## 1. Supplementary materials

### Appendix I: Development and validation of the questionnaire

### 1. Development of the questionnaire

The provisional questionnaire was developed based on the existing literature and on the Social Ecological Model for health promotion of McLeroy et al [12]. This questionnaire was afterwards adapted according to the content and face validity, before distribution to the participants. The provisional questionnaire was divided into four parts. The first part assesses participant's frailty status (Tilburg Frailty Indicator, TFI [13]), risk of sarcopenia (SARC-F [14]), nutritional status (Mini Nutritional Assessment Short form, MNA-SF [15]) and level of physical activity (PA) (Rapid Questionnaire for Physical Activity, RAPA [16]). The TFI consists of fifteen questions rated with 0 or 1 points. Participants with a score  $\geq$  5/15 are indicated as being frail [13]. The SARC-F questionnaire consists of five questions that are rated with 0 to 2 points. A score  $\geq$  4 indicates being at risk of sarcopenia [14]. The MNA consists of five questions and takes the Body Mass Index (BMI) into account. A total score < 8 indicates malnutrition; 8-12 indicates a risk of malnutrition and a score of 12-14 indicates normal nutritional status [15]. The RAPA assesses aerobic activities by seven statements, whereby participants with a result of  $\geq 6/7$  are categorized as sufficiently active. Also, two other statements (1-2 score) must both be positive answered to determine the strength and flexibility activities [16]. The second and third part of the questionnaire consisted of statements and open questions assesses (dis)incentives towards participating in a hypothetical PE and nutritional program and the preferred intervention format (Table 1). The fourth part consists of statements and open questions concerning (dis)incentives towards participation in a combined program of both PE and a nutritional intervention.

### 2. Validation of the questionnaire

### 2.2 Content validity

Seven out of 24 contacted experts in PE, human nutrition and/or motivation psychology validated the content of the questionnaire. The relevance of each item on a four point Likert scale (not relevant - somewhat relevant - quite relevant - highly relevant) according to Polit et al [31] and the clarity of each item (clear - not clear) was rated. Also, comments could be added to each item. The content validity index of each item (I-CVI) was calculated. The I-CVI is the proportion of experts that rated the question as 'quite relevant' or 'highly relevant' compared to the total amount of experts that rated the item. In a panel of  $\geq$  6 experts a score of I-CVI  $\geq$  0.78 is considered to be acceptable (90). To correct for chance agreement and

to assess the 'universal agreement' among the experts of the entire questionnaire, the modified kappa statistic (k\*) and the scale content validity index (S-CVI, the average of all I-CVI's) were calculated [32].

The S-CVI of the questionnaire was 0.92. 68 out of 76 items were evaluated as 'excellent', 5 items as 'good' and 3 items as 'fair'. Items evaluated as 'fair' and 'good' (except for item 5a in part three) were evaluated and deleted. Adjustments have been made based on the expert opinions: 1) one multiple-choice question was reformulated into a question with Likert scale (Part one item 13); 2) examples of commercially available vitamin D, protein and calcium supplements were added; 3) some questions were reformulated to increase clarity of the questions e.g., by replacing jargon with a synonym.

#### 2.3 Face validity

Face validity was assessed in a convenient sample of the target population (n = 8). The participants were asked to complete the questionnaire and to evaluate 1) the amount, clarity and relevance of each item; 2) the clarity of the instructions and 3) the time required to complete the questionnaire.

Five major concerns were identified during face validity, namely 1) the time required to complete the questionnaire (> 30 min) was too long; 2) the Global Physical Activity Questionnaire (GPAQ), which was included in the original questionnaire to assess PA, was perceived to be unclear; 3) the questions in the fourth part investigating the (dis)incentives to participate a combined program of both PE and nutrition overlapped with questions in previous parts; 4) too difficult words were used; 5) one participant wanted to add the statement 'I don't want to participate because I am already active enough'. As a result, 1) the fourth part was removed from the questionnaire; 2) the GPAQ was replaced by RAPA; 3) difficult words were replaced by synonyms; and 4) the missing statement was added, as its importance was also found in the literature [33].

