



# The Current Status of Global Digital Mental Health Implementation: Results and Implications of a Web-Based Survey from All WPA Regions

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## Abstract

The aim of this study was to compare the availability and use of digital mental health (DMH) across all World Psychiatric Association (WPA) regions (WR) and to guide future regional-tailored initiatives to upscale DMH contingent on introducing international policies, regulations, guidelines, education, and training, the WPA Working Group on Digital Psychiatry developed and disseminated a web-based survey among all 145 WPA National Psychiatric Association (NPA) members, according to official WR including (1) The Americas (WR1), (2) Europe (WR2), (3) Africa, Middle East, Central/Western Asia (WR3), and (4) Asia/Australasia (WR4). Collected data were analyzed using the Qualtrics analytic dashboard. The availability of digital tools/programs in DMH largely varies among WPA regions. In Europe and Asia/Australasia, mobile apps were the most available digital tools (respectively, 76.9% and 90.9%), followed by telemental health (respectively, 65.4% and 81.8%). Wearables, serious games, virtual/augmented reality, and chatbots represented the least commonly used tools/programs across all WR. National policies were mainly reported by Asia/Australasia (81.8%), followed by Europe (38.5%) and the Americas (27.3%). In all WR, less than 40% of NPAs reported the provision of education and training in the use of digital tools and programs in their countries. WPA regional analysis of digital needs promotes designing a roadmap to develop targeted actions to implement DMH and guide global digital upscaling of psychiatric services. Improving digital literacy and digital capacity building of the psychiatric workforce are key priorities for future digital initiatives led by the WPA across all WR.

**Keywords** Digital psychiatry · Digital mental health · Digital mental health and care · Global digitalization · WPA

## Introduction

The use of digital technologies to support and improve mental health outcomes and provide mental health care (including early identification of at-risk mental status, prevention, longitudinal assessment, early intervention, treatment, and relapse prevention) owns the potential to improve access and guarantee equity in mental health care, globally (Sin et al., 2020; Torous, 2022; Sasseville et al., 2023; Smith et al., 2023).

The World Psychiatry Association (WPA) Working Group on Digital Psychiatry aimed at improving Global Mental Health and Care by favoring and accelerating the global transformation of mental health systems by implementing and upscaling digital services across WPA member society countries belonging to WPA regions (WRs). Within this scope, the working group collected information on the level of accessibility, availability, and usage of digital mental health and care (DMH) across all four WRs through a global digital survey to

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develop tailored country-based implementation plans to overcome barriers and/or increase potential drivers to DMH and digital psychiatry (DP) adoption and dissemination worldwide (Ramalho et al., 2023; Volpe et al., 2023).

Although several studies were carried out to investigate drivers and barriers to DMH/DP implementation (Bassi et al., 2024; Borghouts et al., 2021; Brantnell et al., 2023; Davies et al., 2020; Kalman et al., 2023; Lim et al., 2024; Lipschitz et al., 2019; Lukka et al., 2023; Torous et al., 2021; Westheimer et al., 2023; Youn et al., 2024; Zhao et al., 2023), they did not address the issue across countries belonging to all world regions. These studies mainly suggested, as potential drivers to DMH/DP implementation (a) the low threshold to DMH accessibility (depending on the country's digital readiness, technical equipment, etc.); (b) the potential to provide new evidence-based and more effective and/or safer treatment alternatives to those traditional ones; (c) an overall positive and constructive attitude and opinion by mental health providers and patients to DMH/DP; and (d) the institutional and governmental will to incentivize policy, regulations and guideline initiatives to DMH/DP implementation at country level. Limiting factors included (a) the lack of ethical, legal, and regulatory policy frameworks; (b) the lack or poor level of mental health providers' knowledge, education, and training in DMH/DP; (c) privacy, security, and confidentiality issues; (d) the lack or poor evidence of effectiveness, reproducibility, and accountability of DMH/DP interventions.

However, no studies so far specifically provided a cross-country comparison across all four WRs in order to design a country-/WR-based roadmap for guiding WPA-supported initiatives to incentivize DMH/DP implementation globally. Therefore, the current analysis of the survey global dataset was carried out to compare the availability and use of DMH across the following WRs: (1) The Americas (WR1); (2) Europe (WR2); (3) Africa, Middle East, Central/Western Asia (WR3);

and (4) Asia/Australasia (WR4) (Table 1). The primary objective was to guide future regional-tailored initiatives to upscale DMH to be integrated with available services by identifying and managing barriers and facilitators to the implementation of selected digital tools and programs and by addressing top-down (e.g., policy, regulations, guidelines) and bottom-up (e.g., mental health providers, professionals and users' literacy, readiness, education, and training) determinants, in line with the WPA's Action Plans of the working group on Digital Psychiatry (WPA, 2023a; WPA, 2023b) and its Position Statement (Ramalho et al., 2023; Volpe et al., 2023; WPA, 2023c).

## Methods

### Procedure and Structure of the Survey

The WPA Working Group on Digital Psychiatry developed and disseminated a web-based survey among all 145 WPA National Psychiatric Association (NPA) members, belonging to the abovementioned four official WRs. The survey was first developed by the Working Group leading team (WG, UV, and RRam). It was then shared with members of the sub-group "Baseline surveillance on digital mental health and care" for feedback, which was then incorporated by the leading team. The survey consisted of 10 sections (see Supplementary Material), including questions on digitalization in general health (GHC) and mental health care (MHC), the current status of availability and use of a set of digital tools and programs used in MHC (e.g., telemental health and care [TMH], digital therapeutics, mobile health care, digital health records, and digital integrated platforms for mental health care), the presence of regional/national policy initiatives, regulations, reimbursement processes, and country- and/or WR-specific guidelines on DMH/DP as well as the level of education and training programs. The survey included definitions of

**Table 1** Description of zones and countries across all four WRs

	WR1	WR2	WR3	WR4
Zone(s)	Zone 1 (Canada) Zone 2 (United States of America) Zone 3 (Mexico, Central America and the Caribbean) Zone 4 (South America—Northern zone) Zone 5 (South America—Southern zone)	Zone 6 (Western Europe) Zone 7 (Northern Europe) Zone 8 (Southern Europe) Zone 9 (Central Europe) Zone 10 (Eastern Europe)	Zone 11 (Northern Africa) Zone 12 (Middle East and Central/Western Asia) Zone 13 (Central and Western Africa) Zone 14 (Eastern and Southern Africa)	Zone 15 (South Asia) Zone 16 (South East Asia) Zone 17 (Eastern Asia) Zone 18 (Australia, New Zealand, and South Pacific)
Number of enrolled NPAs/ number of total NPAs within WR (%)	11/29 (37.9%)	27/64 (42.2%)	9/33 (27.3%)	10/20 (50.0%)

WR World Psychiatry Association Region, NPA National Psychiatric Association

various terms (e.g., telemental health and care was defined as the psychiatric evaluation or psychological assessment as well as provision of mental health care at a distance, using digital telecommunication tools), which were discussed and agreed upon by the Working Group leading team. Collected data were analyzed using Qualtrics analytic dashboard. The procedure of the survey was already described elsewhere (Ramalho et al., 2023). The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and according to the CHERRIES guidelines (Eysenbach, 2004) and guidelines for Good Clinical Practice (GCP), following the approval by the WPA Executive Committee.

