cost and supply issues. The attitudes and beliefs of staff, who provide the day-to-day care for NH residents, are key to understanding strategies required for successful implementation of ongoing testing programs.

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Supervised Exercise (Vivifrail) Protects Institutionalized Older Adults Against Severe Functional Decline After 14 Weeks of COVID Confinement

To the Editor:

Spain experienced a Coronavirus Disease 2019 (COVID-19)–related confinement for 14 weeks (March 14 to June 21, 2020) affecting all citizens irrespective of age, interrupting any kind of supervised physical activity programs for the older adults. This physical inactivity period could lead, among other complications, to disuse atrophy, functional decline, muscle wasting, and disability, which are all associated with longer hospitalization periods and a worse rehabilitation.[1] More so than ever, implementing structured and supervised exercise programs for older adults is critical to improve/maintain the health status of patients at risk of COVID-19 and alleviate the consequences of this pandemic.[1–5] In an attempt to improve physical and functional capacity, we recently developed the Vivifrail multicomponent tailored exercise program (www.vivifrail.com) to focus on providing training to older adults, and to design strategies to promote and prescribe such tailored physical exercise.[6,7] We assessed the impact of a 4-week multicomponent, tailored exercise program on functional capacity and muscle strength in sarcopenic older adults residing in nursing homes after a 14-week COVID-19 confinement. We also compared the functional status of those who stopped the exercise program in the following 14 weeks with those who continued with exercise training for a similar period.

This is a randomized trial on sarcopenic older adults aged ≥75 years living in nursing homes (Supplementary Table 1). Participants (n = 24) completed 4 weeks of the tailored multicomponent exercise training program Vivifrail (www.vivifrail.com).[6,7] One group (training, n = 12) continued the intervention for a further 14 weeks, whereas the other (confinement, n = 12) interrupted the intervention for 14 weeks because of the COVID-19 lockdown. Sarcopenia was determined according to the Foundation for the National Institutes of Health algorithm.[8] Functional capacity and strength were evaluated at baseline, after 4 weeks of exercise, and after 14 weeks of training or detraining. This study is part of an ongoing multicenter trial (NCT03827499).[9]

Participants enrolled into one of the individualized Vivifrail training programs according to their frailty level: Disability (A), Frailty (B), Pre-frailty (C), and Robust (D). Exercise regimen and weight load were set according to the Vivifrail prescription guidelines (http://vivifrail.com/resources/). Each program combined individualized regimens of strength, power, balance, walking, stretching, and cardiovascular exercises. Functional capacity was measured using the Short Physical Performance Battery (SPPB) test

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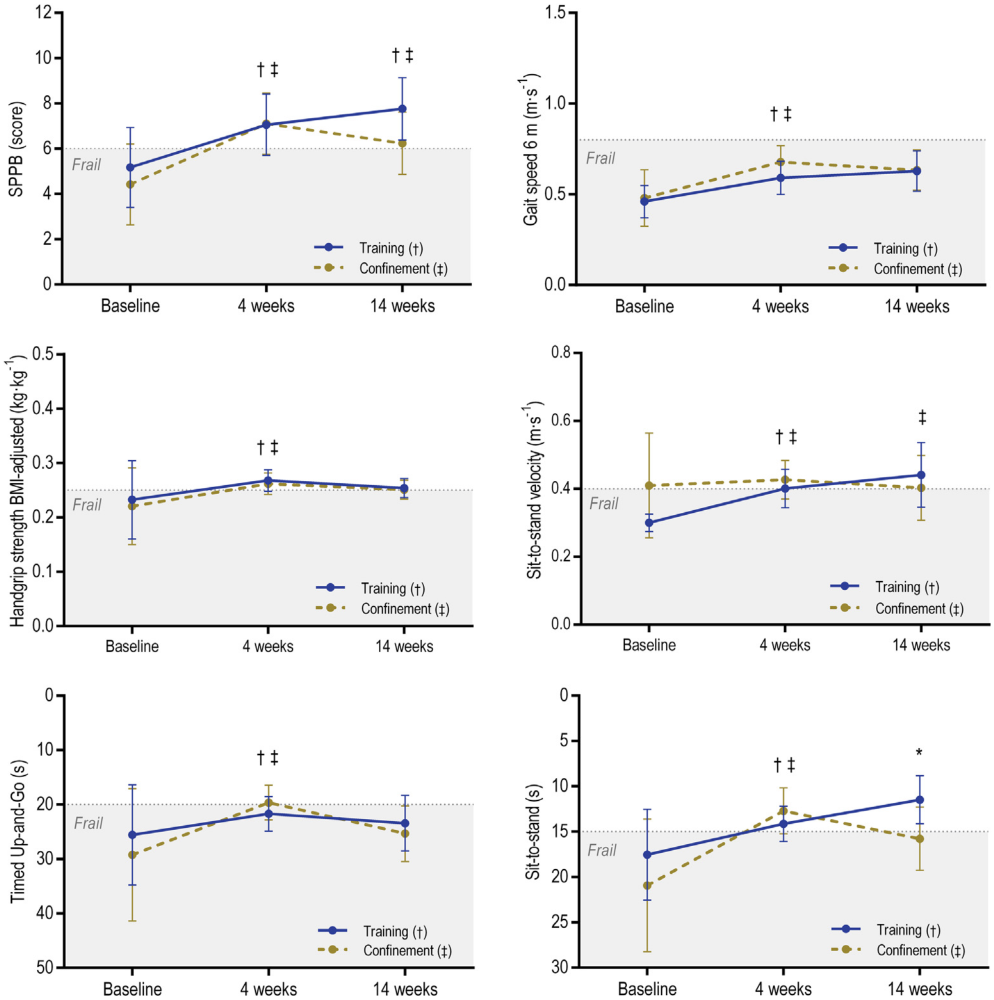