## Content validity of the provisional questionnaire (English translation, originally validated in Dutch)

Item	Experts	Experts	I-CVI <sup>a</sup>	Pc <sup>b</sup>	k*c	Evalua-
	(n)	rated 3				tion <sup>d</sup>
		or 4 (n)				
PART 1: Physical exercise program						
Item 1: Performing exercise regularly, as described in the above physical exercise intervention:						
1a) Physical exercise can help me to increase my lifespan	7	6	0.86	0.055	0.85	Excellent
1b) Physical exercise contributes to healthy ageing	7	6	0.86	0.055	0.85	Excellent
1c) Physical exercise can help me to perform activities of daily living as long as possible	7	6	0.86	0.055	0.85	Excellent
1d) Physical exercise can help me to prevent falls	7	7	1.00	0.008	1.00	Excellent
Item 2: I consider myself physically able to participate in a physical exercise program for multiple months	7	6	0.86	0.055	0.85	Excellent
Item 3: Physical exercise may be useful for me.	7	5	0.71	0.164	0.65	Good
Item 4: It motivates me to participate in the exercise program if:						
4a) my social environment (partner/family/friends) motivates me	7	7	1.00	0.008	1.00	Excellent
4b) my social environment (partner/family/friends) believe this is beneficial for me	7	7	1.00	0.008	1.00	Excellent
4c) I have company to do the physical exercises	7	7	1.00	0.008	1.00	Excellent
4d) My doctor or paramedic can encourage me to do physical exercises	7	7	1.00	0.008	1.00	Excellent
Item 5: Facilities to perform physical exercises (such as a park, the gym) would encourage me to be more	7	6	0.86	0.055	0.85	Excellent
physically active						
Item 6: Sidewalks or bicycle paths near my home would encourage me to be more physically active	7	7	1.00	0.008	1.00	Excellent
Item 7: I prefer to exercise						
7a) in my local sports center	7	6	0.86	0.055	0.85	Excellent
7b) at home	7	7	1.00	0.008	1.00	Excellent
7c) outside the house	7	7	1.00	0.008	1.00	Excellent
Item 8: I prefer to exercise						
8a) In group	7	7	1.00	0.008	1.00	Excellent
8b) At home, independently	7	7	1.00	0.008	1.00	Excellent

8c) A combination of exercises at group and at home (e.g., twice a week at home and once a week in group).	7	6	0.86	0.055	0.85	Excellent
Item 9: Fear of falling prevents me to do physical exercises	7	7	1.00	0.008	1.00	Excellent
Item 10: Fear of injuries prevents me to do physical exercises	7	6	0.86	0.055	0.85	Excellent
Item 11: A lack of time prevents me to do physical exercises	7	6	0.86	0.055	0.85	Excellent
Item 12: The lack of facilities to perform physical exercises (such as a park, the gym) discourages me to be	7	5	0.71	0.164	0.65	Good
more physically active.						
Item 13: I would be motivated to complete the exercise program, if: $\Box$ I would receive feedback of the	7	6	0.86	0.055	0.85	Excellent
improvements $\Box$ I would understand the goal $\Box$ I would receive follow-ups $\Box$ the doctor this recommends						
Item 14: How much money are you willing to spend on an exercise program per month (transportation/	7	6	0.86	0.055	0.85	Excellent
equipment/ membership included)? Indicate the amount that is the closest related to your budget.						
$\Box$ <10 euro $\Box$ 10 to 20 euro $\Box$ 20 to 30 euro $\Box$ > 30 euro						
Item 15: I am motivated the most to do $\Box$ light exercises $\Box$ moderate exercises $\Box$ vigorous exercises	7	4	0.57	0.273	0.41	Fair
Item 16: Are there other factors that are barriers for you to participate in an exercise program? If yes, which?	7	7	1.00	0.008	1.00	Excellent
Item 17: Are there other factors that are motivators for you to participate in an exercise program? If yes,	7	7	1.00	0.008	1.00	Excellent
which?						
PART 2: Nutritional program						
Item 1: Do you take at least once a week a nutritional supplement?  Yes  No If you have indicated 'No',	6	6	1.00	0.016	1.00	Excellent
please continue with question 6						
Item 2: Do you take a protein supplement ? 🗆 Yes, multiple times a day 🗆 Yes, daily 🗆 Sometimes 🗆 No	6	6	1.00	0.016	1.00	Excellent
Item 3: Did your doctor prescribed you a protein supplement at the moment? $\Box$ Yes $\Box$ No	6	5	0.83	0.094	0.81	Excellent
3a) If yes, how often do you need to take the supplement according to the prescription $\Box$ Monthly $\Box$ Weekly $\Box$ Daily $\Box$ Multiple times a day $\Box$ Other:						
Item 4: Do you take a Vitamin D supplement 🗆 Yes, multiple times a day 🗆 Yes, daily 🗆 Sometimes 🗆 No	6	6	1.00	0.016	1.00	Excellent
Item 5: Did your doctor prescribed you a Vitamin D supplement $\Box$ Yes $\Box$ No	6	5	0.83	0.094	0.81	Excellent
5a) If yes, how often do you need to take the supplement according to the prescription						
□ Monthly □ Weekly □ Daily □ Multiple times a day □ Other:						
Item 6: Do you take a calcium supplement? 🗆 Yes, multiple times a day 🗆 Yes, daily 🗆 Sometimes 🗆 No	6	6	1.00	0.016	1.00	Excellent