## Statistical Analysis

Statistical analyses were carried out by using the *Software Statistical Package for Social Sciences* (SPSS) for MacOS (version 27.0, IBM Corp., Armonk NY). All categorical variables were summarized as absolute frequencies ( $n$ ) and percentages (%), while all continuous variables have been summarized as median (M) and 95% confidence interval (CI). Firstly, descriptive sub-analyses were carried out for each of the four WRs, following the thematic areas investigated by the survey (i.e., the level of digitalization in GHC/MHC; the level of availability and usage of digital tools and programs in GHC/MHC; the presence/extent of specific national/regional policies, regulations, and/or guidelines for the use of digital tools and programs; the extent of education and training programs in DMH/DP; and the suggested country-based priorities in implementing DMH/DP). Secondly, a comparison between all four WR groups was performed by using nonparametric Kruskal–Wallis or Brown–Modd tests and post-hoc

pairwise comparisons in order to identify similarities and differences in terms of the usage of digital tools and programs in GHC and MHC, the usage level in a set of mental health areas, and the level of priority regarding the development of guidelines and further areas to be strategically implemented in WPA-supported activities. The  $\chi^2$  test and Fisher's test were used to compare all categorical variables across all four WRs in order to verify which differences and/or similarities emerge regarding each explored thematic area of the survey across all four WRs. The significance level was set a priori at  $p \leq 0.05$ , and all hypotheses were two-tailed.

## Results

### Main Findings Within Each of the Four WPA Regions

#### WPA Region 1 (The Americas)

The survey collected questionnaires from 37.9% of all NPA member societies within the WPA Region 1 (WR1) (Table 1), being data from 90.9% of them officially approved by their NPAs. Most NPAs did not have a section and/or committee on DMH ( $N=9$ ; 81.8%).

Telehealth and TMH represent the only digital tools/programs available in all WR1 NPAs in both GHC (Table 2) and MHC (Table 3). In GHC, mobile apps represent the second most available digital tool (90.9%), followed by therapist-guided internet-based interventions (72.7%). While in MHC, both therapist-guided or unguided internet-based interventions (both 72.7%) were the second most available digital tools (Table 3). Contrarily, mobile apps appeared to be less available

**Table 2** Availability and use levels of digital tools and programs in general healthcare across all WRs

General healthcare		WR1	WR2	WR3	WR4	p-values*
Digital medical record	<b>Availability</b>	80%	100%	33.3%	100%	$\chi^2 = 7.400$ ; $p = \mathbf{0.027}$
	<b>Usage</b>	80%	100% <sup>a</sup>	62.5% <sup>a</sup>	100%	$\chi^2 = 10.453$ ; $p = \mathbf{0.005}$
Digital personal health record	<b>Availability</b>	80%	85.2% <sup>a</sup>	33.3% <sup>a,b</sup>	90% <sup>b</sup>	$\chi^2 = 9.497$ ; $p = \mathbf{0.015}$
	<b>Usage</b>	80%	81.5%	42.9%	100%	$\chi^2 = 6.922$ ; $p = 0.051$
Digital patient portal	<b>Availability</b>	70%	85.2%	55.6%	80%	$\chi^2 = 3.716$ ; $p = 0.284$
	<b>Usage</b>	60%	81.5%	50%	88.9%	$\chi^2 = 4.983$ ; $p = 0.176$
Clinical data repository	<b>Availability</b>	70% <sup>a</sup>	81.5% <sup>b</sup>	11.1% <sup>a,b,c</sup>	80% <sup>c</sup>	$\chi^2 = 14.780$ ; $p = \mathbf{0.001}$
	<b>Usage</b>	60%	77.8% <sup>a</sup>	14.3% <sup>a,b</sup>	88.9% <sup>b</sup>	$\chi^2 = 11.323$ ; $p = \mathbf{0.006}$
Digital prescription	<b>Availability</b>	70%	85.2% <sup>a</sup>	33.3% <sup>a,b</sup>	100% <sup>b</sup>	$\chi^2 = 12.140$ ; $p = \mathbf{0.003}$
	<b>Usage</b>	70%	85.2% <sup>a</sup>	33.3% <sup>a</sup>	88.9%	$\chi^2 = 7.211$ ; $p = \mathbf{0.040}$
Digital treatment monitoring	<b>Availability</b>	60%	55.6%	11.1%	70%	$\chi^2 = 7.647$ ; $p = 0.052$
	<b>Usage</b>	50%	62.5%	14.3%	66.7%	$\chi^2 = 5.600$ ; $p = 0.128$
Digital therapies	<b>Availability</b>	60%	66.7%	22.2%	70%	$\chi^2 = 5.896$ ; $p = 0.112$
	<b>Usage</b>	50%	68%	14.3%	62.5%	$\chi^2 = 6.498$ ; $p = 0.085$

\*Fisher's exact test

Significant values are provided in bold

Superscript letters indicate which compared couples display statistically significant differences

**Table 3** Availability of digital tools and programs in general and mental healthcare across all WRs

Level of availability (%)		WR1	WR2	WR3	WR4	<i>p</i> -values*
Tele(mental)healthcare	MH	100% <sup>a</sup>	70.4%	44.4% <sup>a</sup>	90%	$\chi^2=9.233$ ; <b><i>p</i> = 0.017</b>
	GH	100%	74.1%	88.9%	90%	$\chi^2=3.836$ ; <i>p</i> = 0.236
Internet-based interventions (guided)	MH	72.7%	57.7%	44.4%	77.8%	$\chi^2=2.736$ ; <i>p</i> = 0.452
	GH	72.7%	48.1%	44.4%	70%	$\chi^2=3.121$ ; <i>p</i> = 0.375
Internet-based interventions (unguided)	MH	72.7% <sup>a</sup>	53.8% <sup>b</sup>	11.1% <sup>a,b,c</sup>	66.7% <sup>c</sup>	$\chi^2=8.594$ ; <b><i>p</i> = 0.034</b>
	GH	63.6%	44.4%	33.3%	77.8%	$\chi^2=4.694$ ; <i>p</i> = 0.189
Internet-based interventions (blended)	MH	54.5%	50%	22.2%	66.7%	$\chi^2=3.749$ ; <i>p</i> = 0.303
	GH	63.6%	40.7%	33.3%	75%	$\chi^2=4.553$ ; <i>p</i> = 0.219
Mobile apps	MH	63.6%	81.5%	66.7%	100%	$\chi^2=5.231$ ; <i>p</i> = 0.135
	GH	90.9%	77.8%	100%	100%	$\chi^2=3.814$ ; <i>p</i> = 0.254
Wearables	MH	27.3%	44.4%	22.2%	77.8%	$\chi^2=6.776$ ; <i>p</i> = 0.078
	GH	45.5%	59.3%	62.5%	77.8%	$\chi^2=2.153$ ; <i>p</i> = 0.536
Serious games	MH	27.3%	23.1%	0%	50%	$\chi^2=5.706$ ; <i>p</i> = 0.114
	GH	27.3%	22.2%	22.2%	62.5%	$\chi^2=4.681$ ; <i>p</i> = 0.212
VR/AI-based interventions	MH	54.5% <sup>a</sup>	40.7% <sup>b</sup>	0% <sup>a,b,c</sup>	77.8% <sup>c</sup>	$\chi^2=12.460$ ; <b><i>p</i> = 0.005</b>
	GH	54.5% <sup>a</sup>	34.6% <sup>b</sup>	0% <sup>a,c</sup>	77.8% <sup>b,c</sup>	$\chi^2=12.980$ ; <b><i>p</i> = 0.003</b>
Chatbots	MH	36.4%	33.3%	0%	55.6%	$\chi^2=6.979$ ; <i>p</i> = 0.071
	GH	36.4%	55.6% <sup>a</sup>	0% <sup>a,b</sup>	55.6% <sup>b</sup>	$\chi^2=10.052$ ; <b><i>p</i> = 0.017</b>

