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Vaccine Hesitancy in Women of Childbearing Age and Occupational Physicians: Results from a Cross-Sectional Study (Italy, 2022)

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Abstract: Italian occupational physicians (OPs) are instrumental in promoting vaccination practice in occupational settings, and this study aims to characterize their attitudes, knowledge, and practices (collectively, KAP) towards immunization practice in women of childbearing age. A convenience sample of 120 OPs (50.8% males, mean age of 48.2 ± 5.9 years old) completed a structured online questionnaire (potential recipients: 2034; response rate: 5.9%) assessing their understanding of official recommendations, their general knowledge of vaccine practice, their attitudes towards vaccines, and their risk perception about vaccine-preventable infectious diseases. The sampled OPs exhibited a good understanding of official recommendations, and they were largely favorable towards vaccination of pregnant women. Knowledge status was relatively good (potential range 0 to 100%, average score 22 74.5% ± 18.2), while risk perception towards sampled disorders was heterogenous: the greatest was the one for SARS-CoV-2 (52.7% ± 32.9), followed by seasonal influenza (45.3% ± 31.6), and pertussis (37.8% 24 ± 28.2). The main predictors for promoting vaccination were higher knowledge about seasonal influenza vaccine (SIV; adjusted Odds Ratio [aOR] 102.2, 95% Confidence Interval [95%CI] 9.68–1080.26), tetanus-diphtheria-acellular pertussis vaccine (Tdap; aOR 12.34, 95%CI 2.62; 58.22) 27 and SARS-CoV-2 vaccine (aOR 14.76, 95%CI 2.74–79.69). A better attitude towards SIV was positively associated with previous vaccination of the respondent (aOR 4.90, 95%CI 1.19–20.14), while higher risk perception towards SIV was characterized as a negative predictor (aOR 0.04, 95%CI 0.01–0.35), as was working as an OP in healthcare facilities (aOR 0.03, 95%CI 0.01–0.43). Tdap was positively associated with male gender of respondents (aOR 10.22, 95%CI 2.60 to 40.24) and higher risk perception about pertussis (aOR 10.38, 95%CI 1.47 to 73.47). Overall, our data suggest that improving the understanding of OPs about the health burden of frequently encountered pathogens could be instrumental in increasing their involvement in the promotion of vaccine practice. Because of the low rate of response to our survey, our conclusions remain tentative.

Keywords: pregnant women; vaccine-preventable diseases; knowledge; attitudes; practices; risk perception

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1. Introduction

Where implemented by the national legal framework, occupational physicians (OPs; please refer to Table A1 for a full summary of acronyms) are the medical professionals responsible for health surveillance and promotion across the workplaces [1,2]. Well before the inception of the SARS-CoV-2 pandemic, Italian OPs were actively involved in the implementation of specifically tailored preventive measures against biological risk factors [3–5], including prescription and/or delivery of appropriate vaccinations [2,6]. Not coinciden-

tally, Italian OPs have been extensively involved in the implementation of SARS-CoV-2 vaccination campaigns [7].

Pregnant women may be exposed to various pathogens, including "conventional" ones such as seasonal and pandemic influenza, pertussis, measles, and rubella [8–10], and emerging ones such as Flaviviridae (e.g., Zika virus) [11–13], and most notably SARS-CoV-2 [14–20] not only as healthcare workers (HCWs) but also in settings such as forestry, zootechny, food, veterinary, biotechnology, treatment and waste disposal. Their exposure and contact with highly dangerous agents are associated with an increased risk of morbidity, mortality, and adverse pregnancy outcomes [21–24].

Consequently, the implementation of properly tailored immunization policies among female workers of childbearing age could represent a substantial duty for OPs [25–29]. Notably, since 2017, the Italian National Immunization Plan (NIP) recommends the vaccination of pregnant women with the pertussis vaccine, included in the trivalent formulation tetanus-diphtheria-acellular pertussis (Tdap) vaccine between the 27th and the 36th week of every pregnancy, regardless of prior Tdap history [30,31]. Similarly, Seasonal Influenza Vaccine (SIV) should be delivered at any stage of the gestational period as a preventive intervention targeting both the recipient and the offspring [30–33]. In both cases, the role of OPs in improving vaccination rates among female workers from high-risk settings (e.g., HCW) has been specifically stressed by official Italian guidelines [9,18,34–39]. Unfortunately, coverage rates for recommended vaccinations, including SIV and Tdap, among pregnant women remain very low [27,28,32,33,40–42].

Even SARS-CoV-2 vaccines have been recently addressed by official recommendations that support their delivery in pregnant women. While initially recommended for breastfeeding mothers and pregnant women at higher risk of exposure to the virus or at greater risk of developing a severe illness, since the second half of 2021, SARS-CoV-2 mRNA vaccines have been extended to all pregnant women in their second and third trimester who wish to be vaccinated [43–48]. More precisely, national vaccination guidelines prioritize women at greater risk of contracting SARS-CoV-2 infection because of their occupational exposures (e.g., HCWs) and/or at greater risk of developing severe COVID-19 disease (women with risk factors such as age >30 years, BMI >30, comorbidities, women from countries where the migration pressure is high) [43–45].

In such a setting, the role of OPs may be of particular interest, as they could contribute to the promotion of recommended vaccination in working age groups, which in women largely coincide with childbearing age. Unfortunately, previous studies have reported a high occurrence of false beliefs about vaccinations and a lack of knowledge about national vaccination policies among Italian OPs [2,6,46,47]. Interestingly, similar shortcomings have been reported also in other national settings [1,20,48].

As a consequence, the main endpoint of this study was to assess knowledge (how much the respondents understand a certain topic), attitudes (that is the feelings of sampled individuals towards the assessed subject, as well as any preconceived ideas they may have towards it), and practices (the ways in which they demonstrate their knowledge and attitude through their actions; collectively, KAP) of a sample of OPs about vaccinations and vaccination policies in women of childbearing age and pregnant women. The understanding of general and specific recommendations was specifically focused on, as well as how the KAP of sampled professionals related to these recommendations. Our results may contribute to identifying areas that may be potentially targeted by specific informative and educative campaigns dedicated to OPs.

2. Results

2.1. Descriptive Analysis

As reported in Figure 1, a total of 120 OPs (5.9% of the original population of 2034 OPs) participated in the inquiry.

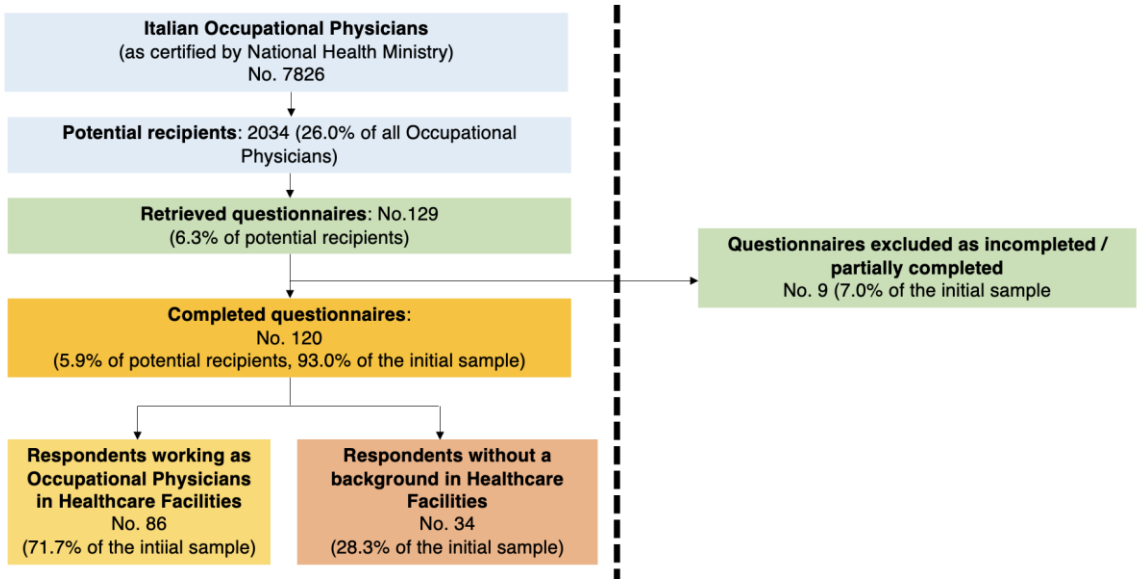


Figure 1. Flowchart of participants included in the present survey.

Overall, 50.8% of the participants were of the male gender, and their mean age was 48.2 ± 5.9 years (30.0% aged 50 years old or more), with average seniority as OPs of 16.3 ± 10.1 years (75.0% of them, with a seniority of 10 years or more). Of these, the large majority had offspring (86.7%) and worked as OPs in healthcare facilities (71.7%) (Table 1).

Table 1. Characteristics of the 120 Italian occupational physicians who participated in the present survey (Italy, 2022).

Variable	No./120	Average ± SD
Gender		
Male	61, 50.8%	
Female	59, 49.2%	
Age (years)		48.2 ± 5.9
Age ≥ 50 years	36, 30.0%	
Offspring	104, 86.7%	
Seniority (years)		16.3 ± 10.3
Seniority ≥ 10 years	90, 75.0%	
Working as Occupational Physician for Healthcare Facilities	86, 71.7%	
General Knowledge Score (%)		74.5% ± 18.2
General Knowledge Score > median (78.6%)	47, 39.2%	

2.2. Assessment of Knowledge Status

Knowledge status was assessed by means of a series of 25 true–false questions, whose internal consistency was good (Cronbach's alpha = 0.873). After percent normalization, the corresponding cumulative score (general knowledge score, or GKS) was generally high (74.5% ± 18.2; actual range 28.6–100%; median 78.6%). A skewed distribution was identified at visual inspection (Figure 2), and the Gaussian distribution was rejected by the D'Agostino–Pearson test (K2 = 22.17, $p < 0.001$).

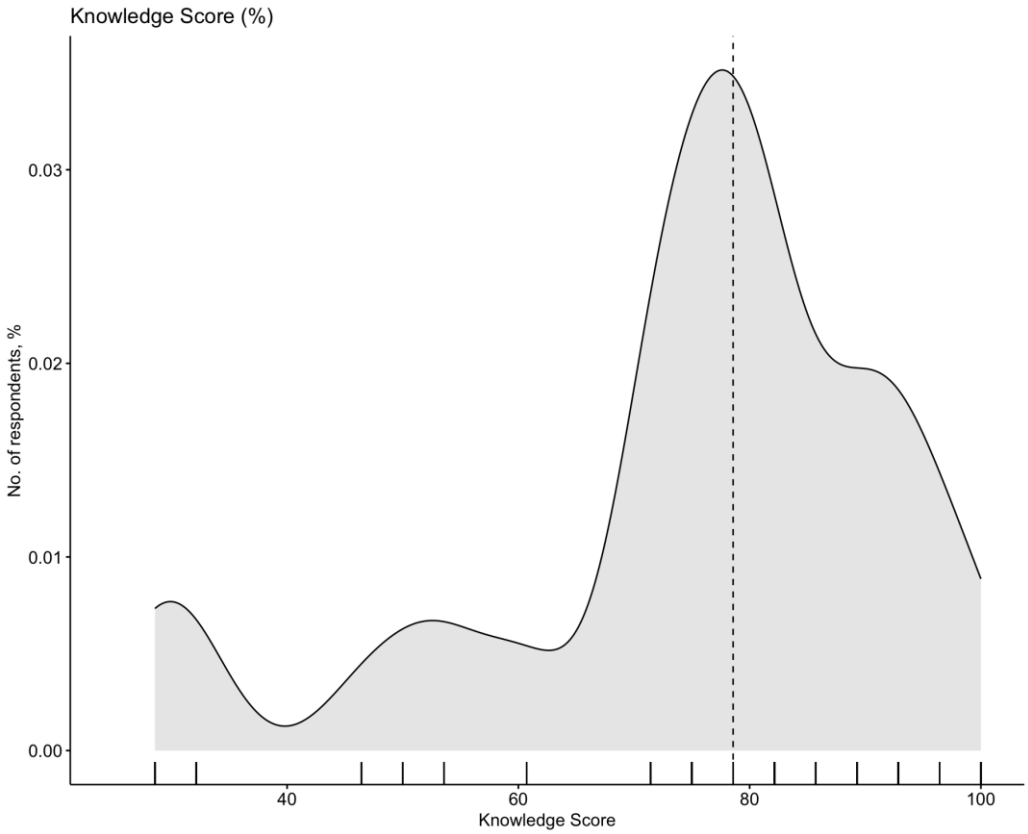


Figure 2. Density plots on general knowledge score (GKS) for participants fulfilling all inclusion criteria (No. 120, 5.9% of the original sample). Average GKS was estimated to be 74.5% ± 18.2 (actual range 28.6–100%; median 78.6%), with a non-Gaussian distribution as confirmed by D'Agostino–Pearson test (K2 = 22.17, $p < 0.001$).

Detailed results of the knowledge test are reported in Table A2. More precisely, substantial uncertainties were associated with items represented by Q19, as only 37.5% of respondents were aware that no RSV vaccine has been to date commercially made available; and Q23, as only 47.5% of participants had any understanding that mRNA vaccines against SARS-CoV-2 vaccines can be employed also in women with a previous history of deep vein thrombosis. Interestingly, even though a large share of participants had a proper understanding of official recommendations that allow the use of vaccines in pregnancy (Q16, 91.7%), similar knowledge gaps affected the recommendations for the delivery of the Tdap vaccine to all pregnant women (Q15, 54.2%) and for avoiding live-attenuated vaccines in pregnancy (Q17, 54.2%).

Moreover, a substantial share of participants exhibited some uncertainties regarding the role of vaccine additives in human health (Q01, 66.7% of correct answers) and the potential resurgence of secondary cases with epidemic potential after vaccinations with live-attenuated vaccines (Q21, 67.5%). Around a third of respondents also exhibited knowledge gaps about the potential vaccine-related induction of encephalitis lethargica (Q04, 66.7%), subacute sclerosing panencephalitis (Q03, 67.5%), and autoimmune Hashimoto's thyroiditis (Q06, 63.3%). Conversely, the large majority of participants properly acknowledged the efficacy of vaccines (Q11), understood the role of smallpox vaccination in the progressive eradication of the pathogen (Q10; 95.8% for both statements), and correctly reported that tetanus vaccination should be delivered in all adults every 10 years (Q18, 91.7%). The large majority of respondents also agreed on the lack of secondary effects of childhood immunization on their resistance to infectious diseases (Q12, 93.3%), and that vaccines do not increase the risk of developing autism (Q07, 91.7%), being of substantial value in promoting the control of infectious disease (Q09, 91.7%).