Item 7: Did your doctor prescribed you a calcium supplement? $\Box$ Yes $\Box$ No	6	5	0.83	0.094	0.81	Excellent
7a) If yes, how often do you need to take the supplement according to the prescription						
□ Monthly □ Weekly □ Daily □ Multiple times a day □ Other:						
Item 8: Do you take at least once a week another than a protein, vitamin or calcium nutritional supplement?	6	5	0.83	0.094	0.81	Excellent
Item 9: Do you consume at least weekly a nutritional component that is supplemented with extra vitamins,	6	5	0.83	0.094	0.81	Excellent
minerals or proteins (e.g., cornflakes with supplemental Iron)?						
Item 10: Would you describe your meal pattern as Western (mainly dairy and meat) or as Mediterranean	6	4	0.67	0.234	0.57	Fair
(mainly vegetables, olive oil, only few refined carbohydrates)?						
Item 11: Eat healthy/take nutritional supplements:						
11a) can help me to increase my lifespan	6	5	0.83	0.094	0.81	Excellent
11b) contributes to healthy ageing	6	5	0.83	0.094	0.81	Excellent
11c) can help to performing activities of daily living as long as possible	6	6	1.00	0.016	1.00	Excellent
11d) can help me to prevent falls	6	6	1.00	0.016	1.00	Excellent
Item 12: I would be motivated to participate to the nutritional program as described above.	6	5	0.83	0.094	0.81	Excellent
Item 13: The nutritional intervention may be useful for me.	6	4	0.67	0.234	0.57	Fair
Item 14: It motivates me to participate in the nutritional program if:						
14a: my social environment (partner/family/friends) motivates me	6	6	1.00	0.016	1.00	Excellent
14b: my social environment (partner/family/friends) believe this is beneficial for me	6	6	1.00	0.016	1.00	Excellent
14c: I am motivated to eat healthy/take nutritional supplements when I have company to follow the	6	6	1.00	0.016	1.00	Excellent
intervention together with me						
14d: The recommendation of a doctor or paramedic can encourage me to eat healthy/take nutritional	6	6	1.00	0.016	1.00	Excellent
supplements						
Item 15: I'd like to take a nutritional supplement in the form of:						
15a: A powder (to dissolve in hot or cold drink)	6	5	0.83	0.094	0.81	Excellent
15b: A liquid (a drink) of 250 ml	6	5	0.83	0.094	0.81	Excellent
15c: A concentrated liquid of 30 ml. This liquid can have a sour taste.	6	6	1.00	0.016	1.00	Excellent
Item 16: I do not want to take nutritional supplements if it has an unpleasant taste	6	5	0.83	0.094	0.81	Excellent

Item 17: I do not want to take nutritional supplements because I think it is unnatural	6	5	0.83	0.094	0.81	Excellent
Item 18: I would be motivated to complete the nutritional program, if: $\Box$ I would receive feedback of the	6	5	0.83	0.094	0.81	Excellent
improvements $\Box$ I would understand the goal $\Box$ I would receive follow-ups $\Box$ the doctor this recommends						
Item 19: How much money are you willing to spend to a nutritional supplement per month? Indicate the	6	6	1.00	0.016	1.00	Excellent
amount that is the closest related to your budget.						
□ <10 euro □ 10 tot 20 euro □ 20 tot 30 euro □ > 30 euro						
Item 26: Are there other factors that are barriers for you to take nutritional supplements? If yes, which?	6	6	1.00	0.016	1.00	Excellent
Item 27: Are there other factors that are motivators for you to take nutritional supplements? If yes, which?	6	6	1.00	0.016	1.00	Excellent
PART 3: Combined program						
Item 1: A combination of exercise and nutritional intervention:						
1a) can help me to increase my lifespan	4	4	1.00	0.063	1.00	Excellent
1b) contributes to healthy ageing	4	4	1.00	0.063	1.00	Excellent
1c) can help to performing activities of daily living as long as possible	4	4	1.00	0.063	1.00	Excellent
1d) can help me to prevent falls	4	4	1.00	0.063	1.00	Excellent
Item 2: I would participate in a combined program of physical exercise and nutritional intervention	4	4	1.00	0.063	1.00	Excellent
Item 3: The combined program of physical exercise and nutritional intervention may be useful for me.	4	3	0.75	0.250	0.67	Good
Item 4: It motivates me to participate in the combined exercise and nutritional program if						
4a: my social environment (partner/family/friends) motivates me	4	4	1.00	0.063	1.00	Excellent
4b: my social environment (partner/family/friends) believe this is beneficial for me	4	4	1.00	0.063	1.00	Excellent
4c: I am motivated to do physical exercises when I have company	4	4	1.00	0.063	1.00	Excellent
4d: The recommendation of a doctor or paramedic can encourage me	4	4	1.00	0.063	1.00	Excellent
Item 5: It motivates me to participate in the program if:						
5a: I take the nutritional supplement spread during the day (at breakfast, at lunch and before bedtime)	4	3	0.75	0.250	0.67	Good
5b: I take the nutritional supplement each time at the same moment in once (e.g., at breakfast)	4	4	1.00	0.063	1.00	Excellent
5c: I take the nutritional supplement immediately after performing the exercises	4	4	1.00	0.063	1.00	Excellent
Item 6: It motivates me to participate in the program if:						
6a: I can choose the moment of the day to perform the exercises	4	3	0.75	0.250	0.67	Good