\* Fisher's exact test

Significant values are provided in bold

Superscript letters indicate which compared couples display statistically significant differences

in MHC compared to GHC (63.6%), despite their reported higher level of usage in MHC compared to GHC. Despite their highly reported availability in MHC, the average median level of usage of TMH was 4.0 on a 6-point Likert scale (Table 3). For other digital tools and programs, it was reported a critical median level, as illustrated in Table 3. The highest median level of usage of digital tools and programs was reported in mental health promotion, illness prevention and treatment, and monitoring of treatment response (Table 4).

Most WR1 NPAs did not report national and/or regional policies for the use of digital tools and programs in MHC (Table 5). Similarly, a poor presence of country-based regulations on quality criteria required for the development (for instance, for later certification or reimbursement procedures) and the usage of digital tools/programs was described by most WR1 NPAs. Most abovementioned regulations were reported on telemedicine (Table 5). Few regulations are available on quality criteria required for the qualification of mental health providers of DMH, being mostly on telemedicine (Table 5).

Most WR1 NPAs reported country-based clinical guidelines only for telemedicine ( $N=6$ ; 54.5%), being serious digital games, chatbots, and virtual/augmented reality those missing in all responding WR1 countries (Table 5). Areas suggested to be mainly implemented in terms of further development of practical guidelines were mainly represented by TMH and virtual/augmented reality, followed by internet-based interventions and mobile apps (Table 6).

Only TMH was reported to be reimbursed by some WR1 NPAs, while other digital tools and programs were overly not reimbursed, with some exceptions in Peru (Table 5).

Education and training related to DMH/DP were overly reported as poor or absent in most responding WR1 NPAs in all training areas (medical school, psychiatry training program, and continuous medical education) (Table 5).

According to participating WR1 NPAs, the highest priority areas for further action in the field of DMH/DP were education/training of mental health professionals, guidelines for the delivery of DMH/DP, guidelines on privacy/safety issues in DMH/DP, and legal regulations (Table 6).

### WPA Region 2 (Europe)

The survey collected questionnaires from 42.2% of all NPA member societies within the WPA Region 2 (WR2) (Table 1), being data from 51.9% of them officially approved by their NPAs. Most NPAs did not have a section and/or committee on DMH ( $N=21$ ; 77.8%).

Telehealth/TMH and mobile apps were the most often reported as available digital tools and programs in both GHC (Table 2) and MHC (Table 3). Despite their highly reported availability, the median level of usage of TMH as well as mobile apps was relatively low (Table 4). For other digital tools, the median level of usage was reported as critical (Table 4). DMH was overly used on a medium/acceptable

**Table 4** Level of use of digital tools/programs and intervention areas in mental health care systems across all WRs

Digital tools, median (95% CI)	WR1	WR2	WR3	WR4	<i>p</i> -values*
Telemental health	4.0 (3.4–4.6)	3.0 (2.4–3.7)	3.0 (1.1–3.7)	4.0 (2.6–4.8)	0.079
Internet-based interventions (guided)	3.0 (2.1–3.9)	2.0 (1.6–2.6)	1.0 (0.7–2.7)	2.0 (0.9–3.3)	0.157
Internet-based Interventions (unguided)	3.0 (1.9–3.6)	2.0 (1.7–2.8)	1.0 (0.5–3.2)	1.5 (1.0–3.0)	0.333
Internet-based Interventions (blended)	3.0 (1.8–3.9)	2.0 (1.5–2.5)	1.5 (0.7–3.3)	1.5 (0.9–3.3)	0.354
Mobile apps	4.0 (2.1–4.5)	2.0 (2.1–3.1)	2.0 (1.1–4.3)	3.0 (1.8–3.5)	0.597
Wearables	1.0 (0.7–2.9)	1.0 (1.3–2.5)	1.0 (0.5–2.2)	1.5 (1.0–2.3)	0.714
Serious games	1.5 (0.6–3.4)	1.0 (1.0–1.9)	1.0 (1.0–1.0)	1.0 (0.8–1.9)	0.259
VR/AI-based interventions	2.0 (1.3–2.7)	1.0 (1.2–1.9)	1.0 (0.7–1.6)	1.0 (0.8–2.3)	0.212
Chatbots	1.5 (0.9–2.8)	1.0 (1.1–2.4)	1.0 (1.0–1.0)	1.0 (0.4–3.2)	0.320
MH areas, median (95% CI)	WR1	WR2	WR3	WR4	<i>p</i> -values
Health promotion	4.0 (2.4–4.9)	3.0 (2.5–3.7)	3.0 (1.8–3.9)	4.0 (3.3–5.2)	0.106
Illness prevention	3.0 (1.9–4.8)	3.0 (2.1–3.2)	2.5 (1.5–2.9)	4.0 (2.1–4.6)	0.148
Screening/digital phenotyping	2.0 (1.3–3.2)	1.0 (1.1–1.9)	1.0 (0.9–1.6)	3.0 (1.7–4.1)	<b>0.008</b>
Early recognition	2.0 (1.1–2.9)	1.0 (1.3–2.2)	1.0 (0.9–2.1)	3.0 (2.1–3.9)	<b>0.019</b>
Diagnosis	3.0 (1.9–4.2)	2.0 (1.6–2.6)	2.0 (1.2–2.3)	4.0 (2.1–4.2)	<b>0.016</b>
Early intervention	2.0 (1.3–2.9)	2.0 (1.5–2.3)	1.0 (0.8–2.9)	3.0 (1.7–3.7)	0.189
Treatment	4.0 (2.4–4.5)	2.0 (2.1–3.1)	1.5 (1.0–2.5)	3.0 (2.1–4.2)	<b>0.010</b>
Monitoring treatment response	3.0 (1.8–4.0)	2.0 (1.7–2.3)	1.0 (0.6–2.6)	2.0 (1.5–3.6)	<b>0.030</b>
Relapse prevention	3.0 (1.7–3.4)	2.0 (1.5–2.2)	1.0 (0.8–2.7)	3.0 (1.9–3.7)	<b>0.038</b>
Rehabilitation	2.0 (1.4–2.8)	2.0 (1.6–2.5)	1.5 (0.9–2.8)	3.0 (1.5–3.6)	0.655

\*Independent samples Kruskal–Wallis tests. *CI* confidence interval, *WR* World Psychiatry Association Region

Significant values are provided in bold

level only in mental health promotion and illness prevention, while in other mental health areas, it was critical (Table 4).

