionals make decisions to prevent death by suicide and contribute to building a meaningful life for the person at risk.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Research Ethics Committee of the Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz (study no. CEI/C/059/2020). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

AJ-T, CA-G, JR, and IG: Conceptualization and methodology. FA-C: formal analysis. FA-C, AJ-T, and CA-G: research and writing of original draft. CA-G and AJ-T: data curation. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2023.1157581/full#supplementary-material

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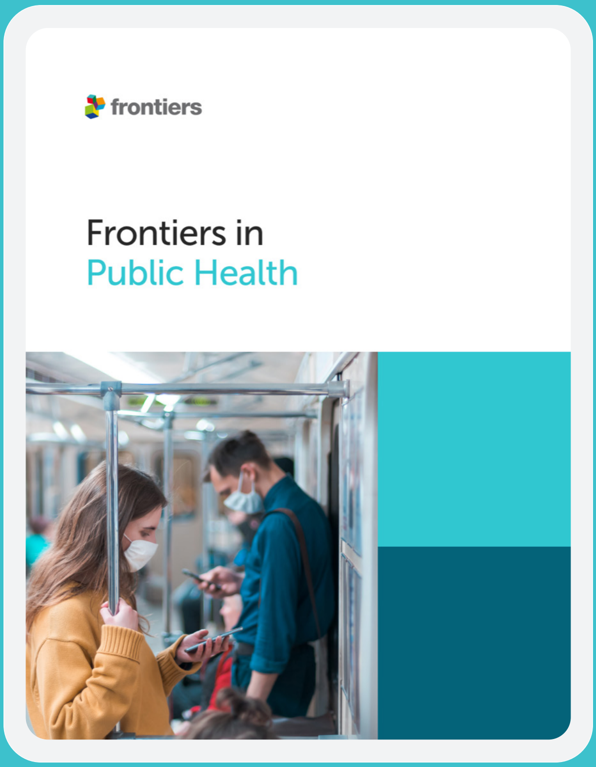

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