6b: I have to perform the exercises at a strict moment of the day	4	3	0.75	0.250	0.67	Good
Item 7: Fear of falling prevents me to do physical exercises or take nutritional supplements	4	4	1.00	0.063	1.00	Excellent
Item 8: Fear of injuries prevents me to do physical exercises or take nutritional supplements	4	4	1.00	0.063	1.00	Excellent
Item 9: A lack of time prevents me to do physical exercises or take nutritional supplements	4	4	1.00	0.063	1.00	Excellent
Item 10: Are there other factors that are barriers for you to do physical exercises or take nutritional	4	4	1.00	0.063	1.00	Excellent
supplements? If yes, which?						
Item 11: Are there other factors that are motivators for you to do physical exercises or take nutritional	4	4	1.00	0.063	1.00	Excellent
supplements? If yes, which?						
Number of items <sup>e</sup>	76					
S-CVI <sub>Ave</sub> <sup>f</sup>	0.92					
a: Item content validity index (I-CVI) = number giving a rating of 3 or 4 /number of experts; b: Probability of a cl	nance occurren	ice (P <sub>c</sub> ) = [N	N! / A! (N - A	!] x 0.5 <sup>ℕ</sup> whe	re N = num	ber of

experts and A = number of experts agreeing on good relevance of the item (rating 3 and 4); <sup>c</sup>: Modified kappa statistic for agreement on relevance ( $k^*$ ) = [I-CVI – P<sub>c</sub>] / [1 – P<sub>c</sub>]; d: evaluation criteria for kappa: fair: (0.40 -0.59), good (0.60 – 0.74); excellent: k > 0.74 [31].

Average scale content validity index (S-CVI<sub>Ave</sub>) = mean of I-CVI (87).

Appendix II: Final questionnaire (English translation; validated in Dutch)

PART 1: Personal info
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I live:	□ At home			
	In serviceflat			
My age is:	age is: Fill in your age			
	years			
My gender is:	Inder is: Indicate the correct option			
	🗅 Male			
	Female			
I live in	Fill in your postal code			
My weight is (average):	Please fill in your weight:			
	kg			
My length is:	Please fill in your length			
	m			
SARC-F	1			
GFI				
Self-MNA				

# PART 2: Questions concerning (dis)incentives for an exercise program

In the following part you can find statements and questions concerning **your motivation or what can influence your motivation to participate in an exercise program**, as described in the box below. You can indicate in what extend you agree or disagree with the statements. Please indicate the option that describes your opinion the best in your current situation. You can opt for **strongly disagree**, **disagree**, **neutral**, **agree or strongly agree**. <u>Remark</u>: the questions assess your motivation, you are not expected to participate in the program.

The physical exercise intervention comprises <u>3 sessions/week of 30 minutes</u>. The participants perform exercises to <u>strengthen</u> the muscles, improve their balance and increase their flexibility. These exercises are personalized to each participant's abilities. Additionally, participants will <u>walk twice a</u> <u>week for 30 minutes</u>.