2.3. Risk Perception

Risk perception scores (RPS) for natural infections and vaccine-related side effects were calculated as the mathematical product of perceived severity (potential range 0 to 5) and perceived incidence (potential range 0 to 5) of the assessed condition (Figures A1 and A2). Briefly, the greatest RPS on natural infections was associated with SARS-CoV-2 (52.7% ± 32.9), followed by rubella (50.3% ± 26.7), varicella (49.4% ± 27.6), seasonal influenza (45.3% ± 31.6), measles (41% ± 26.3), parotitis (40.8% ± 27.5), pertussis (37.8% ± 28.3), hepatitis B (35.1% ± 22.0), diphtheria (27.6% ± 23.3), and tetanus (26.6% ± 22.3).

By arbitrarily assuming seasonal influenza as the reference group, the difference between reported RPS was significant only for tetanus (mean difference in favor of seasonal influenza, 18.71, 95%CI 9.31 to 28.11, $p < 0.001$), diphtheria (mean difference 17.71, 95%CI 8.31 to 27.11, $p < 0.001$), and hepatitis B (mean difference 10.21, 95%CI 8.11 to 19.61, $p = 0.026$) (Table A3). When dealing with reported side effects of vaccinations, the greatest RPS was associated with varicella (25.5% ± 25.7), followed by rubella (21.8% ± 22.4), SARS-CoV-2 immunizations with adenovirus carrier (19.9% ± 19.8), parotitis (19.5% ± 20.0), measles (18.4% ± 19.9), SARS-CoV-2 vaccines based on the mRNA technology (15.7% ± 19.4), hepatitis B vaccine (15.3% ± 16.2), and SARS-CoV-2 vaccines based on the subunit technology (15.2% ± 16.1), while lower estimates were associated with pertussis (13.0% ± 17.0), SIV (12.1% ± 15.0), diphtheria (12.1% ± 16.6), and tetanus (11.4% ± 15.3). When SIV was taken as the reference group, the difference was significant for parotitis (mean difference −7.39, 95%CI −14.09 to 0.70, $p = 0.022$), rubella (mean difference −9.67, 95%CI −16.36 to −2.97 $p = 0.001$), varicella (mean difference −13.33, 95%CI −20.03 to −6.64, $p < 0.001$), and SARS-CoV-2 performed through adenovirus carriers (mean difference −7.79, 95%CI −14.49 to 1.10, $p = 0.013$) (Table A4).

2.4. Attitudes towards Vaccination

When participants were asked about the perceived barriers towards vaccination of pregnant women (Table 2), the most frequently reported one was the inappropriate risk perception by pregnant women (83.3%), followed by their appropriate understanding of official recommendations (79.2%), the fear of side effects (70.8%), the inappropriate understanding of official recommendations by medical professionals (62.5%). Moreover, 45.9% of participants claimed that other medical professionals may not perceive maternal vaccinations as a priority and that vaccination services may be scarcely available given the specificities of pregnant women (37.5%). Only 12.5% of participants reported any complaints about the high costs of vaccines.

Table 2. Perceived barriers towards vaccinations of pregnant women as reported by 120 Italian occupational physicians (Italy, 2022).

Perceived Barriers towards Vaccinations of Pregnant Women (Agree/Totally Agree)	No./120, %
Fear of side effects	85, 70.8%
Costs of vaccinations	15, 12.5%
Not perceived as a priority by other medical professionals	55, 45.9%
Inappropriate risk perception by pregnant women	100, 83.3%
Vaccination services are scarcely available	45, 37.5%
Inappropriate understanding of official recommendations by pregnant women	95, 79.2%
Inappropriate understanding of official recommendations by medical professionals	75, 62.5%

Overall, the majority of participants recommended any of the SARS-CoV-2 vaccines (i.e., mRNA, subunit, or adenovirus-based formulates) in women of childbearing age (74.2%), followed by Tdap (70.8%), SIV (66.7%), and hepatitis B virus vaccine (54.2%) (Table 3). On the contrary, less than 50% of participants actively recommended MPR (45.8%), and varicella (41.7%) immunizations.

Table 3. Vaccinations actively recommended for women of childbearing age by 120 Italian occupational physicians (Italy, 2022).

Vaccines Actively Recommended on Women of Childbearing Age	No./120, %
Seasonal Influenza Virus	80, 66.7%
Diphtheria/Tetanus/Pertussis	85, 70.8%
Measles/Mumps/Rubella	55, 45.8%
Varicella	50, 41.7%
Hepatitis B Virus	65, 54.2%
SARS-CoV-2	89, 74.2%

When participants were asked about their vaccination status (Table 4), 91.7% of them had received a full course for SARS-CoV-2, while 71.7% of them had been reportedly vaccinated against HBV, 65.8% against SIV (at least one time in the previous 5 years). Moreover, 63.3% had received MPR, 61.7% Tdap, and only 16.7% varicella (either in a tetravalent immunization or as an individual vaccination).

Table 4. Vaccination status self-reported by 120 Italian occupational physicians (Italy, 2022).

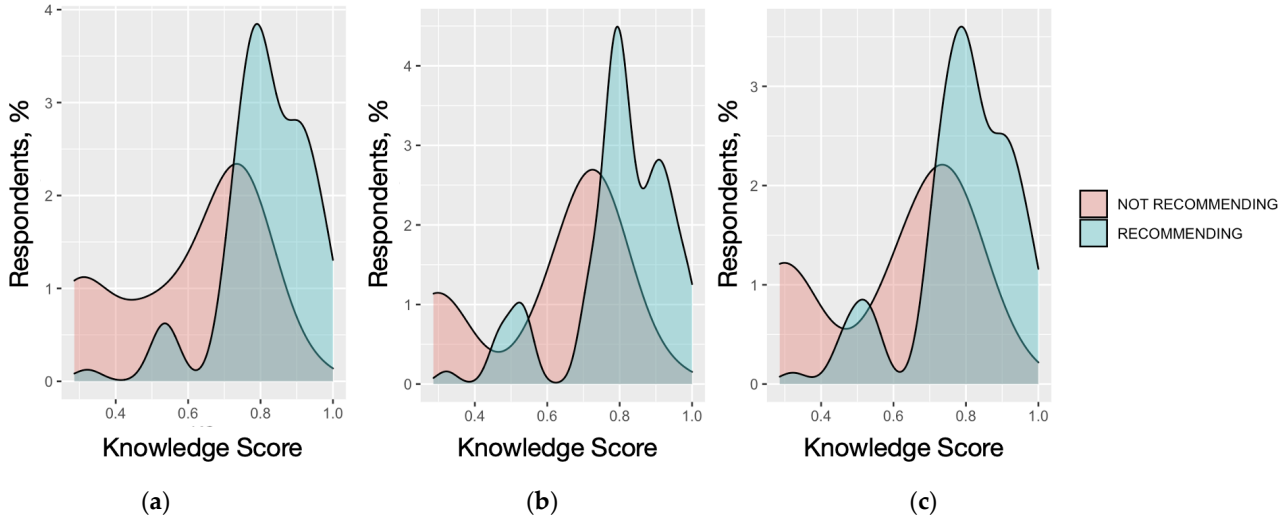
Previously Vaccinated against . . .	No./120, %
Seasonal Influenza Virus [1]	79, 65.8%
Diphtheria/Tetanus/Pertussis [2]	74, 61.7%
Measles/Parotitis/Rubella	76, 63.3%
Varicella	20, 16.7%
Hepatitis B Virus [3]	86, 71.7%
SARS-CoV-2	110, 91.7%

Notes: ([1]) at least 1 time in the previous 5 years; ([2]) at least 1 vaccination shot in the previous 10 years; ([3]) at least 1 vaccination shot in the previous 10 years, or documented antibody titer as >10 UI/mL.

2.5. Univariate Analysis

Overall, a positive correlation between GKS and RPS was identified for the majority of infections reported to the participants, and more precisely: seasonal influenza (r = 0.341, $p < 0.001$), pertussis (r = 0.200, $p = 0.028$), measles (r = 0.356, $p < 0.001$), parotitis (r = 0.238, $p = 0.009$), varicella (r = 0.196, $p = 0.032$), hepatitis B virus (r = 0.406, $p < 001$), and SARS-CoV-2 (r = 0.428, $p < 0.001$). In other words, a better understanding of vaccine-related issues was associated with a greater risk perception of the aforementioned disorders, and vice versa (Table A5).

Conversely, SIV (r = −0.352, $p < 0.001$), vaccines for diphtheria (r = −0.450, $p < 0.001$), tetanus (r = −0.367, $p < 0.001$), pertussis (r = −0.379, $p < 0.001$), hepatitis B virus (r = −0.191, $p = 0.037$), as well as SARS-CoV-2 vaccines based on mRNA (r = −0.354, $p < 0.001$), adenoviral carriers (r = −0.314, $p < 0.001$), and subunit technology (r = −0.314, $p < 0.001$), were negatively correlated with RPS, and a positive correlation between GKS and RPS was only reported for SARS-CoV-2 vaccines based on adenovirus carriers (r = 0.239, $p < 0.009$). Therefore, a better GKS meant a reduced risk perception of side effects following the delivery of SIV, and vaccinations against diphtheria, tetanus, pertussis, hepatitis B virus, and SARS-CoV-2 based on mRNA and subunit technology, while individuals exhibiting a better knowledge status were more frequently concerned about SARS-CoV-2 vaccines based on adenovirus carriers. Moreover, as shown in Figure 3, participants recommending the uptake of SIV, Tdap, and SARS-CoV-2 vaccines consistently had greater GKS compared to those who did not (i.e., SIV 81.7% ± 12.4 vs. 60.1% ± 19.5, Mann–Whitney [M-W] U = 2725.0, $p < 0.001$; Tdap 80.0% ± 14.4 vs. 61.3% ± 19.9, M-W U = 2458.0, $p < 0.001$; SARS-CoV-2 79.4% ± 14.3 vs. 60.6% ± 21.1, M-W U = 2194.5, $p < 0.001$).



(**a**) (**b**) (**c**)

Figure 3. Density plots on General Knowledge Score (GKS). Estimates were broken down by the reported attitude towards the following vaccinations: (**a**) SIV (Seasonal Influenza Virus), (**b**) Tdap, and (**c**) SARS-CoV-2. Briefly, estimates were substantially greater among individuals reporting a positive attitude than among those not recommending the assessed vaccination (i.e., SIV 81.7% ± 12.4 vs. 60.1% ± 19.5, Mann–Whitney [M-W] U = 2725.0, $p < 0.001$; Tdap 80.0% ± 14.4 vs. 61.3% ± 19.9, M-W U = 2458.0, $p < 0.001$; SARS-CoV-2 79.4% ± 14.3 vs. 60.6% ± 21.1, M-W U = 2194.5, $p < 0.001$).

When the outcome variables of actively promoting SIV, Tdap, and SARS-CoV-2 vaccines were compared to the individual characteristics of respondents (Table 5), a positive attitude towards SIV was positively associated with a better knowledge status (55.0% of individuals reporting a favorable attitude versus 7.5% among those not favorable to the reported vaccine, $p < 0.001$), having been previously vaccinated against seasonal influenza (82.5% vs. 32.5%, $p < 0.001$), and reporting higher RPS on influenza (62.5% vs. 25.0%, $p < 0.001$). On the contrary, working as an occupational physician in healthcare facilities (63.7% vs. 87.5%, $p = 0.012$) and reporting higher RPS on the vaccine (25.0% vs. 75.0%, $p < 0.001$) were more frequently reported among individuals not favorable to the vaccine than among those promoting the intervention.

Table 5. Association between the individual attitude towards seasonal influenza vaccine (SIV), diphtheria, tetanus, and pertussis formulate (Tdap), and SARS-CoV-2 vaccination among 120 Italian occupational physicians (Italy, 2022). Note: RPS = risk perception score.

SIV			
	Favorable (No./80, %)	**Not Favorable** (No./40, %)	*p* value
Male Gender	45, 56.3%	16, 40.0%	0.138
Age ≥ 50 years	24, 30.0%	12, 30.0%	1.000
Any Offspring	69, 86.3%	35, 87.5%	1.000
Higher Knowledge status	44, 55.0%	3, 7.5%	<0.001
Working as Occupational Physician for Healthcare facilities	51, 63.7%	35, 87.5%	0.012
Vaccinated against SIV	66, 82.5%	13, 32.5%	<0.001
Higher RPS vs. SIV	50, 62.5%	10, 25.0%	<0.001
Higher RPS vs. SIV vaccine	20, 25.0%	30, 75.0%	<0.001

Table 5. *Cont.*

SIV			
	Tdap		
	Favorable (No./85, %)	**Not Favorable** (No./35, %)	*p* value
Male Gender	50, 58.8%	11, 31.4%	0.011
Age ≥ 50 years	24, 28.2%	12, 34.3%	0.661
Any Offspring	74, 87.1%	30, 85.7%	1.000
Higher Knowledge status	44, 51.8%	3, 8.6%	<0.001
Working as Occupational Physician for Healthcare facilities	61, 71.8%	25, 71.4%	1.000
Vaccinated with Tdap	51, 60.0%	23, 65.7%	0.705
Higher RPS vs. diphtheria	45, 52.9%	5, 14.3%	<0.001
Higher RPS vs. diphtheria vaccine	15, 17.6%	10, 28.6%	0.275
Higher RPS vs. tetanus	40, 47.1%	10, 28.6%	0.096
Higher RPS vs. tetanus vaccine	15, 17.6%	15, 42.9%	0.008
Higher RPS vs. pertussis	55, 64.7%	5, 14.3%	<0.001
Higher RPS vs. pertussis vaccine	34, 40.0%	20, 57.1%	0.130
SARS-CoV-2			
	Favorable (No./89, %)	**Not Favorable** (No./31, %)	*p* value
Male Gender	43, 48.3%	16, 51.6%	0.914
Age ≥ 50 years	20, 22.5%	16, 51.6%	0.005
Any Offspring	77, 86.5%	27, 87.1%	1.000
Higher Knowledge status	45, 50.6%	2, 6.5%	<0.001
Working as Occupational Physician for Healthcare facilities	65, 73.0%	21, 67.7%	0.740
Vaccinated against SARS-CoV-2	88, 98.9%	22, 71.0%	<0.001
Higher RPS vs. SARS-CoV-2	48, 54.5%	12, 37.5%	0.148
Higher RPS vs. SARS-CoV-2 vaccine (mRNA)	34, 38.2%	21, 67.7%	0.008
Higher RPS vs. SARS-CoV-2 vaccine (adenoviral carrier)	39, 43.8%	21, 67.7%	0.037
Higher RPS vs. SARS-CoV-2 vaccine (subunit)	43, 48.3%	17, 54.8%	0.677

Similarly, a positive attitude toward the Tdap vaccine was positively associated with male gender (58.8% vs. 31.4%, $p = 0.011$), reporting a higher knowledge status (51.8% vs. 8.6%, $p < 0.001$), and having a higher RPS on diphtheria (52.9% vs. 14.3%, $p < 0.001$) and pertussis (64.7% vs. 14.3%, $p < 0.001$), while it was negatively associated with higher RPS on tetanus vaccine (17.6% vs. 42.9%, $p = 0.008$).