Only one-third of participating WR2 NPAs reported the presence of a national policy for the use of digital tools and programs in mental health and care, while almost all responding WR2 countries did not report any regional policy (Table 5). Most WR2 NPAs reported the presence of country-based regulations on quality criteria required for the development (for instance, for later certification or reimbursement procedures) and the usage of digital tools and programs, but mainly on telemedicine, TMH, and internet-based interventions (Table 5). A similar picture was reported also for regulations on quality criteria for the qualification required for clinicians to provide digital tools and programs in mental health and care settings, mainly present only for TMH and telemedicine providers, followed by those targeted to internet-based interventions (Table 5).

Most WR2 NPAs did not report country-based clinical guidelines for many of the digital tools and programs nor for telemedicine and TMH (Table 5). Areas suggested to be implemented in terms of further development of practical guidelines were mainly represented by internet-based interventions, TMH, and telemedicine, followed by chatbots and mobile apps (Table 6).

Only telemedicine and TMH have been reported to be reimbursed by some WR2 NPAs, while other digital tools

and programs were overly not reimbursed (Table 5). Only in one-fourth of responding WR2 countries was reported formal training on DMH/DP (particularly, on digital medical reports and telemedicine) since the medical school, while in two-thirds of them, it was reported a formal training on DMH/DP during the psychiatry training program (particularly, on digital medical reports, e-prescriptions, telepsychiatry, digital health records, and reimbursement regulations) (Table 5). A similar trend was reported for the presence of formal training during continuous medical education, particularly on digital medical reports, e-prescriptions, and clinical guidelines on digital consultations (Table 5).

According to participating WR1 NPAs, the highest priority areas for further action in the field of DMH/DP were education/training of mental health professionals, guidelines for the delivery of DMH/DP, guidelines on privacy/safety issues in DMH/DP, and the institution of national policy initiatives (Table 6).

### WPA Region 3 (Africa and Middle East)

The survey collected questionnaires from 27.3% of all NPA member societies within the WPA Region 3 (WR3) (Table 1), being data from 55.6% of them officially approved by their NPAs. Only one country reported the presence of a section and/or committee on DMH ( $N = 1$ ; 11.1%).

**Table 5** Policy, regulations, guidelines, education, and training across WRs

		WR1	WR2	WR3	WR4	p-values*
National policy		27.3% <sup>a</sup>	37.0% <sup>b</sup>	11.1% <sup>c</sup>	90.0% <sup>a,b,c</sup>	$\chi^2 = 13.918$ ; $p = \mathbf{0.002}$
Regional policy		9.1%	14.8%	11.1%	40.0%	$\chi^2 = 3.683$ ; $p = 0.301$
Education and training	Medical training	18.2%	25.9%	11.1%	30.0%	$\chi^2 = 1.222$ ; $p = 0.834$
	Psychiatry residency	27.3%	37.0%	11.1%	20.0%	$\chi^2 = 2.399$ ; $p = 0.529$
	CME	27.3%	37.0%	11.1%	40.0%	$\chi^2 = 2.473$ ; $p = 0.510$
Telemedicine	Regulations on quality criteria for development (for later certification or reimbursement)	36.4%	64.0%	50.0%	60.0%	$\chi^2 = 2.578$ ; $p = 0.464$
	Regulations on quality criteria for their use	45.5%	61.5%	50.0%	80.0%	$\chi^2 = 2.988$ ; $p = 0.416$
	Regulations on quality criteria for the qualification of their users	27.3%	46.2%	37.5%	80.0%	$\chi^2 = 6.198$ ; $p = 0.099$
	Clinical guidelines for the application	54.5%	29.6%	22.2%	60.0%	$\chi^2 = 4.874$ ; $p = 0.186$
Telemental health	Reimbursement	45.5%	51.9%	11.1%	60.0%	$\chi^2 = 7.354$ ; $p = 0.258$
	Regulations on quality criteria for development (for later certification or reimbursement)	27.3%	52.0%	50.0%	60.0%	$\chi^2 = 2.645$ ; $p = 0.472$
	Regulations on quality criteria for their use	27.3%	61.5%	42.9%	80.0%	$\chi^2 = 6.615$ ; $p = 0.088$
	Regulations on quality criteria for the qualification of their users	18.2% <sup>a</sup>	50.0%	37.5%	80.0% <sup>a</sup>	$\chi^2 = 8.247$ ; $p = \mathbf{0.039}$
Internet-based interventions	Clinical guidelines for the application	27.3%	29.6%	11.1%	60.0%	$\chi^2 = 5.143$ ; $p = 0.148$
	Reimbursement	45.5%	40.7%	0%	60.0%	$\chi^2 = 10.726$ ; $p = 0.072$
	Regulations on quality criteria for development (for later certification or reimbursement)	20.0%	52.0%	12.5%	60.0%	$\chi^2 = 6.940$ ; $p = 0.078$
	Regulations on quality criteria for their use	20.0% <sup>a</sup>	48.0%	25.0%	80.0% <sup>a</sup>	$\chi^2 = 8.498$ ; $p = \mathbf{0.034}$
Mobile apps	Regulations on quality criteria for the qualification of their users	20.0% <sup>a</sup>	40.0%	25.0%	80.0% <sup>a</sup>	$\chi^2 = 8.444$ ; $p = \mathbf{0.033}$
	Clinical guidelines for the application	9.1%	18.5%	0% <sup>a</sup>	50.0% <sup>a</sup>	$\chi^2 = 7.344$ ; $p = \mathbf{0.039}$
	Reimbursement	9.1%	18.5%	0%	20.0%	$\chi^2 = 3.928$ ; $p = 0.735$
	Regulations on quality criteria for development (for later certification or reimbursement)	27.3%	38.5%	12.5%	30.0%	$\chi^2 = 1.879$ ; $p = 0.614$
Wearables	Regulations on quality criteria for their use	20.0%	42.3%	12.5%	40.0%	$\chi^2 = 3.268$ ; $p = 0.384$
	Regulations on quality criteria for the qualification of their users	9.1%	26.9%	0%	30.0%	$\chi^2 = 3.805$ ; $p = 0.294$
	Clinical guidelines for the application	27.3%	11.1%	0%	10.0%	$\chi^2 = 3.027$ ; $p = 0.367$
	Reimbursement	18.2%	11.5%	11.1%	0%	$\chi^2 = 2.680$ ; $p = 0.946$
Serious games	Regulations on quality criteria for development (for later certification or reimbursement)	11.1%	34.6%	0%	22.2%	$\chi^2 = 4.527$ ; $p = 0.198$
	Regulations on quality criteria for their use	11.1%	38.5%	0%	33.3%	$\chi^2 = 5.759$ ; $p = 0.112$
	Regulations on quality criteria for the qualification of their users	10.0%	26.9%	0%	20.0%	$\chi^2 = 2.991$ ; $p = 0.442$
	Clinical guidelines for the application	9.1%	3.7%	0%	0%	$\chi^2 = 1.821$ ; $p = 0.772$
VR/AI-based interventions	Reimbursement	0%	3.8%	0%	0%	$\chi^2 = 2.108$ ; $p = 0.967$
	Regulations on quality criteria for development (for later certification or reimbursement)	10.0%	34.6%	0%	33.3%	$\chi^2 = 5.220$ ; $p = 0.149$
	Regulations on quality criteria for their use	10.0%	30.8%	0%	44.4%	$\chi^2 = 5.795$ ; $p = 0.110$
	Regulations on quality criteria for the qualification of their users	10.0%	23.1%	0%	30.0%	$\chi^2 = 3.129$ ; $p = 0.381$
VR/AI-based interventions	Clinical guidelines for the application	0%	3.7%	0%	11.1%	$\chi^2 = 2.222$ ; $p = 0.579$
	Reimbursement	9.1%	0%	0%	0%	$\chi^2 = 5.761$ ; $p = 0.520$
	Regulations on quality criteria for development (for later certification or reimbursement)	10.0%	38.5%	0%	33.3%	$\chi^2 = 6.112$ ; $p = 0.092$
	Regulations on quality criteria for their use	10.0%	38.5%	0%	44.4%	$\chi^2 = 7.083$ ; $p = 0.055$
	Regulations on quality criteria for the qualification of their users	10.0%	28.0%	0%	30.0%	$\chi^2 = 3.736$ ; $p = 0.286$