Intrapersonal factors

Performing exercise regularly, as described in the above physical exercise intervention:

Physical exercise can help me	Strongly	Disagree	Neutral	Agree	Strongly
to increase my lifespan	disagree				agree
					<b>_</b>
	<u>Character</u>	<b>D</b>	NL		
Physical exercise contributes to	Strongly	Disagree	Neutral	Agree	Strongly
Physical exercise can help me	Strongly	Disagree	Neutral	Agree	Strongly
to perform activities of daily	disagree	0		0	agree
living as long as possible					
Physical exercise can help me	Strongly	Disagree	Neutral	Agree	Strongly
to prevent falls	disagree	0		0	agree
Fear of falling prevents me to	Strongly	Disagree	Neutral	Agree	Strongly
do physical exercises	disagree	_		-	agree
Fear of injuries prevents me to	Strongly	Disagree	Neutral	Agree	Strongly
do physical exercises	disagree				agree
A lack of time prevents me to	Strongly	Disagree	Neutral	Agree	Strongly
do privsical exercises					
I would not participate in a	Strongly	Disagree	Neutral	Agree	Strongly
physical exercise program					agree
active enough	_	_	-	-	_
I consider myself physically able	Strongly	Disagree	Neutral	Agree	Strongly
to participate in a physical	disagree	_			agree
exercise program for multiple					
months					
Interpersonal factors					
It motivates me to participate ir	the exercise pro	ogram if:			
I can be motivated to do	Strongly	Disagree	Neutral	Agree	Strongly
physical exercises by my social	disagree	0		0	agree
environment					
(partner/family/friends)					
I am motivated to do physical	Strongly	Disagree	Neutral	Agree	Strongly
exercises when I have	disagree				agree
сопрану				<b>_</b>	<b>_</b>
My doctor can encourage me	Strongly	Disagree	Neutral	Agree	Strongly
to do physical exercises	aisagree				agree

The recommendation of a	Strongly	Disagree	Neutral	Agree	Strongly
paramedics (dietician,	disagree				agree
physiotherapist, nurse) can					
encourage me to do physical					
exercises				-	
I would be motivated to do	Strongly	Disagree	Neutral	Agree	Strongly
physical exercises when I	disagree				agree
would receive feedback on my					
Community-based factors					
					1
Facilities to perform physical	Strongly	Disagree	Neutral	Agree	Strongly
exercises (such as a park, the	disagree				agree
gym) would encourage me to					
be more physically active	Character 1	0	NL L L	<b>A</b>	Charact
Sidewalks or bicycle paths	Strongly	Disagree	Neutral	Agree	Strongly
near my nome would	disagree				agree
physically active					
I prefer the presence of an	Strongly	Disagree	Neutral	Agree	Strongly
instructor during a physical	disagree	Disagiee	Neutrai	Agree	agree
exercise session					
Format factor					
I profer to exercise in group	Strongly	Disagroo	Neutral	Agree	Strongly
i prefer to exercise in group	disagree	Disagiee	Neutrai	Agree	agree
I prefer to exercise at home	Strongly	Disagree	Neutral	Agree	Strongly
independently	disagree		_		agree
I prefer a combination of	Strongly	Disagree	Neutral	Agree	Strongly
exercises at group and at	disagree				agree
home (e.g., twice a week at					
home and once a week in					
group).					

How much money are you willing to spend on an exercise program per month (transportation/ equipment/ membership included)? Indicate the amount that is the closest related to your budget.

Only if it is free

Less than 10 euro/month

□ Between 10 and 20 euro/month

□ Between 20 and 30 euro/month

□ More than 30 euro/month

Are there other factors that are **<u>barriers</u>** for you to participate in an exercise program? If yes, which?

.....

Are there other factors that are **motivators** for you to participate in an exercise program? If yes, which?

.....

PART 3: Questions concerning (dis)incentives to take a nutritional supplement

In what follows, you can find questions concerning your intake of nutritional supplements.

What is a nutritional supplement? A nutritional supplement, or supplement, is a powder, liquid or tablet/capsule that is an addition to your normal nutritional intake. The supplement is a source of one or multiple vitamins, minerals or other nutrients that have an effect on the functioning of your body. <u>Examples</u> of nutritional supplements are vitamin D supplements such as D-cure and Steovit, examples of calcium supplements are Cacit, Calci-chew and Sandoz-calcium.