A favorable attitude towards SARS-CoV-2 vaccine was negatively associated with belonging to older age groups (22.5% among respondents of 50 years or more vs. 51.6% of respondents not favorable to SARS-CoV-2 vaccines) and reporting higher RPS on mRNA (38.2% vs. 67.7%, $p = 0.008$) and adenoviral (43.8% vs. 67.7%, $p = 0.037$) SARS-CoV-2 vaccines. Conversely, having a better knowledge status (50.6% vs. 6.5%, $p < 0.001$), and having been vaccinated against SARS-CoV-2 were positively associated with a favorable attitude (98.9% vs. 71.0%, $p < 0.001$).

2.6. Multivariable Analysis

Multivariable analysis was modeled including the variables that in univariate analysis were significantly associated ($p < 0.05$) with the active promotion among female workers of childbearing age of SIV (Model 1), Tdap (Model 2), and SARS-CoV-2 vaccines (Model 3), and more precisely (Table A6):

(a) Model 1: GKS > median value; having been working as OP in healthcare facilities; having been vaccinated against seasonal influenza; RPS towards SIV and seasonal influenza > median values.
(b) Model 2: being of male gender; GKS > median value; RPS on diphtheria and pertussis > median values; reporting RPS on the vaccine for tetanus > median value.
(c) Model 3: being older than 50 years at the time of the survey; reporting a GKS > median value, having been vaccinated against SARS-CoV-2, reporting RPS values for SARS-CoV-2 vaccines based on mRNA formulates and adenoviral vectors > median.

As shown in Table 6, a favorable attitude towards SIV was more frequently reported among participants exhibiting a better knowledge status (adjusted Odds Ratios [aOR] 102.24, 95% Confidence Interval [95%CI] 9.68 to 1080.26), and having been vaccinated against SIV (aOR 4.90, 95%CI 1.19 to 20.14). On the contrary, it was less frequently reported by participants who reportedly worked as OPs in healthcare facilities (aOR 0.03, 95%CI 0.01 to 0.43) and who reported higher RPS on the vaccine (aOR 0.04, 95%CI 0.01 to 0.35).

Table 6. Multivariable analysis of factors associated with a better individual attitude towards seasonal influenza vaccine (SIV), diphtheria, tetanus, and pertussis formulate (Tdap), and SARS-CoV-2 vaccination among 120 occupational physicians participating in the survey. The assessed models included the favorable attitude towards the individual vaccine as the outcome variable, and assessed as explanatory variables all factors that in univariate analysis were associated ($p < 0.05$) with the corresponding outcomes.

	SIV	**Tdap**	**SARS-CoV-2**
	Adjusted Odds Ratio (95% Confidence Intervals)		
Male Gender	-	10.22 (2.60; 40.24)	-
Age $\geq$ 50 years	-	-	0.62 (0.19; 1.99)
Higher Knowledge status	102.24 (9.68; 1080.26)	12.34 (2.62; 58.22)	14.76 (2.74; 79.69)
Working as Occupational Physician for Healthcare facilities	0.03 (0.01; 0.43)	-	-
Vaccinated against ...			
SIV	4.90 (1.19; 20.14)	-	-
SARS-CoV-2	-	-	7.66 (0.72; 81.12)
Higher RPS vs. the pathogen			
SIV	1.04 (0.23; 4.71)	-	-
diphtheria	-	2.38 (0.36; 15.84)	-
pertussis	-	10.38 (1.47; 73.47)	-
Higher RPS vs. the vaccination			
SIV	0.04 (0.01; 0.35)	-	-
tetanus	-	0.34 (0.10; 1.17)	-
SARS-CoV-2, mRNA	-	-	0.14 (0.02; 1.17)
SARS-CoV-2, adenoviral vector	-	-	2.59 (0.31; 21.45)

Similarly, a better knowledge status was associated with a favorable attitude towards SARS-CoV-2 vaccine (aOR 14.76, 95%CI 2.74 to 79.69), while male gender of respondents (aOR 10.22, 95%CI 2.60 to 40.24), scoring a GKS > median value (aOR 12.34, 95%CI 2.62 to 58.22), and higher risk perception of pertussis (aOR 10.38, 95%CI 1.47 to 73.47) were characterized as explanatory variables for a positive attitude towards Tdap.

3. Discussion

In our cross-sectional study, we assessed the KAP of a small sample of Italian OPs (120 respondents in total) about vaccinations and vaccination policies in female workers of childbearing age. As HCWs, OPs can reasonably represent a model for the general population, but because of their exclusive role in the occupational settings, they are also potentially instrumental in overcoming vaccine hesitancy (delay in acceptance or refusal of vaccines irrespective of their actual availability) [49–51] across workplaces and in high-risk occupational groups [52]. Consequently, when OPs improperly share

false beliefs among the workers they care for, they may even become detrimental to the global efforts to achieve and maintain high vaccination rates, not only for "new" vaccines such as SARS-CoV-2 [1,2,36,53] but also for more conventional ones such ad Tdap and SIV [36,48,54,55]. In our study, the majority of respondents exhibited a relatively good performance on the knowledge test (74.5% ± 18.2) and a somehow discrete positive attitude towards SIV (66.7%), Tdap (70.8%), and SARS-CoV-2 (74.2%). It is often believed that the attitudes towards vaccines of medical professionals (including OPs) should not be negative and that they cannot be affected by substantial vaccine hesitancy. Even though these results are obviously desirable, they cannot be taken for granted [17,56–58].

In our study, the aforementioned vaccinations were associated with quite distinctive predictive variables. On the one hand, a better knowledge status was consistently characterized as a predictive variable (aOR 12.34, 95%CI 2.62 to 58.22 for Tdap, aOR 14.76, 95%CI 2.74 to 79.69 for SARS-CoV-2), particularly for promoting SIV (aOR 102.24, 95%CI 9.68 to 1080.26). On the other hand, the promotion of assessed vaccines was associated with the self-reported immunization of the respondents only for SIV (aOR 4.90, 95%CI 1.19 to 20.14). In this regard, participants working as OPs for healthcare facilities and reporting higher RPS towards the vaccine exhibited a negative attitude towards the promotion of SIV among female workers of childbearing age (aOR 0.03, 95%CI 0.01 to 0.43 and aOR 0.04, 95%CI 0.01 to 0.35, respectively). On the contrary, a positive attitude to Tdap was positively associated with male gender (aOR 10.22, 95%CI 2.60 to 40.24) and higher risk perception of pertussis infection (aOR 10.38, 95%CI 1.47 to 73.47).

Our estimates are therefore somewhat consistent with most of the available KAP studies on immunizations [2,6,7,29,33,53,59–66], where the domain of knowledge has been often acknowledged as a main predictor for attitudes and practices of medical professionals. It should be stressed that similar results have been repetitively but not consistently reported in occupational studies, particularly in those performed on OPs [1,2,6,7,36,53]. Particularly when dealing with KAP studies on biological risk in occupational settings, knowledge represents a key factor that should be specifically addressed. As previously stressed by Betsch et al. in a sample of German professionals [1], OPs are not spared by substantial knowledge gaps and misunderstanding of biological risk agents. Similar estimates were reported from several Italian studies [2,7,53,67], and a likely explanation for these knowledge gaps may be tentatively identified in the core curriculum of OPs. Until recently, despite the underlying legal framework, and the substantial burden represented by pathogens such as HBV, HCV, and HIV, the formal education and the medical training of Italian OPs have often prioritized other topics (e.g., work-related musculoskeletal diseases, occupational pulmonary diseases, occupational neoplasia) over biological risk [15,37,39,68]. In other words, despite their professional role, scientific background, and medical training, not only may OPs fail to overcome the gaps between official recommendations and vaccine objectors [1,2,7,67,69], but their knowledge gaps could even lead to a certain degree of vaccine hesitancy [2,6,7,53,59].

In addition, the negative attitude towards the promotion of SIV among female workers of childbearing age could be explained in terms of potential false beliefs, particularly on the actual efficacy and safety profile of the available vaccines [29,32,70,71]. During the previous decade, the reporting of three deaths within 48 h of vaccination with the Fluad® vaccine led to a sustained reduction in vaccination rates between 2014 and 2017 [72,73], also among medical professionals [72,74], with a sustained lack of trust in this preventive intervention [29,53]. Even in our study, SIV was associated with an RPS that exceeded other immunizations, notably including varicella and rubella immunizations. Both vaccines are represented by live-attenuated pathogens: even though reactivation of vaccine strains is usually acknowledged as somewhat unusual for both varicella and rubella, for the safety of mother and children, their delivery is usually avoided in pregnant women [19,75–79]. Moreover, the reported mismatch between antigens contained in the SIV and the circulating pathogens in several winter seasons has presumptively led to the diffuse underscoring of the actual preventive role of SIV [46,80,81]. Nonetheless, we cannot rule out that a certain disregard for SIV could be associated with the misunderstanding of the actual

aims of this intervention. While vaccines included in Tdap are aimed to avoid the clinical syndromes associated with the natural infection of the primary pathogens, the primary aim of SIV is avoiding complications of the natural infection, likewise with SARS-CoV-2 immunization [24,74,82,83]. Interestingly, the effectiveness of SIV in avoiding sick leave in certain settings, such as healthcare facilities, although proven [84], has been inconsistently reported in several Italian studies [53,83,84]. In other words, some professionals may have failed to properly appreciate the actual cost-benefit ratio of this medical intervention, particularly in individuals such as pregnant women, where the clinician should not only target the health and safety of the patient (i.e., the pregnant woman) but care also for the unborn child. Not coincidentally, being an occupational physician in medical facilities was a negative predictor for a positive attitude towards SIV [26,33,85–88].

The inappropriate attitude of participating OPs towards SIV is particularly unsatisfactory when keeping in mind that vaccination of pregnant women remains globally low [85], and that there is a certain base of evidence that the failure of HCW to recommend, offer, promote, and perform influenza vaccination represents a substantial barrier to antenatal influenza vaccination [85–87]. A more effective contribution of OPs in overcoming usual barriers to maternal vaccination would be therefore both appreciable and necessary, as previously recommended for other medical professionals interacting with pregnant women [26,33,85,88–91].

In our study, the eventual promotion of the SARS-CoV-2 vaccine among pregnant women was remarkable (74.2%) and quite similar to the overall acceptance of mRNA formulates in a precedent report on Italian OPs (89.8% of 166 professionals) [7]. Moreover, the overall risk perception for these vaccines was comparable to other assessed immunizations, with the notable exception of adenovirus-based formulates. In this regard, a worse acceptance of these formulates was reported even in the aforementioned preliminary report (i.e., 51.2% vs. 89.8%) [7]. In fact, participating OPs appeared to be up-to-date in terms of general recommendations towards SARS-CoV-2 vaccines, with the notable exception of the exemption for women previously reporting cases of deep vein thrombosis. During the first SARS-CoV-2 vaccination campaign, several claims of an increased risk of deep vein thrombosis after SARS-CoV-2 vaccination shots urged for a critical reappraisal of these vaccines in groups potentially at high-risk, including individuals with previous episodes of deep vein thrombosis, women using birth control pills or hormone replacement therapy, and pregnant women [92–96]. Still, most of the reported cases were actually associated with adenovirus-based formulates [92,93,97], while mRNA vaccines and subunit vaccines have shown a safer profile [92,95,96]. Even though SARS-CoV-2 immunizations performed by means of an adenovirus carrier were discontinued during 2021, the overall attitude towards this immunization was actually associated with a quite higher RPS than that reported for mRNA formulates (19.9% $\pm$ 19.8 vs. 15.7% $\pm$ 19.4) and for SARS-CoV-2 vaccines based on the subunit technology (15.2% $\pm$ 16.1). The similar appraisal of mRNA and subunit vaccines—at least in this specific sample—may contribute to our understanding of the unsatisfying uptake of subunit formulates during vaccination campaigns in 2021 and 2022. Even though substantial vaccine hesitancy had previously affected similarly designed vaccines targeting hepatitis B and *Neisseria meningitidis* ACWY [31,98–101], subunit formulates have been initially welcome as "more conventional" drugs that could contribute to overcoming most of the concerns about the innovative mRNA technology [102]. However, according to an official report from the Italian National Health Service, by 26 September 2022, a total of 140,689,960 doses of SARS-CoV-2 vaccines had been delivered among Italian residents; of these, only 0.03% were represented by subunit formulates [103]. In other terms, our results seemingly suggest that interventions improving the understanding of actual guidelines among OPs may also improve their acceptance and proactive attitude towards SARS-CoV-2 vaccines even in pregnant women.

Limits and Strengths. Despite its potential significance, our study is affected by several limitations and is not generalizable because of shortcomings affecting the sampling strategy and generalizability of the sample.

In the first place, our sample was quite small, as it included a total of 120 OPs, which is around 1.5% of all Italian occupational physicians at the time of the survey (n = 7826), and only 5.9% of the potential recipients. Therefore, the sample is not likely to be representative of all OPs. Moreover, because of the limited number of sampled professionals, and the similarly limited response rate across the targeted and invited OPs, the present study was also affected by reduced statistical power, urging for a very cautious appraisal of the results we were able to collect. More precisely, assuming as a reference the acceptance of influenza (68.5%), Tdap (52.7%), and SARS-CoV-2 (90.4%) by Italian OPs from some similarly designed studies [7,36,53], a Type I error of 5% (0.05), and a power of 95%, a minimum sample size ranging between 133 for SARS-CoV-2, 332 for SIV, and 383 for Tdap could be calculated [7]. In other words, the present study only collected one-third of the sample size it would have required in order to gather sufficient statistical power. Still, as the specific topic of immunization of childbearing-age women in occupational settings has been assessed in only a limited fashion, particularly in Italy, and available evidence has been mostly collected from healthcare workers [7,29,104–107], our preliminary results could provide some insight for potential interventions aimed to improve the overall delivery of vaccines by OPs.

Second, our research was designed as an internet-based survey, whose implicit limits have been previously addressed [108–110]. Similarly designed studies are acknowledged as reliable and cost-effective, but they are also affected by an extensive double "self-selection" of participating individuals. On the one hand, as participating individuals are recruited through social media platforms, the sample will only include individuals familiar with new media [36,109,111–113]. In turn, this could lead to the oversampling of individuals more accustomed to sharing personal information through internet access, usually more frequently reported among younger age groups. In effect, our sample included a reduced share of respondents aged 50 years or older (30.0% of the total sample), and these figures are quite inconsistent with the Italian medical workforce [114,115]. On the other hand, this sampling strategy would lead to the oversampling of subjects having greater knowledge and/or interest in the assessed topic [29,32,116,117], while not participating could be understood as a negative attitude or a lack of knowledge about the targeted topic [109], and that may impair the overall reliability and generalizability of collected results. Nonetheless, our study deliberately targeted a relatively homogenous subgroup of medical professionals (i.e., OPs) in order to mitigate as much as possible the potential self-selection of the participants and minimize or even rule out the eventual effect of individual factors such as occupational background and educational level.