Fig. 1. Changes in physical functional capacity and strength. Data are means and 95% confidence intervals adjusted for baseline values. Dotted line represents the cutoff points for frailty based on the literature.[7,10] *Significant between-group differences (hierarchical analysis of covariance $P < .05$). †Significant time difference in Training group (paired *t*-test $P < .05$). ‡Significant time difference in Confinement group (paired *t*-test $P < .05$). BMI, body mass index.

scores (from 1 to 12 points), depending on performance in (1) gait speed 6 m, (2) 5-sit-to-stand test, (3) balance, and (4) timed up-and-go tests. Handgrip strength and sit-to-stand velocity (with a linear transducer) were also examined. A paired *t*-test was used to detect within-group differences along the time periods. Analysis of covariance was conducted to determine whether changes were different between the groups at each period after controlling for baseline scores. Effect sizes (ES) were computed by Cohen's *d*.

Postintervention changes are presented in Figure 1 and Supplementary Table 2. After 4 weeks of training, both groups significantly improved in all tests (P values from .001 to .042; ES from 0.33 to 1.08). After 14 weeks of further training, only the SPPB ($P = .021$, ES = 0.23) and the sit-to-stand velocity tests ($P = .008$, ES = 0.60) increased significantly. After 14 weeks of confinement, although the SPPB decreased ($P = .034$, ES = 0.24), participants maintained a better physical condition compared with baseline. Frailty status was reversed in 21% of participants after the 4-week exercise intervention, with 46% achieving high self- autonomy (C and D levels) (Supplementary Figure 1).

The main findings are as follows: (1) The Vivifrail multicomponent tailored exercise program was very effective in the short-term (4 weeks) and produced a similar response to training in 2 groups of sarcopenic, frail, and institutionalized adults aged ≥75 years from 2 different nursing homes. This uniform improvement demonstrates the robustness of the Vivifrail tailored prescription guidelines (http://vivifrail.com/resources/); (2) short-term health improvements after 4 weeks of Vivifrail seemed to persist after 14 weeks of inactivity due to COVID-19 confinement, and may have prevented severe functional decline and strength loss in institutionalized older adults; (3) although overall functional capacity and strength declined along the 14-week confinement, the benefits of the previous exercise training persisted, with older adults in a better physical condition as compared with baseline; (4) frailty reversion (ie, recovery of autonomy) after 4 weeks of exercise was mostly maintained during the 14-week training cessation period. Overall, these results support the positive impact of acute exercise interventions in a sarcopenic and frail population. It would seem advisable to introduce face-to-face, multicomponent exercise programs into nursing homes and long-term care facilities[11] as an essential activity to protect older adults from severe functional decline as a consequence of strict confinement conditions.

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Does Copper Prevent Nosocomial Transmission of COVID-19?

Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) has killed more than 1 million people worldwide since early 2020.[1] Age is one of the main risk factors for death from coronavirus disease-2019 (COVID-19).[2] In France, a third of COVID-19 deaths occurred in long-term accommodation establishments for dependent older people (nursing homes).[3]

Uncertainties persist on the relative importance of modes of transmission of SARS-CoV-2, but it is widely accepted that it is transmitted by respiratory droplets and by hands (especially through contact with contaminated surfaces).[4] The relative contribution of airborne versus surface transmission of COVID-19 remains unclear. Several antimicrobial surfaces have been studied and used around the world to prevent human-to-human transmission of SARS-CoV-2. Copper is a metallic element well known for its antimicrobial properties, and in vitro studies have shown that coronaviruses do not survive for a long time on it.[5,6]

A nursing home in France was divided into 2 distinct identical and symmetrical wings. In 2014, one of them was equipped with elements (door handles, handrails, and grab bars) covered with a copper alloy known to be antimicrobial. This structure, with its two identical wings but different by the copper equipment, enables to evaluate the epidemic spread in each wing and to assess the preventive effectiveness of copper.

We therefore carried out a quasi-experimental study within this nursing home to study the preventive efficacy of copper in infections by SARS-CoV-2 and thus improve knowledge on virus transmission by hands. During the study period, corresponding to the COVID-19 epidemic peak of the first semester in France (from March 20, 2020, to May 15, 2020), we systematically recorded the date of the first positive test in reverse transcription polymerase chain reaction (RT-PCR), for each case confirmed. In case of a suspicious infection, later confirmed as positive by serologic tests (false negative RT-PCR),[7] we chose the date of the negative RT-PCR as the theoretical date of infection. The relative risk and its 95% confidence interval were calculated from the incidence rates of COVID-19 in each wing.

Among the 353 people followed, 47 cases of COVID 19 were recorded (13%) during the study period. The relative risk of infection was significantly higher in the copper-equipped wing (ie, 2.98, 95% confidence interval 1.60-5.89).

These results show that the copper surfaces had no protective effect in preventing the transmission of SARS-CoV-2 and make us question the importance of hand contamination. Recent studies have highlighted the importance of airborne transmission of SARS-CoV-2 via microparticles, and our findings may be additional evidence.[8] Indeed, if the transmission is mainly aerial, it is logical that the protection offered by copper is not sufficient.

A previous study, carried out in the same nursing home, led to similar conclusions with an epidemic of seasonal influenza (also known to be airborne transmitted), and showed that copper did not appear to have any protective effect, although it was effective in

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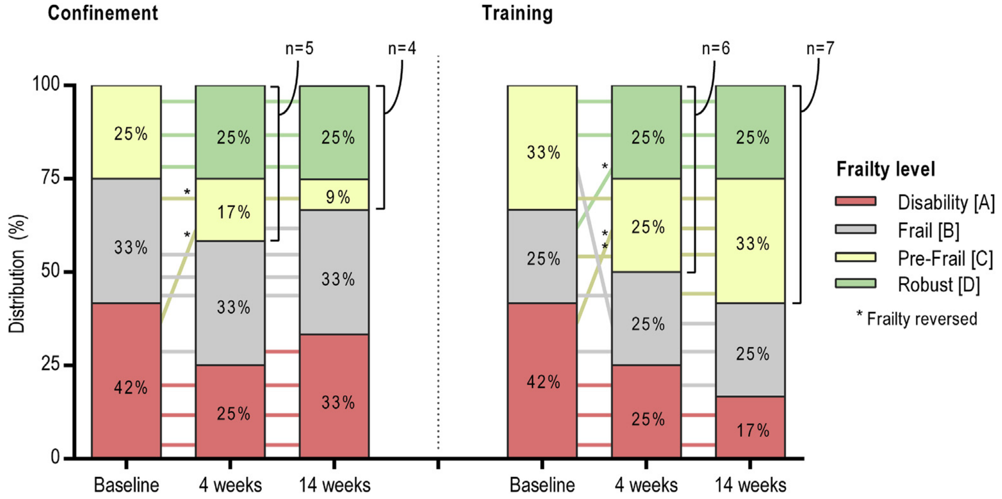

Supplementary Fig. 1. Changes in the frailty level according to the Vivifrail classification (http://vivifrail.com/resources/). Lines are the evolution of each participant across the timepoints. Frailty is considered reversed when upgrading from A or B to C or D levels.