Nutritional supplements	
Do you take at least once a week a nutritional	Indicate the correct option
supplement?	🖵 Yes
	🖵 No
	If you have indicated 'No', please continue with
	question 6
Do you take a protein supplement (e.g., Protifar	Indicate the correct option
powder or Fortimel)?	Yes, multiple times a day
	🖵 Yes, daily
	Yes, but not daily
	Sometimes
	🗖 No
Did your doctor prescribed you a protein	Indicate the correct option
supplement at the moment?	🖵 Yes
	🖵 No
	If yes, how often do you need to take the
	supplement according to the prescription
	Monthly
	🖵 Weekly
	🖵 Daily
	Multiple times a day
	🖵 Other

Do you take a Vitamin D supplement ( <i>e.g., D-cure or Steovit</i> )?	Indicate the correct option <ul> <li>Yes, multiple times a day</li> <li>Yes, daily</li> <li>Yes, but not daily</li> <li>Sometimes</li> <li>No</li> </ul>
Did your doctor prescribed you a vitamineD supplement ( <i>e.g., D-cure of Steovit</i> )?	Indicate the correct option          Yes         No         If yes, how often do you need to take the supplement according to the prescription         Monthly         Weekly         Daily         Multiple times a day         Other, 2x/maand
Do you take a calcium supplement (e.g., Steovit, Cacit, Calci-chew or Sandoz calcium)?	Indicate the correct option <ul> <li>Yes, multiple times a day</li> <li>Yes, daily</li> <li>Yes, but not daily</li> <li>Sometimes</li> <li>No</li> </ul>
Did your doctor prescribed you a calcium supplement (e.g., Steovit, Cacit, Calci-chew of Sandoz calcium)?	Indicate the correct option          Yes         No         If yes, how often do you need to take the supplement according to the prescription         Monthly         Weekly         Daily         Multiple times a day         Other: 2x/maand
Do you take at least once a week another than a protein, vitamin or calcium nutritional supplement?	Indicate the correct option  Image: Constant option  (Please fill in what supplement you take)  No

Do you consume at least weekly a nutritional	Indicate the correct option
component that is supplemented with extra	•
vitamins, minerals or proteins (e.g., cornflakes	(Please fill in what supplement you take)
with supplemental Iron)?	🖵 No

In the following part you can find statements and questions concerning **your motivation or what can influence your motivation to participate in a nutritional program**, as described in the box below. You can indicate in what extend you agree or disagree with the statements. Please indicate the option that describes your opinion the best in your current situation. You can opt for **strongly disagree**, **disagree**, **neutral**, **agree or strongly agree**. <u>Remark</u>: the questions assess your motivation, you are not expected to participate in the program.

In the nutritional program, participants take <u>protein supplements</u> <u>multiple times a day</u> (breakfast, lunch, before bedtime). Additionally, a <u>vitamin D and calcium supplement</u> will be taken <u>once daily</u>.

### Intrapersonal factors

1) A healthy eating pattern, if necessary supplemented with a nutritional supplement, as described in above nutritional program:

Eat healthy/take nutritional supplements can help me to	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
increase my lifespan	ŭ				ū
Eat healthy/take nutritional supplements contributes to	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
healthy ageing	ŭ				Ū
Eat healthy/take nutritional supplements can help to	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
performing activities of daily living as long as possible	ū				
Eat healthy/take nutritional supplements can help me to	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
prevent falls					
I do not want to take nutritional supplements because it has an	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
unpleasant taste					
I do not want to take nutritional	Strongly	Disagree	Neutral	Agree	Strongly
unnatural					

Interpersonal factors									
I would be motivated to participate to the nutritional program, if:									
I can be motivated to eat healthy/take nutritional	Strongly disagree	Disagree	Neutral	Agree	Strongly agree				
supplements by my social									
(partner/family/friends)									
I am motivated to eat healthy/take	Strongly	Disagree	Neutral	Agree	Strongly				
have company to follow the intervention together with me									
The recommendation of a doctor can encourage me to eat	Strongly disagree	Disagree	Neutral	Agree	Strongly agree				
healthy/take nutritional supplements									
The recommendation of a	Strongly	Disagree	Neutral	Agree	Strongly				
physiotherapist, nurse) can encourage me to eat healthy/take nutritional supplements									
The follow-up by a doctor can	Strongly	Disagree	Neutral	Agree	Strongly				
nutritional supplements									
Program format									
I'd like to take a nutritional supplem	nent in the form	n of:							
A powder (to dissolve in hot or	Strongly	Disagree	Neutral	Agree	Strongly				
cold drink)	disagree				agree				
A liquid (a drink) of 250 ml	Strongly	Disagree	Neutral	Agree	Strongly				
					agree				
A liquid (a drink) of 125 ml	Strongly	Disagree	Neutral	Agree	Strongly				
A concentrated liquid of 30 ml.	Strongly	Disagree	Neutral	Agree	Strongly				
This liquid call have a sour laste.									
A tablet/capsule	Strongly disagree	Disagree	Neutral	Agree	Strongly agree				

I'd like to follow a nutritional program whereby:							
I take the nutritional supplement	Strongly	Disagree	Ne				

I take the nutritional supplement spread during the day (at	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
breakfast, at lunch and before					
bedtime)					
I take the nutritional supplement	Strongly	Disagree	Neutral	Agree	Strongly
each time at the same moment in	disagree				agree
once (e.g., at breakfast)					

How much money are you willing to spend to a nutritional supplement per month? Indicate the amount that is the closest related to your budget.