Thirdly, we cannot rule out that some of the respondents did not fully adhere to our selection criteria, further compromising the actual representativity of the sample. In order to cope with this potential shortcoming, our study only included participants that were drawn from discussion groups, whose participation was limited to individuals having previously received a specific invitation from the manager and answered specific "selection" questions [118]. Moreover, we do not know how often sampled participants are usually requested to contribute to workers' vaccinations, and more specifically to the vaccination practice of pregnant women [7,29,36,53,104–107].

Fourth, even though the core of this study, i.e., the knowledge test, was based on a reliable model and characterized by a high degree of internal consistency [1,119], we cannot rule out that some of the items assessed might have been affected by some degree of social desirability bias, whereby some participants reported some answers in terms of "common sense", prioritizing more "socially appropriate" answers over their true understanding of certain topics. Interestingly, such potential bias has been repeatedly identified in previous KAP studies on OPs [1,2,36,53,108], including some surveys performed with a quite similar sample. Therefore, we cannot rule out that our results could have ultimately overstated the share of individuals having an effective understanding of vaccine-associated issues, but also actually acknowledging the reported and assessed vaccinations as recommended and promoted in pregnant women and women of childbearing age. In order to attempt a

certain quantification of participants affected by social desirability bias, the knowledge test specifically reported the still commercially unavailable maternal RSV vaccination [118,120]. Interestingly, only 37.5% of participants correctly ruled out this option, suggesting the need for a critical appraisal of overall results from the knowledge test and individual attitudes towards reported vaccines.

Finally, our study deliberately assessed the KAP of recruited participants on a selected set of immunizations, but women of childbearing age could be targeted by other interventions of some occupational interest, including but not limited to vaccines for *Neisseria meningitidis* and *Mycobacterium tuberculosis* (i.e., BCG) for healthcare workers, Hepatitis A virus, typhoid vaccines, and tick-borne encephalitis vaccine for workers traveling to parts of the world where these pathologies are common, and even rabies vaccines for professionals involved in laboratory and veterinary practice [30,31,121–127]. Moreover, workplaces may represent an appropriate setting for improving the acceptance of immunizations with a more limited occupational interest, such as pneumococcus, and mostly human papillomavirus (HPV) vaccines. In effect, the pneumococcal vaccine is currently indicated only for individuals having certain chronic medical conditions or other risk factors, and routine medical surveillance by OPs may provide an ideal opportunity for reaching potential recipients and/or addressing their vaccine hesitancy [128,129]. Similarly, OPs could contribute to the shared effort for improving HPV vaccination rates. HPV is not only the current most common sexually transmitted disease in the world but it is also acknowledged as the main risk factor for cervical cancer in women with an estimated 570,000 new cases per year [130–133]. According to the current guidelines, the HPV vaccine is currently recommended for everyone through age 26 years if not adequately vaccinated when younger, and OPs, during medical surveillance, could properly identify and address women that can potentially benefit from catch-up vaccination [134]. According to the total worker health approach, future interventions should be therefore tailored in order to include a more extensive list of assessed vaccinations, not strictly limited to the interventions associated with occupational settings [135,136].

4. Materials and Methods

4.1. Study Design

The present study was designed as a cross-sectional questionnaire-based study according to the STROBE statement (see STROBE checklist as Supplementary File S1) and performed between 1 April 2022 and 30 April 2022. The study was delivered across seven private Facebook group pages and four closed forums focusing on occupational medicine, whose applications were officially limited to OPs. According to the built-in statistics of the parent social media, by 1 April 2022, the group pages had a total of 2034 members. Still, no information could be retrieved about cross-membership and the number of actual, active users.

In order to share the study with the group members, the chief researcher (MR) preventively contacted the administrators of the groups, requesting preventive authorization for posting an invitation link to the questionnaire. Users who clicked on the invitation texts were then provided with a page reporting (a) the full study information; (b) the informed consent (authors' translation of the informed consent is available as Supplementary File S2); and (c) a web link to the first page of the survey (Google Forms; Google LLC; Menlo Park, California, CA, USA).

On the first page of the survey, participants were initially asked whether they (a) were or not living and working in Italy and (b) were working as an OP at the time of the survey. Only participants sharing two positive answers to these checkpoint items received the full questionnaire, while in all other cases, the survey was closed, and no further data were retained. The questionnaire was compiled anonymously: personal data (e.g., name, IP address, email address), and all personal information unnecessary to the survey were not requested, saved, or tracked.

4.2. Questionnaire and Availability of Data and Material

The questionnaire was originally formulated in Italian, being designed as a follow-up to an instrument originally validated in obstetrics and gynecology [29]. The final questionnaire included the following sections:

1. Individual characteristics: age, seniority as OPs, gender, and whether they (a) had any professional experience as an occupational physician with any healthcare provider (yes vs. no) and (b) had any child.
2. Knowledge test: participants received a 31-item questionnaire on vaccination in pregnancy [29] that was based on previous KAP studies in occupational settings [137,138]. Briefly, the questionnaire included a series of true/false items based on the current understanding and guidelines on vaccinations in pregnancy, specifically focusing on (a) general issues about vaccinations and (b) official recommendations on SARS-CoV-2, SIV, and Tdap. GKS was calculated as the sum of correctly and incorrectly marked recommendations: for all correct answers, +1 was added to a sum score, while a missing/"don't know" answer or a wrong indication added 0 to the cumulative score.
3. Risk perception: participants were initially asked to rate by means of a fully labeled 5-point Likert scale (range: 1, "of no significant concern in daily practice", to 5, "of very high concern in daily practice") the perceived severity (C) and the perceived frequency (I) of a series of vaccine-preventable disorders in pregnant women: seasonal influenza, tetanus, diphtheria, pertussis, measles, parotitis, rubella, varicella, hepatitis B, SARS-CoV-2. Similarly, participants were then asked to rate how they perceived a series of vaccinations (i.e., against seasonal flu, tetanus, diphtheria, pertussis, measles, parotitis, rubella, varicella, hepatitis B virus, SARS-CoV-2 delivered as mRNA formulate, adenoviral vector-based formulates, and subunit vaccine) when delivered to pregnant women in terms of the perceived severity (C) and frequency (I) of their side effects.

As previously suggested by Yates, a quantitative estimate of perceived risk can be defined as the mathematical product of the perceived probability of an event and its expected consequences [1,139], and the corresponding RPS for vaccines and natural infection was therefore calculated as:

$$RPS = I \times C$$

4. Attitudes and practices: we initially inquired of participants whether they had previously received any of the following vaccinations: seasonal influenza virus, Tdap or dT, MPR, varicella (either as a single formulate or within an MPR-V vaccine), hepatitis B virus, SARS-CoV-2 (any). Similarly, participants were asked whether, during the last 12 months, they had recommended any of the aforementioned vaccines in women of childbearing age. Finally, we reported a series of potential barriers towards vaccinations in women of childbearing age (i.e., fear of side effects; costs of vaccinations; not being perceived as a priority by other medical professionals; inappropriate risk perception by pregnant women; vaccination services are scarcely available; inappropriate understanding of official recommendations by pregnant women; inappropriate understanding of official recommendations by medical professionals), and participants were asked to rate their perceived significance through a 5-point Likert scale ranging from 1 (not agreeing at all) to 5 (totally agreeing).

All questions were self-reported and not externally validated. The internal consistency or reliability of each of the sections of the questionnaire was assessed with the Cronbach alpha test, the results of which were interpreted in accordance with the literature. An English translation of the questionnaire is available on request to the study Authors.

4.3. Ethical Approval

Before giving their consent to the survey, participants were briefed that the principles and guidelines of the Helsinki Declaration would be followed across all steps of this study. More precisely, data were gathered anonymously and handled confidentially, being stored for a limited timeframe, in order to only allow aggregate data analysis. Participation was

strictly voluntary, and no monetary or other compensation was offered to the participants. Moreover, only subjects who had expressed consent for study participation were able to provide the questionnaire for data analysis. As individuals cannot be identified based on the presented material, this study caused no plausible harm or stigma to participants. The study was deliberately designed with an anonymous, observational approach, and it did not include clinical data. Moreover, demographic data were deliberately limited to very generic items (i.e., age, seniority, and gender). According to Italian law (Gazzetta Ufficiale no. 76, dated 31 March 2008; Supplementary File S3), a preliminary evaluation by an ethical committee was not required.

4.4. Data Analysis

Cumulative scores (RPS, GKS) were initially normalized to percent value, being then dichotomized by median value as "high" (i.e., >median) and "low" ($\leq$median) groups. All continuous variables were reported as mean $\pm$ standard deviation. After visual inspection, their distributions were assessed by means of the D'Agostino–Pearson K2 test and compared through the Student's t-test for unpaired data or ANOVA for K2 test p value > 0.100 (i.e., normally distributed variable), or through the Mann–Whitney or Kruskal–Wallis test for K2 test p value < 0.100 (i.e., not normally distributed variable). According to the distribution of variables, their correlation was then assessed by Pearson's correlation coefficient (i.e., normally distributed variables) or through Spearman's ranks test (i.e., not normally distributed variable).

In order to properly characterize explanatory variables of the outcome variables represented by a somewhat positive attitude towards recommending SIV, Tdap, and SARS-CoV-2 vaccine, a multivariable analysis was modeled as follows. Firstly, univariate analysis of all of the categorical variables was performed in respect of the aforementioned outcome variables through a chi-squared test in order to test variables to be included in the multivariable analysis. All variables that at univariate analysis were significantly ($p < 0.05$) associated with a somewhat positive attitude towards recommending SIV, Tdap, and SARS-CoV-2 vaccines were then included in a stepwise binary logistic regression analysis model in order to calculate multivariate odds ratios (aOR) and their respective 95% confidence intervals (95%CI). We opted for a more restrictive stepwise approach over an a priori modeling as in a small dataset the latter could find many false associations that happen only by chance [140]. All statistical analyses were performed by means of IBM SPSS Statistics 26.0 for Macintosh (IBM Corp. Armonk, NY, USA).

5. Conclusions

OPs are called upon to play a dual key role, i.e., reconciling the right to work and protecting and promoting workers' health at the same time. Despite a generally favorable attitude towards vaccines among our OP respondents, the results of our study suggest substantial knowledge gaps and a need for better training in the area of immunization of pregnant women. Because of the low response to the survey, however, these results remain preliminary.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/women3020019/s1, File S1: STROBE checklist; File S2: Authors' translation of the informed consent; File S3: Author's translation of the Gazzetta Ufficiale no. 76, dated 31 March 2008.

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Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki. A preventive ethical review and approval were waived for this study because of its anonymous, observational design and due to the lack of clinical data about patients that could configure the present research as a clinical trial. Participants were also guaranteed that retrieved data would be stored only for the time required by data analysis. The study, therefore, did not configure itself as a clinical trial, and a preliminary evaluation by an ethical committee was not required, according to Italian law (Gazzetta Ufficiale no. 76, dated 31 March 2008).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data are available on request.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

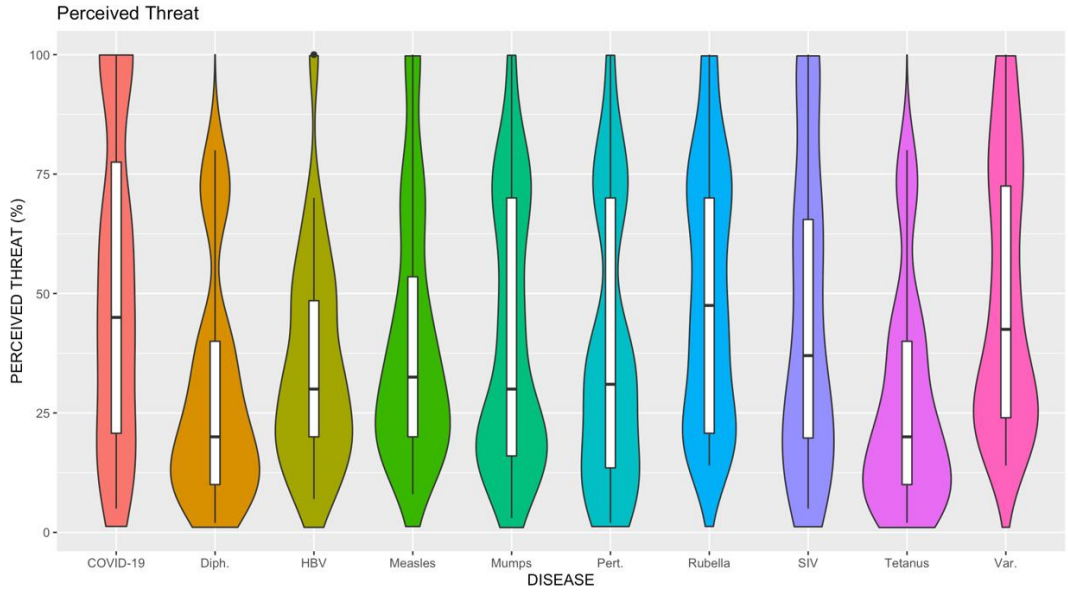

Figure A1. Risk Perception Score (RPS) towards a selected series of vaccine-preventable diseases in pregnant women. Notes: Diph. = diphtheria; HBV = hepatitis B virus; Pert. = pertussis; SIV = Seasonal influenza vaccine; Var. = varicella.

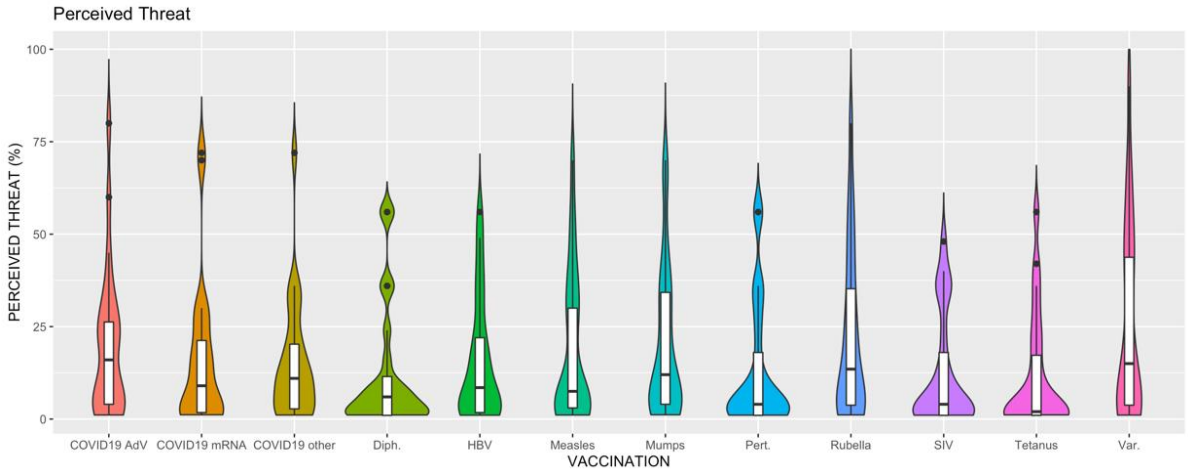

Figure A2. Risk Perception Score (RPS) towards a selected series of vaccines to be performed in pregnant women. Notes: AdV = adenoviral vector; mRNA = mRNA-based vaccine; Diph. = diphtheria; HBV = hepatitis B virus; Pert. = pertussis; SIV = Seasonal influenza vaccine; Var. = varicella.