**Table 5** (continued)

		WR1	WR2	WR3	WR4	<i>p</i> -values*
Chatbots	Clinical guidelines for the application	0%	7.4%	0%	11.1%	$\chi^2 = 1.713$ ; $p = 0.861$
	Reimbursement	9.1%	0%	0%	0%	$\chi^2 = 5.301$ ; $p = 0.617$
	Regulations on quality criteria for development (for later certification or reimbursement)	11.1%	26.9%	0%	25.0%	$\chi^2 = 3.036$ ; $p = 0.426$
	Regulations on quality criteria for their use	11.1%	32.0%	0%	44.4%	$\chi^2 = 5.632$ ; $p = 0.124$
	Regulations on quality criteria for the qualification of their users	10.0%	26.9%	0%	20.0%	$\chi^2 = 2.653$ ; $p = 0.519$
	Clinical guidelines for the application	0%	7.4%	0%	11.1%	$\chi^2 = 1.713$ ; $p = 0.861$
	Reimbursement	0%	4%	0%	0%	$\chi^2 = 4.076$ ; $p = 0.896$

\*Fisher's exact test

Significant values are provided in bold

Superscript letters indicate which compared couples display statistically significant differences

**Table 6** Priority areas to be implemented in dMHC across WRs

Median (95% CI)	WR1	WR2	WR3	WR4	<i>p</i> -values*
National policy initiatives	5.0 (3.1–5.8)	5.0 (3.8–4.9)	6.0 (5.0–6.4)	5.0 (3.9–5.4)	0.073
Legal regulations	6.0 (3.9–5.9)	4.0 (3.4–4.8)	6.0 (5.0–6.4)	5.0 (3.2–6.0)	<b>0.021</b>
Guidelines for the delivery of dMHC	6.0 (3.8–5.9)	5.0 (4.4–5.4)	6.0 (4.0–6.3)	6.0 (3.8–6.7)	0.430
Guidelines on ethical issues in dMHC	5.0 (2.9–5.6)	4.0 (3.6–4.9)	6.0 (4.8–6.3)	5.0 (4.9–5.8)	0.066
Guidelines on privacy and safety issues in dMHC	6.0 (4.4–6.0)	5.0 (3.9–5.2)	6.0 (4.3–6.3)	5.0 (4.9–5.6)	0.341
Training in cultural competencies	5.0 (3.0–5.6)	3.0 (2.9–4.1)	5.0 (3.9–6.1)	4.0 (2.5–4.9)	0.120
Regulations for reimbursement	4.0 (2.9–5.6)	4.0 (3.2–4.5)	5.0 (3.4–5.8)	5.0 (3.9–5.8)	0.466
Education and training of mental health professionals	6.0 (4.3–6.5)	5.0 (4.3–5.3)	6.0 (5.5–6.2)	6.0 (4.5–6.3)	<b>0.024</b>

\*Independent samples Kruskal–Wallis tests. *CI* confidence interval, *WR* World Psychiatry Association Region

Significant values are provided in bold

Mobile apps and telehealth/TMH were the most often reported as available digital tools and programs in both GHC (Table 2) and MHC (Table 3), despite their relatively low usage in mental health care systems (Table 3). For other digital tools, the median level of usage was reported as critical, with serious digital games, chatbots, and virtual/augmented reality missing at all (Table 3). The highest median level of usage of digital tools and programs in MHC was reported in mental health promotion, illness prevention, and diagnosis, while in other mental health areas, it is critical (Table 4).

Almost all participating WR3 NPAs reported the lack of a national and regional policy for the use of digital tools and programs in MHC (Table 5). Half of responding WR3 NPAs reported the presence of country-based regulations on quality criteria required for the development (for instance, for later certification or reimbursement procedures), the usage, and quality criteria for the qualification required for clinicians to provide digital tools and programs in MHC settings, but only for telemedicine and TMH. No countries reported regulations on quality criteria (Table 5).

Most WR3 NPAs did not report country-based clinical guidelines for many of the digital tools and programs, including telemedicine and TMH (Table 5). Priority areas suggested to be developed in terms of practical guidelines were telemedicine, TMH, internet-based interventions, and mobile apps (Table 5).

Almost all responding WR3 NPAs declared no reimbursement for most digital tools and programs (Table 5).

In only one country, it was reported the presence of formal training on DMH/DP during medical school, psychiatry training program, and continuous medical education, mainly on telepsychiatry due to the COVID-19 pandemic (Table 5).

According to participating WR3 NPAs, the highest priority areas for further action in the field of DMH were represented by almost all of those listed (Table 6).

#### WPA Region 4 (Asia and Australasia)

The survey collected questionnaires from 50% of all NPA member societies within the WPA Region 4 (WR4)

(Table 1), being data from 90% of them officially approved by their NPAs. Half of participating WR4 NPAs reported having a section and/or committee on DMH ( $N=5$ ; 50%).

Mobile apps and telehealth/TMH were the most often reported as available and used digital tools and programs in both GHC (Table 2) and MHC (Table 3), followed by internet-based interventions, wearables, and virtual/augmented reality. Among participating WR4 NPAs, the highest median level of usage of digital tools and programs was reported in mental health promotion, illness prevention, and diagnosis (Table 4) while in other mental health areas, the median level of usage was reported as minimum or critical (Table 4).

Almost all WR4 NPAs reported the presence of a national policy for the use of digital tools and programs in MHC, while lower is the number of WR4 countries with regional policy (Table 5).

More than half of all responding WR4 NPAs declared to have country-based regulations on quality criteria required for the development (for instance, for later certification or reimbursement procedures), the usage, and quality criteria needed for mental health providers for the use of digital tools and programs, despite only for telemedicine, TMH, and internet-based interventions (Table 5).

Country-based clinical guidelines are available only for telemedicine and TMH in slightly more than half of the responding WR4 countries (Table 5). Priority areas suggested to be developed in terms of practical guidelines were telemedicine and TMH, followed by virtual/augmented reality, internet-based interventions, chatbots, mobile apps, and wearables (Table 6).