Supplementary Table 1
Baseline Sample Characteristics of the Study Participations

Variable	Confinement	Training	*P* value
Age (y)	87.3 (7.7)	87.2 (6.5)	.98
Weight (kg)	72.4 (11.5)	65.3 (12.6)	.16
BMI (kg·m^{-2})	28.8 (3.5)	28 (3.9)	.61
BMD (g·cm^{-2})	1.08 (0.16)	1.06 (0.13)	.76
Fat (%)	37.6 (8.4)	41.4 (8.3)	.28
Lean mass (kg)	39.8 (7.6)	36 (6.3)	.19
MNA (score)	17.9 (3.8)	18.8 (6.0)	.67
SARC-F (score)	4.5 (2.0)	5.2 (3.0)	.69
Barthel (score)	66.7 (29.3)	72.5 (24.6)	.61
Lawton (score)	2.1 (1.2)	4.3 (5.6)	.23
FES-I (score)	12.8 (2.9)	13.4 (7.2)	.82
MMSE (score)	25.9 (5.7)	23.3 (7.2)	.34
Yesavage (score)	3.5 (3.6)	5.1 (2.2)	.21
SPPB (score)	4.4 (2.8)	5.2 (2.8)	.84
Timed Up-and-Go (s)	29.2 (18.1)	25.6 (13.7)	.52
Gait speed 6 m (m·s^{-1})	0.48 (0.22)	0.46 (0.14)	.79
Sit-to-stand (s)	20.9 (7.9)	17.5 (7.0)	.76
Sit-to-stand MPV (m·s^{-1})	0.41 (0.15)	0.30 (0.03)	.15
Handgrip (kg)	16.3 (8.4)	15.2 (6.6)	.71
Handgrip/BMI (kg·kg^{-1})	0.22 (0.11)	0.23 (0.11)	.80

BMD, bone mineral density; BMI, body mass index; FES-I, Falls Efficacy Scale International; MMSE, Mini Mental State Evaluation; MNA, Mini Nutritional Assessment; MPV, mean propulsive velocity; SARC-F, strength, assistance walking, rise from a chair, climb stairs, and falls.
Data are mean (SD).

Supplementary Table 2
Changes in Functional Capacity and Strength in Response to the Training Interventions

Variable	Group	n	Baseline [T0] vs. 4-week Training [T1]			4-week Training [T1] vs.14-week Training/ Detraining [T2]		
			Change (95% CI)	*P* Value	ES	Change (95% CI)	*P* Value	ES
SPPB (score)	Confinement	12	2.3 (0.8 to 3.8)	.006*	0.71	−.91 (−.08 to −1.7)	.034*	0.24
	Training	12	2.2 (3.3 to 1.1)	.001*	0.78	.74 (.13 to 1.4)	.021*	0.23
Timed Up-and-Go (s)	Confinement	11	−8.6 (−1.6 to −15.5)	.021*	0.59	6.2 (−.93 to 13.3)	.08	0.41
	Training	11	−4.8 (−.21 to −9.5)	.042*	0.42	1.1 (−1.5 to 3.9)	.36	0.13
Gait speed 6 m ($m \cdot s^{-1}$)	Confinement	11	.21 (.11 to .32)	.001*	0.76	−.04 (−.14 to .05)	.34	0.14
	Training	11	.11 (.01 to .21)	.023*	0.60	.03 (−.05 to .12)	.36	0.13
Sit-to-stand (s)	Confinement	7	−7.0 (−3.6 to −10.4)	.002*	1.08	2.8 (−1.1 to 6.7)	.13	0.45
	Training	10	−4.2 (−1.4 to 7.1)	.008*	0.68	−2.4 (−5.1 to .01)	.07	0.58
Sit-to-stand velocity† ($m \cdot s^{-1}$)	Confinement	6	.07 (.01 to .12)	.019*	0.43	−.02 (−.01 to .05)	.44	0.18
	Training	6	.05 (.01 to .11)	.037*	0.91	.04 (.01 to .06)	.008*	0.60
Handgrip strength (kg)	Confinement	12	2.7 (1.4 to 4.0)	.001*	0.32	−.91 (−2.1 to .22)	.10	0.11
	Training	12	2.4 (.92 to 3.9)	.005*	0.38	−1.1 (−2.3 to .15)	.08	0.17
Handgrip/BMI ($kg \cdot kg^{-1}$)	Confinement	12	.03 (.01 to .05)	.001*	0.33	−.01 (−.01 to −.02)	.13	0.10
	Training	12	.04 (.01 to .06)	.002*	0.36	−.01 (−.01 to −.03)	.13	0.12

BMI, body mass index; CI, confidence interval.

*Significant differences (paired *t*-test $P < .05$).

†Mean propulsive velocity measured with a linear transducer. From T0 to T1, both groups completed the same multicomponent exercise program; then, from T1 to T2 "Confinement" group interrupted the exercise program while "Training" maintained it.