Table A1. Summary of shortcuts and acronyms employed across the manuscript.

Acronyms	Meaning
95%CI	95% Confidence Interval
aOR	Adjusted Odds Ratio
BMI	Body Mass Index
COVID-19	Coronavirus Disease 2019
GKS	General Knowledge Score
HAV	Hepatitis A Virus
HBV	Hepatitis B Virus
HPV	Human Papillomavirus
ICOH	International Commission on Occupational Health
ISS	Italian National Institute of Health (in Italian, Istituto Superiore di Sanità)
KAP	Knowledge, Attitudes, Practices
MPR	Measles-Parotitis-Rubella vaccine
NHS	National Health Service
NIP	(Italian) National Immunization Plan
OPs	Occupational Physicians
PPE	Personal Protective Equipment
RPS	Risk Perception Score
RSV	Respiratory Syncytial Virus
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
SIV	Seasonal Influenza Virus
STROBE	STrengthening the Reporting of Observational studies in Epidemiology
Tdap	trivalent formulation tetanus-diphtheria-acellular pertussis
VPDs	Vaccine-Preventable Disease

Table A2. Knowledge Test in 120 occupational physicians participating in a survey on vaccinations in pregnant women (Italy, 2022).

Statement	Correct Answer	No./120, %
Q01. Addictive used in vaccines are not dangerous for human health	TRUE	80, 66.7%
Q02. Multiple sclerosis may be elicited by HBV recombinant vaccine	FALSE	105, 87.5%
Q03. Subacute sclerosing panencephalitis can be elicited by the measles vaccine	FALSE	81, 67.5%
Q04. Encephalitis lethargica can be elicited by vaccines against influenza (in particular, against pandemic influenza)	FALSE	80, 66.7%
Q05. Some vaccinations increase the risk of developing diabetes	FALSE	100, 83.3%
Q06. Some vaccinations increase the risk of developing autoimmune disorders including Hashimoto's thyroiditis	FALSE	76, 63.3%
Q07. Some vaccinations increase the risk of developing autism (e.g., vaccine against measles)	FALSE	110, 91.7%
Q08. Some vaccinations increase the risk of developing allergies	FALSE	85, 70.8%
Q09. Vaccines are of limited value in controlling infectious diseases as etiological drugs are extensively available	FALSE	110, 91.7%
Q10. Without vaccination programs, smallpox would still exist	TRUE	115, 95.8%
Q11. The efficacy of vaccines has been extensively proven	TRUE	115, 95.8%

Table A2. *Cont.*

Statement	Correct Answer	No./120, %
Q12. Children would exhibit greater resistance to infectious diseases if they received a more limited number of vaccines	FALSE	100, 93.3%
Q13. A substantial share of vaccines is delivered too early to properly activate the immune system	FALSE	105, 87.5%
Q14. The proper development of the immune system could be impaired by the delivery of a large number of vaccines	FALSE	85, 70.8%
Q15. According to the current National Vaccination Plan, shots with combined vaccine Diphtheria-Tetanus-Pertussis (Tdap) to all pregnant women	TRUE	65, 54.2%
Q16. According to the current National Vaccination Plan, vaccines should be avoided during pregnancy, in general	FALSE	110, 91.7%
Q17. According to the current National Vaccination Plan, live-attenuated vaccines should be avoided during pregnancy	TRUE	65, 54.2%
Q18. According to the current National Vaccination Plan, tetanus vaccination shots should be delivered to all adults every 10 years	TRUE	110, 91.7%
Q19. A vaccine preventing Respiratory Syncytial Virus (RSV) is currently recommended for pregnant women	FALSE	45, 37.5%
Q20. According to the current National Vaccination Plan, seasonal influenza vaccine should be avoided in pregnant women during the third trimester	FALSE	97, 80.8%
Q21. Vaccines against measles, parotitis, and rubella (with and without varicella) can elicit secondary cases with epidemic potential	FALSE	81, 67.5%
Q22. According to our current understanding, mRNA vaccines against SARS-CoV-2 can elicit impairment of fertility	FALSE	95, 79.2%
Q23. According to our current understanding, mRNA vaccines against SARS-CoV-2 should be avoided in women with a previous history of deep vein thrombosis	FALSE	57, 47.5%
Q24. According to the current guidelines, combined delivery of SARS-CoV-2 and Seasonal Influenza vaccines in pregnant women is a potential option.	TRUE	100, 83.3%
Q25. Pregnant women should avoid all occupational settings with a well-defined biological risk.	TRUE	104, 86.7%

Table A3. Comparison between perceived Risk Perception Score (RPS, potential range 0 to 100) on natural infections in pregnant women for selected pathogens as reported by 120 occupational physicians participating in the present survey (Italy, 2022) (Note: 95%CI = 95% confidence interval; ANOVA = analysis of the variance).

Pathogen	RPS (95%CI)	Mean Difference (95%CI)	*p* Value (ANOVA, Dunnet's Post Hoc Test)
Seasonal influenza Virus	45.29 (39.59 to 50.99)	REFERENCE	REFERENCE
Tetanus	26.58 (23.37 to 31.80)	18.71 (9.31 to 28.11)	<0.001
Diphtheria	27.58 (23.37 to 31.80)	17.71 (8.31 to 27.11)	<0.001
Pertussis	37.79 (32.69 to 42.89)	7.50 (−1.90 to 16.90)	0.185
Measles	41.00 (36.25 to 45.75)	4.29 (−5.11 to 13.69)	0.774
Parotitis	40.75 (35.78 to 45.72)	4.54 (−4.86 to 13.94)	0.722
Rubella	50.33 (45.50 to 55.16)	−5.04 (−14.44 to 4.36)	0.614
Varicella	49.42 (44.42 to 54.41)	−4.13 (−13.52 to 5.27)	0.806
Hepatitis B	35.08 (31.11 to 39.06)	10.21 (0.81 to 19.61)	0.026
SARS-CoV-2	52.71 (46.76 to 58.65)	−7.42 (−16.81 to 1.98)	0.195

Table A4. Comparison between perceived Risk Perception Score (RPS, potential range 0 to 100) on vaccinations for pregnant women as reported by 120 occupational physicians participating in the present survey (Italy, 2022) (Note: 95%CI = 95% confidence interval; ANOVA = analysis of the variance).

Pathogen	RPS (95%CI)	Mean Difference (95%CI)	*p* Value (ANOVA, Dunnet's Post Hoc Test)
Seasonal Influenza Vaccine	12.13 (9.42 to 14.83)	REFERENCE	REFERENCE
Tetanus	11.38 (8.61 to 14.14)	0.75 (−5.94 to 7.44)	0.999
Diphtheria	12.13 (9.12 to 15.13)	0.00 (−6.69 to 6.69)	1.000
Pertussis	12.96 (9.88 to 16.03)	−0.83 (−7.53 to 5.86)	0.999
Measles	18.44 (14.85 to 22.04)	−6.32 (−13.01 to 0.38)	0.075
Parotitis	19.52 (15.89 to 23.14)	−7.39 (−14.09 to −0.70)	0.022
Rubella	21.79 (17.75 to 25.83)	−9.67 (−16.36 to 2.97)	0.001
Varicella	25.46 (20.81 to 30.11)	−13.33 (−20.03 to −6.64)	<0.001
Hepatitis B	15.29 (12.35 to 18.23)	−3.17 (−9.86 to 3.53)	0.775
SARS-CoV-2 mRNA	15.67 (12.16 to 19.18)	−3.54 (−10.24 to 3.15)	0.660
Adenoviral carrier	19.92 (16.34 to 23.50)	−7.79 (−14.49 to −1.10)	0.013
Subunit vaccine	15.17 (12.25 to 18.08)	−3.04 (−9.74 to 3.65)	0.811

Table A5. Correlation of Risk Perception Score (RPS) on diseases and corresponding vaccinations, and General Knowledge Score in 120 Italian occupational physicians participating in the survey on vaccines in pregnant women. The correlation was assessed by means of Spearman's rank test.

	RPS (Disease) vs. GKS	RPS (Vaccination) vs. RPS (Disease)	RPS (Vaccination) vs. GKS
Seasonal Influenza Virus	r = 0.341 $p < 0.001$	r = −0.157 $p = 0.088$	r = −0.352 $p < 0.001$
Diphtheria	r = 0.072 $p = 0.473$	r = 0.008 $p = 0.931$	r = −0.450 $p < 0.001$
Tetanus	r = 0.041 $p = 0.655$	r = −0.136 $p = 0.139$	r = −0.367 $p < 0.001$
Pertussis	r = 0.200 $p = 0.028$	r = 0.152 $p = 0.097$	r = −0.379 $p < 0.001$
Measles	r = 0.356 $p < 0.001$	r = 0.121 $p = 0.186$	r = −0.061 $p = 0.509$
Parotitis	r = 0.237 $p = 0.009$	r = 0.146 $p = 0.111$	r = −0.079 $p = 0.391$
Rubella	r = 0.177 $p = 0.053$	r = 0.208 $p = 0.022$	r = −0.056 $p = 0.541$
Varicella	r = 0.196 $p = 0.032$	r = 0.135 $p = 0.141$	r = −0.010 $p = 0.918$
Hepatitis B Virus	r = 0.406 $p < 0.001$	r = 0.164 $p = 0.074$	r = −0.191 $p = 0.037$
SARS-CoV-2	r = 0.428 $p < 0.001$	-	-
mRNA vaccine	-	r = −0.054 $p = 0.558$	r = −0.354 $p < 0.001$

Table A5. *Cont.*

	RPS (Disease) vs. GKS	RPS (Vaccination) vs. RPS (Disease)	RPS (Vaccination) vs. GKS
Adenoviral-based vaccines	-	r = 0.239 $p = 0.009$	r = −0.294 $p = 0.001$
Subunit	-	r = 0.155 $p = 0.091$	r = −0.314 $p < 0.001$

Table A6. Summary of the categorical variables that were included as explanatory ones in the logistic regression models (Model 1: outcome variable, somehow positive attitude towards Seasonal Influenza Vaccine, SIV; Model 2: outcome variable, somehow positive attitude towards tetanus-diphtheria-pertussis [Tdap] vaccine; Model 3: outcome variable, somehow positive attitude towards SARS-CoV-2 vaccines) (Note: RPS = risk perception score).

	Model I	Model 2	Model 3
Male Gender	Not included	Included	Not included
Age $\geq$ 50 years	Not included	Not included	Included
Any Child in the household	Not included	Not Included	Not included
Higher Knowledge status	Included	Included	Included
Working as Occupational Physician for Healthcare facilities	Included	Not included	Not included
Vaccinated (SIV)	Included	-	-
Vaccinated (Tdap)	-	Not included	-
Vaccinated (SARS-CoV-2)	-	-	Included
Higher RPS vs. seasonal influenza	Included	-	-
Higher RPS vs. diphtheria	-	Included	-
Higher RPS vs. tetanus	-	Not included	-
Higher RPS vs. pertussis	-	Included	-
Higher RPS vs. SARS-CoV-2	-	-	Not included
Higher RPS vs. SIV	Included	-	-
Higher RPS vs. diphtheria vaccine	-	Not included	-
Higher RPS vs. tetanus vaccine	-	Included	-
Higher RPS vs. pertussis vaccine	-	Not included	-
Higher RPS vs. SARS-CoV-2 vaccine (mRNA)	-	-	Included
Higher RPS vs. SARS-CoV-2 vaccine (adenoviral carrier)	-	-	Included
Higher RPS vs. SARS-CoV-2 vaccine (subunit)	-	-	Not Included

References

1. Betsch, C.; Wicker, S. Personal Attitudes and Misconceptions, Not Official Recommendations Guide Occupational Physicians' Vaccination Decisions. *Vaccine* **2014**, *32*, 4478–4484. [CrossRef] [PubMed]
2. Riccò, M.; Cattani, S.; Casagranda, F.; Gualerzi, G.; Signorelli, C. Knowledge, Attitudes, Beliefs and Practices of Occupational Physicians towards Vaccinations of Health Care Workers: A Cross Sectional Pilot Study in North-Eastern Italy. *Int. J. Occup. Med. Environ. Health* **2017**, *30*, 775–790. [CrossRef] [PubMed]
3. Peretti-Watel, P.; Seror, V.; Cortaredona, S.; Launay, O.; Raude, J.; Verger, P.; Beck, F.; Legleye, S.; L'Haridon, O.; Ward, J. A Future Vaccination Campaign against COVID-19 at Risk of Vaccine Hesitancy and Politicisation. *Lancet* **2020**, *20*, 769–770. [CrossRef]