Most WR4 NPAs reported that only telemedicine and TMH were reimbursed by their countries (Table 5).

Interestingly, despite the wide availability and usage of many digital tools and programs in WR4 countries, the average level of education and training related to digital mental health and care was overly reported poor in most responding WR4 NPAs in all training areas: medical school (reported in only 30% of responding countries) and psychiatry training program (reported in only 20% of responding countries) while in continuous medical education, the percentage is slightly higher, being reported in 40% of all responding WR4 NPAs (Table 5).

According to participating WR4 NPAs, the highest priority areas for further action in the field of DMH/DP were the education and training of mental health professionals and guidelines for the delivery of DMH/DP (Table 6).

## Comparisons Between WPA Regions

Significant differences were found across WRs regarding the level of availability and usage of digital tools and programs in GHC, being WR3 with a lower level of availability and usage of digital medical records, clinical data

repository, and digital prescriptions compared to other WRs (Table 2; Supplementary File). Significant differences were found across WRs regarding the level of availability of telehealth and unguided internet-based interventions in MHC for WR3 compared to other WRs (Table 3; Supplementary File). No significant differences were reported across WRs regarding the median level of usage of the abovementioned digital tools (Table 4; Supplementary File). While applying post-hoc comparisons with Bonferroni's correction, significant differences across all WRs were found regarding the type of mental health areas in which digital tools and programs are commonly used. Specifically, WR4 countries display significantly higher levels of usage of digital tools and programs in screening/phenotyping compared to WR2 ( $p=0.005$ ) and WR3 ( $p=0.008$ ) as well as in early recognition of mental illness symptomatology compared to WR2 ( $p=0.004$ ) while WR1 countries significantly display higher levels of usage of digital tools and programs in treatment and in monitoring of treatment response compared to WR3 (respectively,  $p=0.002$  and  $p=0.007$ ) (Table 4; Supplementary File).

Significant differences were found across WRs regarding the presence of national policy for the use of digital tools and programs in MHC, mainly reported within WR4 ( $p=0.002$ ) (Table 5; Supplementary File). Significant differences were found across WRs regarding the presence of regulations on quality criteria for the use of TMH, mainly reported already existing within WR4 ( $p=0.039$ ). Similarly, regulations on quality criteria for the use of internet-based interventions are mainly reported as already existing within WR4 ( $p=0.034$ ). Moreover, WR4 countries also reported a significantly higher proportion of countries that have already available specific regulations on quality criteria for the qualification of TMH and internet-based interventions (guided) mental health providers (respectively,  $p=0.039$  and  $p=0.039$ ). Significant differences were found across WRs regarding the presence of clinical guidelines for the application of internet-based interventions, being mainly represented within WR2 and WR4 compared to others ( $p=0.039$ ). There were no significant differences across all four WRs regarding the reimbursement processes for any of the digital tools and/or programs either for the current *status quo* regarding the education and/or training on DMH/DP (Table 5; Supplementary File).

Regarding priority topics to be implemented, significant differences across all WRs were found in the following areas: legal regulations and education/training for mental health professionals in DMH/DP, after verifying with post-hoc comparison and Bonferroni's correction. Particularly, WR3 displayed significantly higher levels of priority regarding both the need to develop and implement legal regulations but also education/training compared to WR2 (respectively,  $p=0.002$  and  $p=0.008$ ) (Table 6; Supplementary File).



## Discussion

To the best of our knowledge, this is the first global study investigating the thorough implementation of digital tools in psychiatry across all four WRs. According to our findings, the global scenario largely differs across WRs, requiring to properly develop specific country/region-tailored roadmaps.

According to our results, WR1 (Americas) reported a higher availability/usage in MHC of TMH which also represents the only digital tool more frequently regulated and reimbursed in most WR1 NPAs. TMH emerged as one of the areas to be prioritized in terms of guidelines development.

Similarly, (guided and unguided) internet-based interventions had the highest availability in around two-thirds of WR1 responding countries, despite their minimal reported usage in MHC and limited availability of country-specific guidelines. Mobile apps were less available in MHC than in GHC, with limited availability of country-specific guidelines, despite their highly reported use in MHC. National and regional policies, regulations, and guidelines for the delivery of DMH/DP are overly missing.

WR2 (Europe) countries had higher availability of mobile apps and TMH, compared to other digital tools/programs, despite their usage in MHC being relatively low.

<p><b>Phase 1:</b> Consolidation and improvement of availability, usage and knowledge (education/training) levels of the digital tools and programs already mostly available and used</p>	<ul style="list-style-type: none"> <li>• As already fully available in all WR1 countries for mental health and care, TMH should be further implemented in their usage among all mental health professionals.</li> <li>• As available in mental health and care in two-third of WR1 countries, Internet-based interventions (guided, unguided and blended) should be further increased in their availability as well as implemented in their usage and knowledge among all mental health professionals.</li> <li>• As more available in general healthcare, despite its good usage in mental health and care, mobile apps should be further increased in their availability as well as implemented in their knowledge among all mental health professionals.</li> <li>• There is the urge to build country-specific evidence-based guidelines for the delivery and requirements needed to provide TMH and Internet-based interventions, as the most frequently available and used.</li> <li>• There is also the need to build country-specific evidence-based guidelines for the delivery and requirements needed to provide mobile apps-based interventions, following their implementation in terms of availability also in mental health care.</li> <li>• In parallel, there is the need to build and provide a specific curriculum for these digital tools and programs, by spreading education and training on these tools.</li> <li>• Specific country-based regulations should be created for reimbursement of Internet-based interventions and mobile apps.</li> </ul>
<p><b>Phase 2:</b> Increasing the availability, usage and knowledge (education/training) levels of other digital tools and programs currently not enough available and/or used at minimum level</p>	<ul style="list-style-type: none"> <li>• Following a country-based evaluation of financial resources and long-term sustainability in terms of investments needed to implement other digital tools and programs, a selected range of digital tools and programs should be increased in their availability and usage in mental health care systems.</li> <li>• In parallel, specific country-based regulations also for the reimbursement and evidence-based guidelines should be created for these selected digital tools and programs.</li> <li>• Before the implementation with each mental health system, a specific curriculum for these digital tools and programs, should be capillary provided to all mental health professionals.</li> <li>• The priority seemed to be addressed to VR-/AI-based interventions.</li> </ul>
<p><b>Phase 3:</b> Guiding and supporting in the creation of country-specific national and regional policies, legal and reimbursement regulations in DMH</p>	<ul style="list-style-type: none"> <li>• National policies should be prioritized, followed by regional ones.</li> <li>• Regulations and reimbursement processes should follow a step-by-step priority strategy, in line with Phase 1 and then Phase 2.</li> <li>• Education and training should include basic (rather than an advanced level) knowledge on DMH/DP as well as modules illustrating adopted national policies, regulations and reimbursement procedures.</li> </ul>

VR: Virtual Reality; AR: Augmented Reality; DMH: Digital Mental Health; DP: Digital Psychiatry; TMH: telemental health.