- Only if it is free
- Less than 10 euro/month
- □ Between 10 and 20 euro/month
- □ Between 20 and 30 euro/month
- □ More than 30 euro/month

Are there other factors that are **<u>barriers</u>** for you to take nutritional supplements? If yes, which?

.....

Are there other factors that are **motivators** for you to take nutritional supplements? If yes, which?

### Appendix III: Factor analysis.

Factor/principal component analysis cannot cope with incomplete data and usually observations with missing values are left out of the analysis (a process called listwise deletion). Instead of listwise deletion of the observations with the missing value(s), which can result in bias, the multiple imputation method can be used to impute missing data [31]. The multiple imputation method imputes the dataset *k* times (20 times in this study), which results in *k* different, complete datasets. Complete datasets make listwise deletion redundant, which means that all the data of all participants can be used in the factor analysis. After imputation is each complete dataset analyzed by factor analysis and the results are combined in one final result.

Factor analysis is a data reduction method whereby items with similar content are collected in latent (unmeasured) grouping variables, so called 'factors'. The aim of a factor analysis is to describe the dataset with these over coupling concepts. The input for the factor analysis is a correlation matrix of all variables. In this study, polychoric correlations are used instead of Pearson correlations because these first are more accurate to use than the latter for variables measured using Likert scales. A polychoric correlation assumes that while the variables are measured on an ordinal scale (for example, a Likert scale), the underlying parameter is continuous and normally distributed.

As an output of the factor analysis, Cronbach's alpha (CA), explained variance and factor loadings are obtained. CA is a measure of reliability which measures whether the items measure the same concept. CA varies between 0 and 1 and higher numbers indicate higher reliability. Because there are 2-5 items per scale, CA's are given for the entire scale which result in lower values compared to CA's per factor. The explained variance is het proportion of the total variability in the data which can be explained by the chosen factor model. The primary factor loading indicates how strong an item 'loads' on that factor. The cross-loading indicates how strong that item loads on the other factors. As a rule of thumb, a primary factor loading should be above .5 for each item (preferable above .6), cross-loadings should preferable be under .3 and there should be a gap of at least .2 between the primary loading and the cross-loading. To achieve a simple factor structure and distinguish better between the factors, a rotation can be used. An orthogonal rotation assumes that the variables are unrelated. Since some of our factors are highly correlated, a non-orthogonal rotation was used (direct oblimin). Factor loadings of the 20 complete datasets cannot simply be averaged, since the order of the factors could be, and is, different in the 20 analyses due to differences in the completed datasets. This is because factors of a factor analysis are ordered based on the variance explained by the factor from high to low which can easily change over the

analyses. Therefore, matching factors were identified based on factor similarity using factor congruence. Congruence coefficients measure the similarity of two factors, but are not centered, in contrast to the Pearson correlation coefficient, since the mean has no meaning for factor loadings. The final factor loadings are the averaged factor loadings of matched factors. The factor labels are proposed by the researchers and describe in the best possible way the items which belong to that factor, guided by the items with the highest primary loadings.

## Appendix IV:

Descriptive statistics, factor loadings and Cronbach's alpha values based on factor analysis with oblimin rotation for the PE intervention scale and nutritional intervention scale (N = 114).