4. Verger, P.; Dubé, E. Restoring Confidence in Vaccines in the COVID-19 Era. *Expert Rev. Vaccines* **2020**, *19*, 991–993. [CrossRef]
5. Verger, P.; Scronias, D.; Dauby, N.; Adedzi, K.A.; Gobert, C.; Bergeat, M.; Gagneur, A.; Dubé, E. Attitudes of Healthcare Workers towards COVID-19 Vaccination: A Survey in France and French-Speaking Parts of Belgium and Canada, 2020. *Euro Surveill.* **2021**, *26*, 2002047. [CrossRef] [PubMed]
6. Riccò, M.; Gualerzi, G.; Ranzieri, S.; Ferraro, P.; Bragazzi, N.L. Knowledge, Attitudes, Practices (KAP) of Italian Occupational Physicians towards Tick Borne Encephalitis. *Trop. Med. Infect. Dis.* **2020**, *5*, 117. [CrossRef] [PubMed]
7. Riccò, M.; Ferraro, P.; Peruzzi, S.; Balzarini, F.; Ranzieri, S. Mandate or Not Mandate: Knowledge, Attitudes, and Practices of Italian Occupational Physicians towards SARS-CoV-2 Immunization at the Beginning of Vaccination Campaign. *Vaccines* **2021**, *9*, 889. [CrossRef]
8. Accurti, V.; Gambitta, B.; Iodice, S.; Manenti, A.; Boito, S.; Dapporto, F.; Leonardi, M.; Molesti, E.; Fabietti, I.; Montomoli, E.; et al. SARS-CoV-2 Seroconversion and Pregnancy Outcomes in a Population of Pregnant Women Recruited in Milan, Italy, between April 2020 and October 2020. *Int. J. Environ. Res. Public Health* **2022**, *19*, 16720. [CrossRef]
9. Gabutti, G.; Cetin, I.; Conversano, M.; Costantino, C.; Durando, P.; Giuffrida, S. Experts' Opinion for Improving Pertussis Vaccination Rates in Adolescents and Adults: A Call to Action. *Int. J. Environ. Res. Public Health* **2022**, *19*, 4412. [CrossRef]
10. van Beukering, M.D.M.; Schuster, H.J.; Peelen, M.J.C.S.; Schonewille, M.E.A.; Hajenius, P.J.; Duijnhoven, R.G.; Brand, T.; Painter, R.C.; Kok, M. Working Conditions in Low Risk Nulliparous Women in The Netherlands: Are Legislation and Guidelines a Guarantee for a Healthy Working Environment? A Cohort Study. *Int. Arch. Occup. Environ. Health* **2022**, *95*, 1305–1315. [CrossRef]
11. Esté, J.; Cabrera-rodrí, R. Zika Virus Pathogenesis: A Battle for Immune Evasion. *Vaccines* **2021**, *9*, 294.
12. Loconsole, D.; Metallo, A.; De Robertis, A.L.; Morea, A.; Quarto, M.; Chironna, M. Seroprevalence of Dengue Virus, West Nile Virus, Chikungunya Virus, and Zika Virus in International Travelers Attending a Travel and Migration Center in 2015–2017, Southern Italy. *Vector Borne Zoonotic Dis.* **2018**, *18*, 331–334. [CrossRef] [PubMed]
13. Silva, N.M.; Santos, N.C.; Martins, I.C. Dengue and Zika Viruses: Epidemiological History, Potential Therapies, and Promising Vaccines. *Trop. Med. Infect. Dis.* **2020**, *5*, 150. [CrossRef] [PubMed]
14. Brunelli, L.; Antinolfi, F.; Malacarne, F.; Cocconi, R.; Brusaferro, S. A Wide Range of Strategies to Cope with Healthcare Workers' Vaccine Hesitancy in A North-Eastern Italian Region: Are They Enough? *Healthcare* **2020**, *9*, 4. [CrossRef] [PubMed]
15. Maggiore, U.L.R.; Scala, C.; Toletone, A.; Debarbieri, N.; Perria, M.; D'Amico, B.; Montecucco, A.; Martini, M.; Dini, G.; Durando, P. Susceptibility to Vaccine-Preventable Diseases and Vaccination Adherence among Healthcare Workers in Italy: A Cross-Sectional Survey at a Regional Acute-Care University Hospital and a Systematic Review. *Hum. Vaccin. Immunother.* **2017**, *13*, 470–476. [CrossRef] [PubMed]
16. Dzieciolowska, S.; Hamel, D.; Gadio, S.; Dionne, M. Covid-19 Vaccine Acceptance, Hesitancy, and Refusal among Canadian Healthcare Workers: A Multicenter Survey. *Am. J. Infect. Control.* 2021; *in press*. [CrossRef]
17. Maltezou, H.C.; Theodoridou, K.; Ledda, C.; Rapisarda, V.; Theodoridou, M. Vaccination of Healthcare Workers: Is Mandatory Vaccination Needed? *Expert Rev. Vaccines* **2019**, *18*, 5–13. [CrossRef]
18. Dini, G.; Toletone, A.; Sticchi, L.; Orsi, A.; Bragazzi, N.L.; Durando, P. Influenza Vaccination in Healthcare Workers: A Comprehensive Critical Appraisal of the Literature. *Hum. Vaccin. Immunother.* **2018**, *14*, 772–789. [CrossRef]
19. Chodick, G.; Ashkenazi, S.; Livni, G.; Lerman, Y. Cost-Effectiveness of Varicella Vaccination of Healthcare Workers. *Vaccine* **2005**, *23*, 5064–5072. [CrossRef]
20. Loulergue, P.; Moulin, F.; Vidal-Trecan, G.; Absi, Z.; Demontpion, C.; Menager, C.; Gorodetsky, M.; Gendrel, D.; Guillevin, L.; Launay, O. Knowledge, Attitudes and Vaccination Coverage of Healthcare Workers Regarding Occupational Vaccinations. *Vaccine* **2009**, *27*, 4240–4243. [CrossRef]
21. Marshall, H.; McMillan, M.; Andrews, R.M.; Macartney, K.; Edwards, K. Vaccines in Pregnancy: The Dual Benefit for Pregnant Women and Infants. *Hum. Vaccin. Immunother.* **2016**, *12*, 848–856. [CrossRef] [PubMed]
22. Kuehn, B.M. Recommended Vaccines Underused During Pregnancy. *J. Am. Med. Assoc.* **2019**, *320*, 1949. [CrossRef] [PubMed]
23. Fortner, K.B.; Nieuwoudt, C.; Reeder, C.F.; Swamy, G.K. Infections in Pregnancy and the Role of Vaccines. *Obstet. Gynecol. Clin. N. Am.* **2018**, *45*, 369–388. [CrossRef] [PubMed]
24. Gall, S.A. Vaccines for Pertussis and Influenza: Recommendations for Use in Pregnancy. *Clin. Obstet. Gynecol.* **2008**, *51*, 486–497. [CrossRef]
25. Bonville, C.A.; Cibula, D.A.; Domachowske, J.B.; Suryadevara, M. Vaccine Attitudes and Practices among Obstetric Providers in New York State Following the Recommendation for Pertussis Vaccination during Pregnancy. *Hum. Vaccin. Immunother.* **2015**, *11*, 713–718. [CrossRef]
26. Naleway, A.L.; Smith, W.J.; Mullooly, J.P. Delivering Influenza Vaccine to Pregnant Women. *Epidemiol. Rev.* **2006**, *28*, 47–53. [CrossRef] [PubMed]
27. Kharbanda, E.O.; Vazquez-Benitez, G.; Lipkind, H.S.; Klein, N.P.; Cheetham, T.C.; Naleway, A.L.; Lee, G.M.; Hambidge, S.; Jackson, M.L.; Omer, S.B.; et al. Maternal Tdap Vaccination: Coverage and Acute Safety Outcomes in the Vaccine Safety Datalink, 2007–2013. *Vaccine* **2016**, *34*, 968–973. [CrossRef]
28. DeSilva, M.; Vazquez-Benitez, G.; Nordin, J.D.; Lipkind, H.S.; Klein, N.P.; Cheetham, T.C.; Naleway, A.L.; Hambidge, S.J.; Lee, G.M.; Jackson, M.L.; et al. Maternal Tdap Vaccination and Risk of Infant Morbidity. *Vaccine* **2017**, *35*, 3655–3660. [CrossRef]

29. Riccò, M.; Vezzosi, L.; Gualerzi, G.; Balzarini, F.; Capozzi, V.A.; Volpi, L. Knowledge, Attitudes, Beliefs and Practices of Obstetrics-Gynecologists on Seasonal Influenza and Pertussis Immunizations in Pregnant Women: Preliminary Results from North-Western Italy. *Minerva Ginecol.* **2019**, *71*, 288–297. [CrossRef]
30. Bonanni, P.; Ferrero, A.; Guerra, R.; Iannazzo, S.; Odone, A.; Pompa, M.; Rizzuto, E.; Signorelli, C. Vaccine Coverage in Italy and Assessment of the 2012–2014 National Immunization Prevention Plan. *Epidemiol. Prev.* **2015**, *39*, 146–158. [CrossRef]
31. Signorelli, C.; Guerra, R.; Siliquini, R.; Ricciardi, W. Italy's Response to Vaccine Hesitancy: An Innovative and Cost Effective National Immunization Plan Based on Scientific Evidence. *Vaccine* **2017**, *35*, 4057–4059. [CrossRef] [PubMed]
32. Napolitano, F.; Napolitano, P.; Angelillo, I.F. Seasonal Influenza Vaccination in Pregnant Women: Knowledge, Attitudes, and Behaviors in Italy. *BMC Infect. Dis.* **2017**, *17*, 1–7. [CrossRef] [PubMed]
33. D'Alessandro, A.; Napolitano, F.; D'Ambrosio, A.; Angelillo, I.F. Vaccination Knowledge and Acceptability among Pregnant Women in Italy. *Hum. Vaccin. Immunother.* **2018**, *14*, 1573–1579. [CrossRef] [PubMed]
34. Esposito, S.; Principi, N. Prevention of Pertussis: An Unresolved Problem. *Hum. Vaccin. Immunother.* **2018**, *14*, 2452–2459. [CrossRef]
35. Meregaglia, M.; Ferrara, L.; Melegaro, A.; Demicheli, V. Parent "Cocoon" Immunization to Prevent Pertussis-Related Hospitalization in Infants: The Case of Piemonte in Italy. *Vaccine* **2013**, *31*, 1135–1137. [CrossRef]
36. Riccò, M.; Vezzosi, L.; Gualerzi, G.; Bragazzi, N.L.; Balzarini, F. Pertussis Immunization in Healthcare Workers Working in Pediatric Settings: Knowledge, Attitudes and Practices (KAP) of Occupational Physicians. *Prelim. Results A Web-Based Surv.* **2020**, *61*, E66–E75.
37. Durando, P.; Dini, G.; Massa, E.; La Torre, G. Tackling Biological Risk in the Workplace: Updates and Prospects Regarding Vaccinations for Subjects at Risk of Occupational Exposure in Italy. *Vaccines* **2019**, *7*, 141. [CrossRef]
38. Esposito, S.; Durando, P.; Bosis, S.; Ansaldi, F.; Tagliabue, C.; Icardi, G. Vaccine-Preventable Diseases: From Paediatric to Adult Targets. *Eur. J. Intern. Med.* **2014**, *25*, 203–212. [CrossRef]
39. Manzoli, L.; Sotgiu, G.; Magnavita, N.; Durando, P.; Barchitta, M.; Carducci, A.; Conversano, M.; De Pasquale, G.; Dini, G.; Firenze, A.; et al. Evidence-Based Approach for Continuous Improvement of Occupational Health. *Epidemiol. Prev.* **2015**, *39*, 81–85.
40. Ding, H.; Black, C.L.; Ball, S.; Fink, R.V.; Williams, W.W.; Fiebelkorn, A.P.; Lu, P.-J.; Kahn, K.E.; D'Angelo, D.V.; Devlin, R.; et al. Influenza Vaccination Coverage Among Pregnant Women—United States, 2016–2017 Influenza Season. *Morb. Mortal. Wkly. Rep.* **2017**, *66*, 1016–1022. [CrossRef]
41. Sukumaran, L.; McCarthy, N.L.; Kharbanda, E.O.; Weintraub, E.S.; Vazquez-Benitez, G.; McNeil, M.M.; Li, R.; Klein, N.P.; Hambidge, S.J.; Naleway, A.L.; et al. Safety of Tetanus, Diphtheria, and Acellular Pertussis and Influenza Vaccinations in Pregnancy. *Obstet. Gynecol.* **2016**, *48*, 923–930. [CrossRef]
42. Regan, A.K.; Tracey, L.E.; Blyth, C.C.; Richmond, P.C.; Effler, P.V. A Prospective Cohort Study Assessing the Reactogenicity of Pertussis and Influenza Vaccines Administered during Pregnancy. *Vaccine* **2016**, *34*, 2299–2304. [CrossRef] [PubMed]
43. Donders, G.G.G.; Grinceviciene, S.; Haldre, K.; Lonnee-Hoffmann, R.; Donders, F.; Tsiakalos, A.; Adriaanse, A.; de Oliveira, J.M.; Ault, K.; Mendling, W. Isidog Consensus Guidelines on Covid-19 Vaccination for Women before, during and after Pregnancy. *J. Clin. Med.* **2021**, *10*, 2902. [CrossRef] [PubMed]
44. Centers for Disease Control and Prevention (CDC). Safety and Effectiveness of COVID-19 Vaccination during Pregnancy. 2022, CDC, Atlanta, USA. Available online: https://www.cdc.gov/coronavirus/2019-ncov/vaccines/recommendations/pregnancy.html (accessed on 3 May 2023).
45. Giusti, A.; Zambri, F.; Marchetti, F.; Corsi, E.; Preziosi, J.; Sampaolo, L. Interim Guidance on Pregnancy, Childbirth, Breastfeeding and Care of Infants (0–2 Years) in Response to the COVID-19 Emergency. 2021 Italian National Health Institute (ISS), Rome. Available online: https://www.iss.it/documents/5430402/0/Rapporto+ISS+COVID-19+2_2021_EN.pdf/421a0bc6-1933-aa77-6b39-a7860d866a16?t=1615472502820 (accessed on 3 May 2023).
46. Falato, R.; Ricciardi, S.; Franco, G. Influenza Risk Perception and Vaccination Attitude in Medical and Nursing Students during the Vaccination Campaigns of 2007/2008 (Seasonal Influenza) and 2009/2010 (H1N1 Influenza). *Med. Lav.* **2011**, *102*, 208–215. [PubMed]
47. La Torre, G.; Scalingi, S.; Garruto, V.; Siclari, M.; Chiarini, M.; Mannocci, A. Knowledge, Attitude and Behaviours towards Recommended Vaccinations among Healthcare Workers. *Healthcare* **2017**, *5*, 13. [CrossRef]
48. Graves, M.C.; Harris, J.R.; Kohn, M.; Hannon, P.A.; Lichiello, P.A.; Martin, D.P. Employers' Views on Influenza and Tetanus-Diphtheria-Pertussis Vaccination in the Workplace. *J. Occup. Environ. Med.* **2016**, *58*, e157–e158. [CrossRef]
49. Dubé, E.; MacDonald, N.E. How Can a Global Pandemic Affect Vaccine Hesitancy? *Expert Rev. Vaccines* **2020**, *19*, 899–901. [CrossRef]
50. Bloom, B.R.; Marcuse, E.; Mnookin, S. Addressing Vaccine Hesitancy. *Science* **2014**, *344*, 339. [CrossRef]
51. Goldstein, S.; MacDonald, N.E.; Guirguis, S.; Eskola, J.; Liang, X.; Chaudhuri, M.; Dube, E.; Gellin, B.; Larson, H.; Manzo, M.L.; et al. Health Communication and Vaccine Hesitancy. *Vaccine* **2015**, *33*, 4212–4214. [CrossRef]
52. Yaqub, O.; Castle-Clarke, S.; Sevdalis, N.; Chataway, J. Attitudes to Vaccination: A Critical Review. *Soc. Sci. Med.* **2014**, *112*, 1–11. [CrossRef]