**Fig. 1** Step-by-step intervention plan for WR1 as DMH/DP implementation strategy. VR, virtual reality; AR, augmented reality; DMH, digital mental health; DP, digital psychiatry; TMH, telemental health

<p><b>Phase 1:</b> Consolidation and improvement in the usage of the digital tools and programs already available in mental health care, particularly TMH and mobile apps</p>	<ul style="list-style-type: none"> <li>• As already fully available in almost all WR2 countries for mental health and care, TMH should be further implemented in their usage and knowledge among all mental health professionals (basic education and training).</li> <li>• Given TMH and mobile apps higher availability in most WR2 countries compared to their lower usage in mental healthcare, further initiatives should investigate the motivations of lower engagement in these digital tools and programs among both mental health professionals and users (acceptability, digital readiness, attitude, opinion, education and training, etc.).</li> <li>• Regulations and reimbursement processes should be implemented for TMH while they should be developed for mobile apps in mental healthcare.</li> <li>• Evidence-based guidelines for the delivery, safety and privacy issues should be developed for mobile apps.</li> </ul>
<p><b>Phase 2:</b> Increasing the availability, usage and knowledge (education/training) levels of other digital tools and programs currently not enough available and/or used at minimum level</p>	<ul style="list-style-type: none"> <li>• Following a country-based evaluation of financial resources and long-term sustainability in terms of investments needed to implement other digital tools and programs, a selected range of digital tools and programs should be increased in their availability and usage in mental health care systems.</li> <li>• In parallel, specific country-based reimbursement and evidence-based guidelines should be created for these selected digital tools and programs.</li> <li>• Before the implementation within each mental health system, a specific curriculum for these digital tools and programs, should be capillary provided to all mental health professionals (advanced level), given that the basic education and training level seemed to be overly well represented in most WR2 countries.</li> <li>• The priority seemed to be addressed to Internet-based interventions.</li> </ul>
<p><b>Phase 3:</b> Guiding and supporting in the creation of country-specific national and regional policies in DMH, including awareness among general population and mental health professionals on DMH tools and programs</p>	<ul style="list-style-type: none"> <li>• National policies should be prioritized, followed by regional ones, with the aim to increase the awareness of DMH among mental health professionals and the general population.</li> <li>• Regulations should be implemented to go beyond TMH, telemedicine, telepsychiatry and Internet-based interventions (already available in more than half of WR2 countries)</li> <li>• Reimbursement processes should be implemented to go beyond TMH, telemedicine, telepsychiatry and Internet-based interventions (already available in more than half of WR2 countries)</li> <li>• Education and training should be implemented at an advanced level including also other digital tools and programs beyond telemedicine, telepsychiatry, digital medical records, e-prescriptions, and so forth.</li> </ul>

VR: Virtual Reality; AR: Augmented Reality; DMH: Digital Mental Health; DP: Digital Psychiatry; TMH: telemental health.

**Fig. 2** Step-by-step intervention plan for WR2 as DMH/DP implementation strategy. VR, virtual reality; AR, augmented reality; DMH, digital mental health; DP, digital psychiatry; TMH, telemental health

Compared to WR1, digital tools/programs were less used in mental health, except for illness prevention and promotion. Most WR2 countries do not have dedicated national and/or regional policies. Regulations and guidelines, whereas present, were mainly addressed to TMH, telemedicine, and internet-based interventions. Reimbursement was reported only for TMH/telemedicine. Compared to WR1, education and training levels seemed to be more structured, particularly during psychiatric training programs, despite focusing mainly on digital medical records, e-prescription, and TMH.

Overall, the WR3 (Africa and Middle East) was the least homogeneously represented WR (most data coming from WR3 countries were not those officially provided by NPAs), with a potential decrease in the representativeness of data. Only one WR3 country reported to have an official section on DMH/DP, developed after the COVID-19 pandemic.

Anyway, our analysis clearly revealed a severe lack of infrastructures for DMH/DP and sub-optimal availability of most digital tools/programs in MHC, except for mobile apps (reported in two-thirds of WR3 countries). However, despite their availability in some countries, TMH interventions' usage was generally reported as "low," prompting further investigations on country-specific factors that may limit their spreading among mental health professionals and/or patients. National regulations, guidelines, and procedures for reimbursement were overly reported as "missing" or addressed only to telemedicine in general. Education/training in DMH/DP was almost absent. Also, in terms of priority areas to be implemented, most WR3 responding countries clearly reported a higher number of areas to be implemented and developed at a basic level before increasing further DMH/DP areas and digital tools/programs.

<p><b>Phase 1:</b> Investigating the country-based and zone-based differences and similarities across each WR3 countries in terms of financial sustainability and feasibility in implementing specific digital tools and/or programs improvement of availability, usage and knowledge (education/training) levels of the digital tools and programs already mostly available and used</p>	<ul style="list-style-type: none"> <li>• There is the urge to build country-specific DMH implementation strategies as the situation is extremely poorly represented and not homogenous in terms of digitalization level, financial resources and long-term sustainability</li> <li>• The poor representativeness of WR3 countries as well as the poor percentage of responses officially supported by respective NPAs, suggests the need to increase the active involvement of each WR3 NPAs, by developing specific informative campaigns/initiatives to increase awareness about DMH/DP, evidence-based interventions useful in mental health care, by clearly underlining the advantages and overcoming potential limiting country-specific factors.</li> <li>• In parallel, there is the need to build and provide a specific curriculum for basic knowledge on DMH/DP, digital tools and programs, by providing at least a basic education and training on these tools.</li> </ul>
<p><b>Phase 2:</b> Consolidating and increasing the usage and knowledge (education/training) levels of those digital tools and programs reported as enough available and/or used at minimum level</p>	<ul style="list-style-type: none"> <li>• Given its highly reported availability in mental healthcare, mobile apps-based interventions should be furtherly implemented in their use in several areas of mental health care.</li> <li>• In parallel, a dedicated education and training programs on mobile apps-based interventions should be provided to all mental health professionals.</li> <li>• Specific country-based regulations also for the reimbursement and evidence-based guidelines should be created for these selected digital tools and programs.</li> </ul>
<p><b>Phase 3:</b> Guiding and supporting in the creation of country-specific national and regional policies, legal regulations and reimbursement strategies in DMH</p>	<ul style="list-style-type: none"> <li>• National policies should be prioritized.</li> <li>• Regulations and reimbursement processes should follow a step-by-step priority strategy, in line with Phase 1 and then Phase 2.</li> <li>• Education and training should include basic (rather than an advanced level) knowledge on DMH/DP as well as modules illustrating adopted national policies, regulations and reimbursement procedures.</li> </ul>

VR: Virtual Reality; AR: Augmented Reality; DMH: Digital Mental Health; DP: Digital Psychiatry; TMH: telemental health.