	Descriptive statistics						Factor analysis				
							Factor	oadings <sup>a</sup>		Cronbach's	
										alpha <sup>b</sup>	
Item	Mean	Median	SD	Kurtosis	Skew-	Intrinsic	Influence of	(Para)medi-	Fear of falling	Cronbach's	
					ness	health	significant	cal encoura-	or injuries	alpha value if	
						beliefs	others (and	gement		item deleted	
							environment)				
Physical exercise can help me to increase my lifespan	3.21	3.00	0.96	2.37	-1.46	0.91	-0.05	0.13	0.14	0.74	
Physical exercise contributes to healthy ageing	3.38	4.00	0.83	4.29	-1.83	0.92	-0.06	0.08	0.03	0.75	
Physical exercise can help me to perform activities of	2 50	4.00	0.70	F 04	2.14	0.92	0.02	0.01	0.21	0.76	
daily living as long as possible	3.50	3.50	4.00	0.79	5.94	-2.14	0.85	0.03	0.01	-0.21	0.76
Physical exercise can help me to prevent falls	2.94	3.00	1.00	0.35	-0.80	0.73	0.01	-0.03	-0.14	0.76	
I can be motivated to do physical exercises by my	2 20	2 30	2.00	1 10	0.65	0.25	0.22	0.69	0.20	0.22	0.74
social environment (partner/family/friends)	2.30	2.00	1.15	0.05	-0.55	0.33	0.05	-0.20	0.55	0.74	
I am motivated to do physical exercises when I have	2 51	3.00	1 24	-0 24	-0 77	0.04	0 58	0.25	0.06	0 74	
company	2.51	5.00	1.24	0.24	0.77	0.04	0.55	0.25	0.00	0.74	
Facilities to perform physical exercises (such as a											
park. the gym) would encourage me to be more	2.13	2.00	1.23	-0.64	-0.28	-0.05	0.78	0.11	0.11	0.73	
physically											
Sidewalks or bicycle paths near my home would	2.20	2.00	1.29	-0.77	-0.26	-0.09	0.73	0.05	0.03	0.75	
encourage me to be more physically active											
I prefer the presence of an instructor during a	2.23	2.00	1.22	-0.80	-0.32	-0.06	0.63	0.06	-0.28	0.76	
physical exercise session	2.25	2.00			0.02				0.20		
My doctor can encourage me to do physical	2.72	3.00	1.16	0.29	-0.91	0.00	0.03	0.90	0.11	0.74	
exercises											
The recommendation of a paramedics (dietician,											
physiotherapist, nurse) can encourage me to do	2.58	3.00	1.12	0.34	-0.71	0.06	-0.01	0.92	0.02	0.73	
physical exercises											

I would be motivated to do physical exercises when I would receive feedback on my performances	2.39	2.00	1.09	-0.06	-0.40	0.11	0.13	0.69	-0.09	0.74
Fear of falling prevents me to do physical exercises	1.03	0.00	1.31	-0.26	1.02	-0.07	-0.03	0.12	0.92	0.76
Fear of injuries prevents me to do physical exercises	0.91	0.00	1.14	-0.28	0.96	-0.15	0.09	-0.06	0.90	0.77
Eat healthy/take nutritional supplements can help me to increase my lifespan	2.62	3.00	1.03	-0.44	-0.24	0.92	0.00	0.05		0.75
Eat healthy/take nutritional supplements contributes to healthy ageing	2.81	3.00	1.00	-0.32	-0.48	0.93	-0.02	0.00		0.76
Eat healthy/take nutritional supplements can help to performing activities of daily living as long as possible	2.73	3.00	1.02	-0.17	-0.51	0.92	0.06	0.07		0.75
Eat healthy/take nutritional supplements can help me to prevent falls	2.20	2.00	1.10	0.10	-0.07	0.70	0.14	-0.04		0.77
I do not want to take nutritional supplements because I think it is unnatural	2.49	2.27	1.20	-0.47	-0.42	0.58	-0.11	-0.02		0.79
I can be motivated to eat healthy/take nutritional supplements by my social environment (partner/family/friends)	1.82	2.00	1.16	-0.74	-0.06	0.06	0.91	0.01		0.79
I am motivated to eat healthy/take nutritional supplements when I have company to follow the intervention together with me	1.56	2.00	1.05	-0.63	-0.06	-0.01	0.91	0.05		0.79
The recommendation of a doctor can encourage me to eat healthy/take nutritional supplements	3.01	3.00	0.95	1.62	-1.14	0.17	-0.18	0.95		0.76
The recommendation of a paramedics (dietician. physiotherapist. nurse) can encourage me to eat healthy/take nutritional supplements	2.60	3.00	1.06	0.24	-0.67	-0.09	0.15	0.88		0.77
The follow-up by a doctor can encourage me to eat healthy/take nutritional supplements	2.94	3.00	1.02	1.02	-1.01	-0.05	0.07	0.92		0.77

<sup>a</sup> factor loadings: **bold**: primary factor loadings indicating how strong an item 'loads' on that factor; not bold: cross-loadings indicating how strong

that item loads on the other factors;

<sup>b</sup> Cronbach's alpha is a measure of reliability which measures whether the items measure the same concept. Cronbach's alpha varies between 0

and 1 and higher numbers indicate higher reliability.