53. Riccò, M.; Cattani, S.; Casagranda, F.; Gualerzi, G.; Signorelli, C. Knowledge, Attitudes, Beliefs and Practices of Occupational Physicians towards Seasonal Influenza Vaccination: A Cross-Sectional Study from North-Eastern Italy. *J. Prev. Med. Hyg.* **2017**, *58*, E141–E154. [PubMed]
54. Dorribo, V.; Lazor-Blanchet, C.; Hugli, O.; Zanetti, G. Health Care Workers' Influenza Vaccination: Motivations and Mandatory Mask Policy. *Occup. Med. (Chic. Ill.)* **2015**, *65*, 739–745. [CrossRef]
55. Riphagen-Dalhuisen, J.; Gefenaite, G.; Hak, E. Predictors of Seasonal Influenza Vaccination among Healthcare Workers in Hospitals: A Descriptive Meta-Analysis. *Occup. Environ. Med.* **2012**, *69*, 230–235. [CrossRef] [PubMed]
56. Maltezou, H.C.; Gargalianos, P.; Nikolaidis, P.; Katerelos, P.; Tedoma, N.; Maltezos, E.; Lazanas, M. Attitudes towards Mandatory Vaccination and Vaccination Coverage against Vaccine-Preventable Diseases among Health-Care Workers in Tertiary-Care Hospitals. *J. Infect.* **2012**, *64*, 319–324. [CrossRef]
57. Maltezou, H.C.; Wicker, S.; Borg, M.; Heininger, U.; Puro, V.; Theodoridou, M.; Poland, G.A. Vaccination Policies for Health-Care Workers in Acute Health-Care Facilities in Europe. *Vaccine* **2011**, *29*, 9557–9562. [CrossRef] [PubMed]
58. Maltezou, H.C.; Botelho-Nevers, E.; Brantsæter, A.B.; Carlsson, R.M.; Heininger, U.; Hübschen, J.M.; Josefsdottir, K.S.; Kassianos, G.; Kyncl, J.; Ledda, C.; et al. Vaccination of Healthcare Personnel in Europe: Update to Current Policies. *Vaccine* **2019**, *37*, 7576–7584. [CrossRef] [PubMed]
59. Riccò, M.; Ferraro, P.; Camisa, V.; Satta, E.; Zaniboni, A.; Ranzieri, S.; Baldassarre, A.; Zaffina, S.; Marchesi, F. When a Neglected Tropical Disease Goes Global: Knowledge, Attitudes and Practices of Italian Physicians towards Monkeypox, Preliminary Results. *Trop. Med. Infect. Dis.* **2022**, *7*, 135. [CrossRef] [PubMed]
60. Morrone, T.; Napolitano, F.; Albano, L.; Di, G. Meningococcal Serogroup B Vaccine: Knowledge and Acceptability among Parents in Italy Meningococcal Serogroup B Vaccine: Knowledge and Acceptability among Parents in Italy. *Hum. Vaccines Immunother.* **2017**, *3*, 1921–1927. [CrossRef]
61. Eppes, C.; Wu, A.; Cameron, K.A.; Garcia, P.; Grobman, W. Does Obstetrician Knowledge Regarding Influenza Increase HINI Vaccine Acceptance among Their Pregnant Patients? *Vaccine* **2012**, *30*, 5782–5784. [CrossRef]
62. Bert, F.; Olivero, E.; Rossello, P.; Gualano, M.R.; Castaldi, S.; Damiani, G.; D'Errico, M.M.; di Giovanni, P.; Fantini, M.P.; Fabiani, L.; et al. Knowledge and Beliefs on Vaccines among a Sample of Italian Pregnant Women: Results from the NAVIDAD Study. *Eur. J. Public Health* **2019**, *30*, 286–292. [CrossRef]
63. Loubet, P.; Kernéis, S.; Groh, M.; Loulergue, P.; Blanche, P.; Verger, P.; Launay, O. Attitude, Knowledge and Factors Associated with Influenza and Pneumococcal Vaccine Uptake in a Large Cohort of Patients with Secondary Immune Deficiency. *Vaccine* **2015**, *33*, 3703–3708. [CrossRef] [PubMed]
64. Gualano, M.R.; Olivero, E.; Voglino, G.; Corezzi, M.; Rossello, P.; Vicentini, C.; Bert, F.; Siliquini, R. Knowledge, Attitudes and Beliefs towards Compulsory Vaccination: A Systematic Review. *Hum. Vaccin. Immunother.* **2019**, *15*, 918–931. [CrossRef] [PubMed]
65. Zhang, J.; While, A.E.; Norman, I.J. Knowledge and Attitudes Regarding Influenza Vaccination among Nurses: A Research Review. *Vaccine* **2010**, *28*, 7207–7214. [CrossRef]
66. Smith, S.; Sim, J.; Halcomb, E. Nurses' knowledge, attitudes and practices regarding influenza vaccination: An integrative review. *J. Clin. Nurs.* **2016**, *25*, 2730–2744. [CrossRef] [PubMed]
67. La Vecchia, C.; Alicandro, G.; Negri, E.; Scarpino, V.; Coggiola, M.; Spatari, G. Attitudes towards COVID-19 Vaccination and Containment Measures in Italy and the Role of Occupational Physicians. *Med. Del Lav.* **2022**, *113*, e2022018. [CrossRef]
68. Bagnasco, A.; Zanini, M.; Catania, G.; Watson, R.; Hayter, M.; Dasso, N.; Dini, G.; Agodi, A.; Pasquarella, C.; Zotti, C.M.; et al. Predicting Needlestick and Sharps Injuries in Nursing Students: Development of the SNNIP Scale. *Nurs. Open* **2020**, *7*, 1578–1587. [CrossRef] [PubMed]
69. Kirupakaran, J.; Meloche, C.; Upfal, M. Practices and Attitudes of Michigan-Based Occupational Physicians Regarding Adult Immunization. *J. Occup. Environ. Med.* **2018**, *60*, 1034–1041. [CrossRef]
70. La Torre, G.; Semyonov, L.; Mannocci, A.; Boccia, A. Knowledge, Attitude, and Behaviour of Public Health Doctors towards Pandemic Influenza Compared to the General Population in Italy. *Scand. J. Soc. Med.* **2012**, *40*, 69–75. [CrossRef]
71. Albano, L.; Matuozzo, A.; Marinelli, P.; di Giuseppe, G. Knowledge, Attitudes and Behaviour of Hospital Health-Care Workers Regarding Influenza A/H1N1: A Cross Sectional Survey. *BMC Infect. Dis.* **2014**, *14*, 208. [CrossRef]
72. Levi, M.; Bonanni, P.; Biffino, M.; Conversano, M.; Corongiu, M.; Morato, P.; Maio, T. Influenza Vaccination 2014–2015: Results of a Survey Conducted among General Practitioners in Italy. *Hum. Vaccin. Immunother.* **2018**, *14*, 1342–1350. [CrossRef]
73. Levi, M.; Sinisgalli, E.; Lorini, C.; Santomauro, F.; Chellini, M.; Bonanni, P. The "Fluad Case" in Italy: Could It Have Been Dealt Differently? *Hum. Vaccin. Immunother.* **2017**, *13*, 379–384. [CrossRef] [PubMed]
74. Bonanni, P.; Boccalini, S.; Zanobini, P.; Dakka, N.; Lorini, C.; Santomauro, F.; Bechini, A. The Appropriateness of the Use of Influenza Vaccines: Recommendations from the Latest Seasons in Italy. *Hum. Vaccin. Immunother.* **2018**, *14*, 699–705. [CrossRef] [PubMed]
75. van Lier, A.; Ferreira, J.A.; Mollema, L.; Sanders, E.A.M.; de Melker, H.E. Intention to Vaccinate Universally against Varicella, Rotavirus Gastroenteritis, Meningococcal B Disease and Seasonal Influenza among Parents in the Netherlands: An Internet Survey. *BMC Res. Notes* **2017**, *10*, 672. [CrossRef]
76. Taddei, C.; Ceccherini, V.; Niccolai, G.; Porchia, B.R.; Boccalini, S.; Levi, M.; Tiscione, E.; Santini, M.G.; Baretti, S.; Bonanni, P.; et al. Attitude toward Immunization and Risk Perception of Measles, Rubella, Mumps, Varicella, and Pertussis in Health Care Workers Working in 6 Hospitals of Florence, Italy 2011. *Hum. Vaccin. Immunother.* **2014**, *10*, 2612–2622. [CrossRef] [PubMed]

77. Fedeli, U.; Zanetti, C.; Saia, B. Susceptibility of Healthcare Workers to Measles, Mumps Rubella and Varicella. *J. Hosp. Infect.* **2002**, *51*, 133–135. [CrossRef]
78. Lambert, N.; Strebel, P.; Orenstein, W.; Icenogle, J.; Poland, G.A. Rubella. *Lancet* **2015**, *385*, 2297–2307. [CrossRef]
79. Schenk, J.; Abrams, S.; Theeten, H.; van Damme, P.; Beutels, P.; Hens, N. Immunogenicity and Persistence of Trivalent Measles, Mumps, and Rubella Vaccines: A Systematic Review and Meta-Analysis. *Lancet Infect. Dis.* **2021**, *21*, 286–295. [CrossRef]
80. Asma, S.; Akan, H.; Uysal, Y.; Poçan, A.G.; Sucaklı, M.H.; Yengil, E.; Gereklioğlu, Ç.; Korur, A.; Başhan, İ.; Erdogan, A.F.; et al. Factors Effecting Influenza Vaccination Uptake among Health Care Workers: A Multi-Center Cross-Sectional Study. *BMC Infect. Dis.* **2016**, *16*, 192. [CrossRef]
81. Hayward, A.C.; Harling, R.; Wetten, S.; Johnson, A.M.; Munro, S.; Smedley, J.; Murad, S.; Watson, J.M. Effectiveness of an Influenza Vaccine Programme for Care Home Staff to Prevent Death, Morbidity, and Health Service Use among Residents: Cluster Randomised Controlled Trial. *BMJ* **2006**, *333*, 1241. [CrossRef]
82. Osterholm, M.T.; Kelley, N.S.; Sommer, A.; Belongia, E.A. Quantifying the Efficacy of Influenza Vaccines: Authors' Reply. *Lancet Infect. Dis.* **2012**, *12*, 660–661. [CrossRef]
83. Zhai, Y.; Santibanez, T.A.; Kahn, K.E.; Black, C.L.; de Perio, M.A. Paid Sick Leave Benefits, Influenza Vaccination, and Taking Sick Days Due to Influenza-like Illness among U.S. Workers. *Vaccine* **2018**, *36*, 7316–7323. [CrossRef] [PubMed]
84. Gianino, M.M.; Politano, G.; Scarmozzino, A.; Charrier, L.; Testa, M.; Giacomelli, S.; Benso, A.; Zotti, C.M. Estimation of Sickness Absenteeism among Italian Healthcare Workers during Seasonal Influenza Epidemics. *PLoS ONE* **2017**, *12*, e0182510. [CrossRef] [PubMed]
85. Buchy, P.; Badur, S.; Kassianos, G.; Preiss, S.; Tam, J.S. Vaccinating Pregnant Women against Influenza Needs to Be a Priority for All Countries: An Expert Commentary. *Int. J. Infect. Dis.* **2020**, *92*, 1–12. [CrossRef]
86. Dubé, E.; Gagnon, D.; Kaminsky, K.; Green, C.R.; Ouakki, M.; Bettinger, J.A.; Brousseau, N.; Castillo, E.; Crowcroft, N.S.; Driedger, S.M.; et al. Vaccination Against Influenza in Pregnancy: A Survey of Canadian Maternity Care Providers. *J. Obstet. Gynaecol. Can.* **2019**, *41*, 479–488. [CrossRef] [PubMed]
87. Gualano, M.R.; Bert, F.; Voglino, G.; Buttinelli, E.; D'Errico, M.M.; de Waure, C.; di Giovanni, P.; Fantini, M.P.; Giuliani, A.R.; Marranzano, M.; et al. Attitudes towards Compulsory Vaccination in Italy: Results from the NAVIDAD Multicentre Study. *Vaccine* **2018**, *36*, 3368–3374. [CrossRef]
88. Eppes, C.; Wu, A.; You, W.; Cameron, K.A.; Garcia, P.; Grobman, W. Barriers to Influenza Vaccination among Pregnant Women. *Vaccine* **2013**, *31*, 2874–2878. [CrossRef]
89. O'Leary, S.T.; Riley, L.E.; Lindley, M.C.; Allison, M.A.; Crane, L.A.; Hurley, L.P.; Beaty, B.L.; Brtnikova, M.; Collins, M.; Albert, A.P.; et al. Immunization Practices of U.S. Obstetrician/Gynecologists for Pregnant Patients. *Am. J. Prev. Med.* **2018**, *54*, 205–213. [CrossRef]
90. Stark, L.M.; Power, M.L.; Turrentine, M.; Samelson, R.; Siddiqui, M.M.; Paglia, M.J.; Strassberg, E.R.; Kelly, E.; Murtough, K.L.; Schulkin, J. Influenza Vaccination among Pregnant Women: Patient Beliefs and Medical Provider Practices. *Infect. Dis. Obstet. Gynecol.* **2016**, *2016*, 3281975. [CrossRef]
91. Vilca, M.L.; Esposito, S. The Crucial Role of Maternal Care Providers as Vaccinators for Pregnant Women. *Vaccine* **2017**, *36*, 5379–5384. [CrossRef]
92. Willame, C.; Dodd, C.; Durán, C.; Elbers, R.; Gini, R.; Bartolini, C.; Paoletti, O.; Wang, L.; Ehrenstein, V.; Kahlert, J.; et al. Background Rates of 41 Adverse Events of Special Interest for COVID-19 Vaccines in 10 European Healthcare Databases—An ACCESS Cohort Study. *Vaccine* **2023**, *41*, 251–262. [CrossRef]
93. Lee, M.T.; Choi, W.; You, S.H.; Park, S.; Kim, J.Y.; Nam, D.R.; Lee, J.W.; Jung, S.Y. Safety Profiles of MRNA COVID-19 Vaccines Using World Health Organization Global Scale Database (VigiBase): A Latent Class Analysis. *Infect. Dis. Ther.* **2022**, *12*, 443–458. [CrossRef] [PubMed]
94. Barello, S.; Palamenghi, L.; Graffigna, G. Public Reaction towards the Potential Side Effects of a COVID-19 Vaccine: An Italian Cross-Sectional Study. *Vaccines* **2022**, *10*, 429. [CrossRef] [PubMed]
95. Serrao, A.; Agrippino, R.; Brescini, M.; Mormile, R.; Chistolini, A. Thromboembolic Events Following MRNA Vaccines for COVID 19: A Case Series. *J. Thromb. Thrombolysis* **2022**, *53*, 971–973. [CrossRef] [PubMed]
96. Carli, G.; Nichele, I.; Ruggeri, M.; Barra, S.; Tosetto, A. Deep Vein Thrombosis (DVT) Occurring Shortly after the Second Dose of MRNA SARS-CoV-2 Vaccine. *Intern. Emerg. Med.* **2021**, *16*, 803–804. [CrossRef]
97. Durand, J.; Dogné, J.; Cohet, C.; Browne, K.; Gordillo Maranon, M.; Piccolo, L.; Zaccaria, C.; Genov, G. Safety Monitoring of COVID-19 Vaccines: Perspective from the European Medicines Agency. *Clin. Pharmacol. Ther.* 2022; *Epub Ahead of print*. [CrossRef]
98. Cascini, F.; Pantovic, A.; Al-Ajlouni, Y.; Failla, G.; Ricciardi, W. Attitudes, Acceptance and Hesitancy among the General Population Worldwide to Receive the COVID-19 Vaccines and Their Contributing Factors: A Systematic Review. *EClinicalMedicine* **2021**, *40*, 101113. [CrossRef]
99. Killian, M.; Detoc, M.; Berthelot, P.; Charles, R.; Gagneux-Brunon, A.; Lucht, F.; Pulcini, C.; Barbois, S.; Botelho-Nevers, E. Vaccine Hesitancy among General Practitioners: Evaluation and Comparison of Their Immunisation Practice for Themselves, Their Patients and Their Children. *Eur. J. Clin. Microbiol. Infect. Dis.* **2016**, *35*, 1837–1843. [CrossRef]
100. Mesch, G.S.; Schwirian, K.P. Social and Political Determinants of Vaccine Hesitancy: Lessons Learned from the H1N1 Pandemic of 2009–2010. *Am. J. Infect. Control.* **2015**, *43*, 1161–1165. [CrossRef]