**Fig. 3** Step-by-step intervention plan for WR3 as DMH/DP implementation strategy. VR, virtual reality; AR, augmented reality; DMH, digital mental health; DP, digital psychiatry; TMH, telemental health

Finally, WR4 (Asia/Australasia) was the most represented and homogeneous WR surveyed, with almost all responses officially supported by respective NPAs. WR4 responding countries reported the highest rate of NPAs with an official section on DMH/DP. Almost all digital tools/programs were reported as “fully” available or “enough,” mobile apps and TMH being the most available and used in MHC. Indeed, despite the highest availability, an overall poor usage was reported, probably due to poor knowledge and/or education/training among mental health professionals and not a missing/poor financial and/or governmental support. In fact, a good percentage of (both national and regional) policy initiatives were reported as already well-present in most WR4 countries. Similarly, country-specific regulations, guidelines, and reimbursement strategies were reported as already well present in most WR4 countries, particularly for telemedicine, TMH, and internet-based interventions which represented the main areas to be furtherly prioritized in WR4. A critical issue seemed to be the lack of a capillary education and training program on DMH/DP which could partially explain the lower usage percentage despite the higher availability of many digital tools/programs despite consolidated policy initiatives and regulations.

Overall, specific roadmaps to implement DMH/DP should be planned within each WR, following consultation with each NPA, as described in Figs. 1, 2, 3, and 4, with the priority areas summarized in Table 7.

Our study owns a series of limitations that should be taken into consideration during the development of roadmaps. First, the cross-sectional study design takes a punctual picture of the current state-of-the-art DMH situation across all four WRs and could indeed evolve over time. Therefore, a longitudinal study should be conducted to periodically follow the changes in thematic areas following ad hoc WPA-supported initiatives, also at the national/regional level. Second, the current situation was indeed surveyed in a post-COVID-19 pandemic phase, and it could indeed be influenced by the governmental restrictions and limitations imposed by the pandemic itself. This could also partially explain the mismatch observed between education/training and the availability/usage of DMH/DP. Third, the poor responsiveness reached in our survey represents a relevant limitation in the generalizability of our findings, particularly for WR3 countries with limited/absent access to the Internet and/or technological facilities. Enhancing the representativeness of data from currently underrepresented regions could

<p><b>Phase 1:</b> Supporting the creation and dissemination of a specific curriculum for education and training of DMH across all mental health professionals as well as implementing informative initiatives to increase awareness of general population on DMH tools and programs</p>	<ul style="list-style-type: none"> <li>• As already fully available in almost all WR4 countries dedicated national policy initiatives and the excellent availability of almost all digital tools and programs in almost all WR4 countries, further initiatives should be implemented to increase their usage which remain still poorly represented for most digital tools and programs (except for TMH and telemedicine, telepsychiatry).</li> <li>• Further informative initiatives should be implemented and developed to increase awareness of DMH tools and programs in the general and clinical population</li> <li>• Structured education and training programmes should be implemented since Medicine course with differential levels of basic and advanced notions depending on the education levels, the integration of specific digital tools and programs within each differential mental health care systems and the basic level of each mental health professionals</li> </ul>
<p><b>Phase 2:</b> Increasing the capillary usage of digital tools and programs in all mental health areas</p>	<ul style="list-style-type: none"> <li>• Considering the low level of usage of digital tools and programs in almost all mental health areas, despite their highly and widely availability in both general and mental health care systems, further informative and incentivizing initiatives should be developed and integrated to increase the capillary usage of DMH in all mental health areas.</li> <li>• In parallel, motivating and awareness programs should be developed in the general and clinical population to motivate users to be more engaged in mental health areas through the use of digital tools and programs.</li> </ul>
<p><b>Phase 3:</b> Guiding and supporting in the implementation of advanced levels of country-specific regulations, guidelines and reimbursement strategies beyond the already present for telemedicine, telemental health and Internet-based interventions</p>	<ul style="list-style-type: none"> <li>• Regulations should be implemented to go beyond TMH, telemedicine, telepsychiatry and Internet-based interventions (already available)</li> <li>• Country-specific guidelines should be implemented to go beyond TMH, telemedicine, telepsychiatry and Internet-based interventions (already available)</li> <li>• Reimbursement processes should be implemented to go beyond TMH, telemedicine, telepsychiatry and Internet-based interventions (already available)</li> </ul>

VR: Virtual Reality; AR: Augmented Reality; DMH: Digital Mental Health; DP: Digital Psychiatry; TMH: telemental health.

**Fig. 4** Step-by-step intervention plan for WR4 as DMH/DP implementation strategy. VR, virtual reality; AR, augmented reality; DMH, digital mental health; DP, digital psychiatry; TMH, telemental health

**Table 7** Comparative priority areas recommended to be implemented across all WRs

Priority level	WR1	WR2	WR3	WR4
A	<ul style="list-style-type: none"> <li>● Education and training (basic and advanced)</li> <li>● Guidelines for the delivery of digital mental health and care</li> <li>● Guidelines on privacy and safety issues in e-mental health and care</li> <li>● Legal regulations</li> </ul>	<ul style="list-style-type: none"> <li>● Education and training (advanced)</li> <li>● Guidelines for the delivery of digital mental health and care</li> <li>● Guidelines on privacy and safety issues in e-mental health and care</li> <li>● National policies</li> </ul>	<ul style="list-style-type: none"> <li>● National policies</li> <li>● Legal regulations</li> <li>● Guidelines for the delivery of digital mental health and care</li> <li>● Guidelines on ethical issues in e-mental health and care</li> <li>● Guidelines on privacy and safety issues in e-mental health and care</li> <li>● Education and training (basic)</li> </ul>	<ul style="list-style-type: none"> <li>● Education and training (basic and advanced)</li> <li>● Guidelines for the delivery of digital mental health and care</li> </ul>
B	<ul style="list-style-type: none"> <li>● National policies</li> <li>● Education and training in cultural competence</li> <li>● Guidelines on ethical issues in e-mental health and care</li> </ul>	<ul style="list-style-type: none"> <li>● Legal regulations</li> <li>● Guidelines on ethical issues in e-mental health and care</li> <li>● Regulations for reimbursement</li> </ul>	<ul style="list-style-type: none"> <li>● Education and training in cultural competence</li> <li>● Regulations for reimbursement</li> </ul>	<ul style="list-style-type: none"> <li>● Guidelines on privacy and safety issues in e-mental health and care</li> <li>● Guidelines on ethical issues in e-mental health and care</li> <li>● National policies</li> <li>● Legal regulations</li> <li>● Regulations for reimbursement</li> </ul>
C	<ul style="list-style-type: none"> <li>● Regulations for reimbursement</li> </ul>	<ul style="list-style-type: none"> <li>● Education and training in cultural competence</li> </ul>		<ul style="list-style-type: none"> <li>● Education and training in cultural competence</li> </ul>

further strengthen future studies. Finally, another issue to be addressed is the presence of not officially confirmed findings from NPAs which could determine a selection bias.

## Conclusions

Despite the above limitations, our findings provide a global representation of the current DMH/DP implementation and may guide further initiatives towards the development of a WR-tailored roadmap for further WPA-supported activities at the WR/country level.

The development of a roadmap for DMH implementation and upscaling the gaps in treatment and care for the different categories of patients should include capacity building and digital literacy improvement of the public, policymakers, stakeholders, and the mental health workforce. This development needs to be organized with constant discussions with WPA leadership, relevant sections of WPA, and the NPA member societies of each WR.

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**Data Availability** All data supporting the findings of this study are available within the paper and its Supplementary Information.

## Declarations

**Ethics Approval** This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of the World Psychiatry Association (WPA).

**Consent to Participate** Informed consent was obtained and provided from all individual participants included in the study.

**Competing Interests** The authors declare no competing interests.

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