101. Moore, P.J.A.; Millar, B.C.; Moore, J.E. Meningococcal ACWY Vaccine Uptake and Awareness among Student Freshers Enrolled at Northern Ireland Universities. *Int. J. Adolesc. Med. Health* **2017**, *32*, 20160087. [CrossRef]
102. Richmond, P.; Hatchuel, L.; Dong, M.; Ma, B.; Hu, B.; Smolenov, I.; Li, P.; Liang, P.; Han, H.H.; Liang, J.; et al. Safety and Immunogenicity of S-Trimer (SCB-2019), a Protein Subunit Vaccine Candidate for COVID-19 in Healthy Adults: A Phase 1, Randomised, Double-Blind, Placebo-Controlled Trial. *Lancet* **2021**, *397*, 682–694. [CrossRef]
103. AIFA (Italian Medicine Agency) Rapporto Sulla Sorveglianza Dei Vaccini Anti-COVID-19, N.13; AIFA, Rome. 2022. Available online: https://www.aifa.gov.it/web/guest/rapporti-su-sorveglianza-dei-vaccini-covid-19?p_p_id=it_gov_aifa_portlet_GestioneCookies&p_p_lifecycle=1&p_p_state=normal&p_p_mode=view&_it_gov_aifa_portlet_GestioneCookies_javax.portlet.action=saveCookieAIFA (accessed on 1 March 2023).
104. He, Q.; Wang, G.; He, J.; Wang, Y.; Zhang, J.; Luo, B.; Chen, P.; Luo, X.; Ren, J. Knowledge, Attitude and Practice Regarding Occupational Protection against COVID-19 among Midwives in China: A Nationwide Cross-Sectional Study. *Int. J. Disaster Risk Reduct.* **2022**, *79*, 103184. [CrossRef] [PubMed]
105. Tasnim, H.; Amin, M.B.; Roy, N.; Aktarujjaman, M.; Rogers, B.T.; Rosby, R.; Hossain, E. Knowledge, Attitudes, and Practices towards COVID-19 among Pregnant Women in Northern Bangladesh: A Community-Based Cross-Sectional Study. *Behav. Sci.* **2022**, *13*, 2. [CrossRef] [PubMed]
106. Napolitano, F.; Navaro, M.; Vezzosi, L.; Santagati, G.; Angelillo, I.F. Primary Care Pediatricians' Attitudes and Practice towards Hpv Vaccination: A Nationwide Survey in Italy. *PLoS ONE* **2018**, *13*, e0194920. [CrossRef] [PubMed]
107. Di Giuseppe, G.; Pelullo, C.P.; della Polla, G.; Montemurro, M.V.; Napolitano, F.; Pavia, M.; Angelillo, I.F. Surveying Willingness towards SARS-CoV-2 Vaccination of Healthcare Workers in Italy. *Expert Rev. Vaccines* **2021**, *20*, 881–889. [CrossRef]
108. Riccò, M.; Cerviere, M.P.; Marchesi, F.; Bottazzoli, M. Invasive Meningococcal Disease and Meningococcal Serogroup B Vaccination in Adults and Their Offspring: Knowledge, Attitudes, and Practices in Italy (2019). *Vaccines* **2023**, *11*, 508. [CrossRef]
109. Heiervang, E.; Goodman, R. Advantages and Limitations of Web-Based Surveys: Evidence from a Child Mental Health Survey. *Soc. Psychiat. Epidemiol.* **2011**, *46*, 69–76. [CrossRef]
110. Huang, Y.; Xu, S.; Lei, W.; Zhao, Y.; Liu, H.; Yao, D.; Xu, Y.; Lv, Q.; Hao, G.; Xu, Y.; et al. Knowledge, Attitudes, and Practices Regarding Zika: Paper and Internet Based Survey in Zhejiang, China. *JMIR Public Health Surveill.* **2017**, *3*, e81. [CrossRef]
111. Riccò, M.; Ferraro, P.; Peruzzi, S.; Balzarini, F.; Ranzieri, S. Hantaviruses in Agricultural and Forestry Workers: Knowledge, Attitudes and Practices in Italian Physicians. *Trop. Med. Infect. Dis.* **2021**, *6*, 169. [CrossRef]
112. Riccò, M.; Ferraro, P.; Camisa, V.; di Palma, P.; Minutolo, G.; Ranzieri, S.; Zaffina, S.; Baldassarre, A.; Restivo, V. Managing of Migraine in the Workplaces: Knowledge, Attitudes and Practices of Italian Occupational Physicians. *Medicina (B Aires)* **2022**, *58*, 686. [CrossRef]
113. Maietti, E.; Reno, C.; Sanmarchi, F.; Montalti, M.; Fantini, M.P.; Gori, D. Are psychological status and trust in information related to vaccine hesitancy during COVID-19 pandemic? A latent class and mediation analyses in Italy. *Hum. Vaccin. Immunother.* **2022**, *18*, 2157622. [CrossRef]
114. Riccò, M.; Vezzosi, L.; Balzarini, F. Challenges Faced by the Italian Medical Workforce. *Lancet* **2020**, *395*, e55–e56. [CrossRef] [PubMed]
115. Vicarelli, G.; Pavolini, E. Health Workforce Governance in Italy. *Health Policy* **2015**, *119*, 1606–1612. [CrossRef] [PubMed]
116. Hayat, A.M.; Tribble, D.R.; Sanders, J.W.; Faix, D.J.; Shiau, D.; Armstrong, A.W.; Riddle, M.S. Knowledge, Attitudes, and Practice of Travelers' Diarrhea Management among Frontline Providers. *J. Travel Med.* **2011**, *18*, 310–317. [CrossRef]
117. Çiftci, F.; Şen, E.; Demir, N.; Çiftci, O.; Erol, S.; Kayacan, O. Beliefs, Attitudes, and Activities of Healthcare Personnel about Influenza and Pneumococcal Vaccines. *Hum. Vaccin. Immunother.* **2018**, *14*, 111–117. [CrossRef] [PubMed]
118. Riccò, M.; Ferraro, P.; Peruzzi, S.; Zaniboni, A.; Ranzieri, S. Respiratory Syncytial Virus: Knowledge, Attitudes and Beliefs of General Practitioners from North-Eastern Italy (2021). *Pediatr. Rep.* **2022**, *14*, 147–165. [CrossRef]
119. Zingg, A.; Siegrist, M. Measuring People's Knowledge about Vaccination: Developing a One-Dimensional Scale. *Vaccine* **2012**, *30*, 3771–3777. [CrossRef]
120. Baraldi, E.; Checcucci Lisi, G.; Costantino, C.; Heinrichs, J.H.; Manzoni, P.; Riccò, M.; Roberts, M.; Vassilouthis, N. RSV Disease in Infants and Young Children: Can We See a Brighter Future? *Hum. Vaccin. Immunother.* **2022**, *18*, 2079322. [CrossRef]
121. Cuadera, M.K.Q.; Mader, E.M.; Safi, A.G.; Harrington, L.C. Knowledge, attitudes, and practices for tick bite prevention and tick control among residents of Long Island, New York, USA. *Ticks Tick Borne Dis.* **2023**, *14*, 102124. [CrossRef]
122. Coyer, L.; Sogan-Ekinci, A.; Greutélaers, B.; Kuhn, J.; Saller, F.S.; Hailer, J.; Böhm, S.; Brosch, R.; Wagner-Wiening, C.; Böhmer, M.M. Knowledge, Attitudes and Behaviors regarding Tick-Borne Encephalitis Vaccination and Prevention of Tick-Borne Diseases among Primary Care Physicians in Bavaria and Baden-Wuerttemberg, Germany, May-September 2022. *Microorganisms* **2023**, *11*, 961. [CrossRef]
123. Bocquier, A.; Branchereau, M.; Gauchet, A.; Bonnay, S.; Simon, M.; Ecollan, M.; Chevreul, K.; Mueller, J.E.; Gagneux-Brunon, A.; Thilly, N. PrevHPV Study Group. Promoting HPV vaccination at school: A mixed methods study exploring knowledge, beliefs and attitudes of French school staff. *BMC Public Health* **2023**, *23*, 486. [CrossRef]
124. Marano, C.; Moodley, M.; Melander, E.; de Moerlooze, L.; Nothdurft, H.D. Multinational Survey Shows Low Awareness of Tick-Borne Encephalitis and Rabies among Travellers to Endemic Regions. *J. Travel Med.* **2018**, *26*, S1–S2. [CrossRef]

125. Olson, S.; Hall, A.; Riddle, M.S.; Porter, C.K. Travelers' Diarrhea: Update on the Incidence, Etiology and Risk in Military and Similar Populations—1990–2005 versus 2005–2015, Does a Decade Make a Difference? *Trop. Dis. Travel Med. Vaccines* **2019**, *5*, 1. [CrossRef] [PubMed]
126. Tan, E.M.; St. Sauver, J.L.; Sia, I.G. Impact of Pre-Travel Consultation on Clinical Management and Outcomes of Travelers' Diarrhea: A Retrospective Cohort Study. *Trop. Dis. Travel Med. Vaccines* **2018**, *4*, 16. [CrossRef] [PubMed]
127. Riccò, M.; Zaniboni, A.; Satta, E.; Baldassarre, A.; Cerviere, M.P.; Marchesi, F.; Peruzzi, S. Management and Prevention of Traveler's Diarrhea: A Cross-Sectional Study on Knowledge, Attitudes, and Practices in Italian Occupational Physicians (2019 and 2022). *Trop. Med. Infect. Dis.* **2022**, *7*, 370. [CrossRef]
128. Cafiero-Fonseca, E.T.; Stawasz, A.; Johnson, S.T.; Sato, R.; Bloom, D.E. The Full Benefits of Adult Pneumococcal Vaccination: A Systematic Review. *PLoS ONE* **2017**, *12*, e0186903. [CrossRef] [PubMed]
129. Gualano, M.R.; Santoro, P.E.; Borrelli, I.; Rossi, M.F.; Amantea, C.; Tumminello, A.; Daniele, A.; Beccia, F.; Moscato, U. Employee Participation in Workplace Vaccination Campaigns: A Systematic Review and Meta-Analysis. *Vaccines* **2022**, *10*, 1898. [CrossRef]
130. la Torre, G.; de Waure, C.; Chiaradia, G.; Mannocci, A.; Capri, S.; Bamfi, F.; Ricciardi, W. Guidance for Future HTA Applications to Vaccines: The HPV Lesson. *Hum. Vaccin.* **2011**, *7*, 900–904. [CrossRef]
131. de Waure, C.; Quaranta, G.; Ianuale, C.; Panatto, D.; Amicizia, D.; Apprato, L.; Campanella, P.; Colotto, M.; de Meo, C.; di Nardo, F.; et al. Knowledge, Attitudes and Behaviors of the Italian Population towards Neisseria Meningitidis, Streptococcus Pneumoniae and HPV Diseases and Vaccinations: A Cross-Sectional Multicentre Study. *Public Health* **2016**, *141*, 136–142. [CrossRef]
132. Bogani, G.; Raspagliesi, F.; di Donato, V.; Brusadelli, C.; Guerrisi, R.; Pinelli, C.; Casarin, J.; Ghezzi, F.; del Fabro, A.; Ditto, A.; et al. Spotlight on the Role of Human Papillomavirus Vaccines. *Gynecol. Oncol.* **2021**, *160*, 346–350. [CrossRef]
133. Monti, M.; D'aniello, D.; Scopelliti, A.; Tibaldi, V.; Santangelo, G.; Colagiovanni, V.; Giannini, A.; di Donato, V.; Palaia, I.; Perniola, G.; et al. Relationship between Cervical Excisional Treatment for Cervical Intraepithelial Neoplasiaand Obstetrical Outcome. *Minerva Obstet. Gynecol.* **2021**, *73*, 233–246. [CrossRef]
134. Meites, E.; Szilagyi, P.G.; Chesson, H.W.; Unger, E.R.; Romero, J.R.; Markowitz, L.E. Human Papillomavirus Vaccination for Adults: Updated Recommendations of the Advisory Committee on Immunization Practices. *Morb. Mortal. Wkly. Rev.* **2019**, *68*, 698–702. [CrossRef] [PubMed]
135. Pronk, N. Total Worker Health ®: An Emerging Innovation in Workplace Health and Well-Being. *ACSM's Health Fit. J.* **2020**, *24*, 42–44. [CrossRef]
136. di Prinzio, R.R.; Nigri, A.G.; Zaffina, S. Total Worker Heath Strategies in Italy: New Challenges and Opportunities for Occupational Health and Safety Practice. *J. Health Soc. Sci.* **2021**, *6*, 313–318.
137. Riccò, M.; Vezzosi, L.; Cella, C.; Pecoraro, M.; Novembre, G.; Moreo, A.; Ognibeni, E.M.; Schellenberg, G.; Maranelli, G. Tetanus Vaccination Status in Construction Workers: Results from an Institutional Surveillance Campaign. *Acta Biomed.* **2019**, *90*, 269–278. [CrossRef]
138. Riccò, M.; Vezzosi, L.; Balzarini, F.; Bragazzi, N.L. Inappropriate Risk Perception for SARS-CoV-2 Infection among Italian HCWs in the Eve of COVID-19 Pandemic. *Acta Biomed.* **2020**, *91*, 1–2. [CrossRef]
139. Yates, F.J.; Stone, E.R. The Risk Construct. In *Risk-Taking Behaviour*; Yates, F.J., Ed.; John Wiley & Sons: Chichester, UK, 1992; pp. 1–25. ISBN 0471922501.
140. Bursac, Z.; Gauss, C.H.; Williams, D.K.; Hosmer, D.W. Purposeful Selection of Variables in Logistic Regression. *Source Code Biol. Med.* **2008**, *3*, 17. [CrossRef]