

Table S1. Mapping of the Behavior Change Wheel components of behavior change to the domains of the Theoretical Domains Framework

BCW component	TDF domain
Capability	Knowledge
	Skills
	Memory, Attention and Decision
	Processes
	Behavioural Regulation
Motivation	Social/Professional Role & Identity
	Beliefs about Capabilities
	Optimism
	Beliefs about Consequences
	Reinforcement
	Intentions
	Goals
Opportunity	Emotion
	Environmental Context and Resources
	Social Influences

Table S2. Doctors' and nurses' views on barriers to implementing alcohol screening and brief interventions at the baseline.

BCW Component	TDF Domain	Construct	Item	Intervention N=82	Control N=82
Capability	D1 Knowledge	Knowledge	I know the content and objectives of the guideline on alcohol screening and brief intervention	3.7±1.4	3.6±1.4
		Procedural knowledge	I know how to screen for alcohol misuse and how to deliver a brief intervention	3.7±1.5	3.5±1.2
	D2 Skills	Skills	I have been trained how to screen for alcohol misuse and how to deliver a brief intervention	2.9±1.6	2.5±1.5
			I have the skills to screen for alcohol misuse and to deliver a brief intervention	3.4±1.4	3.2±1.2
Motivation	D3 Social/professional role and identity	Professional role	Screening and advising for alcohol misuse is part of my work as a doctor/nurse	5.5±1.0	5.3±1.0
			It is my responsibility as a doctor/nurse to screen and advise for alcohol misuse	5.5±1.0	5.3±1.0
	D4 Beliefs about capabilities	Self-efficacy	I am confident that I can screen and advise for alcohol misuse even when the patient is not motivated	4.3±1.3	4.3±1.0
			I am confident that I can screen and advise for alcohol misuse even when there is little time	3.7±1.5	4.0±1.1
		Perceived behavioral control	For me, screening and advising for alcohol misuse is difficult	4.5±1.0	4.6±1.0
	D5 Optimism	Optimism	With regard to screening and advising for alcohol misuse I am always optimistic about the future	3.8±1.1	3.9±0.9
			With regard to screening and advising for alcohol misuse overall, I expect more good things to happen than bad	4.1±1.0	4.2±1.0
	D6 Beliefs about consequences	Outcome expectancies	If I screen and advise for alcohol misuse it will benefit public health	5.8±1.1	5.8±1.0
			If I screen and advise for alcohol misuse it will have disadvantages for my relationship with the patient	3.0±1.1	2.9±1.1

BCW Component	TDF Domain	Construct	Item	Intervention N=82	Control N=82
Motivation	D7 Reinforcement	Reinforcement	Whenever I screen and advise for alcohol misuse, I feel like I am making a difference	4.9±1.1	5.0±0.9
			Whenever I screen and advise for alcohol misuse, I get recognition from professionals who are important to me	4.0±1.0	4.2±0.8
	D8 Intention	Intention	I intend to screen and advise for alcohol misuse in the next appointment	4.6±1.1	4.6±0.8
			I will definitely screen and advise for alcohol misuse in the next appointment	4.4±1.0	4.4±0.8
	D9 Goals	Action planning	I have a clear plan how often I will screen and advise for alcohol misuse	3.7±1.0	3.6±0.8
		Priority	Generally, I am more pressured to cover something else than to screen and advise for alcohol misuse	5.0±1.3	4.9±1.2
Capability	D10 Memory, attention and decision processes	Memory	Screening and advising for alcohol misuse is difficult to remember	3.7±1.1	3.7±1.2
			I often need to check the guideline on alcohol screening and brief intervention before screening and advising for alcohol misuse	4.4±1.2	4.3±1.1
Opportunity	D11 Environmental context and resources	Resources/material resources	Screening and advising for alcohol misuse has a good fit with routine practice	4.3±1.3	3.9±1.0
			In the organization I work screening and advising for alcohol misuse is routine	3.7±1.4	3.5±1.0
			In the organization I work there is enough time to screen and advise for alcohol misuse	2.9±1.2	2.8±1.1
			In the organization I work I have the tools to screen and advise for alcohol misuse	3.6±1.2	3.5±1.2
			In the organization I work I have a working network for referring patients with alcohol dependence	3.7±1.4	3.8±1.5

BCW Component	TDF Domain	Construct	Item	Intervention N=82	Control N=82
Opportunity	D12 Social influences	Social support	I can rely on a dedicated team of professionals when things get tough when screening and advising for alcohol misuse	3.7±1.3	3.6±1.3
			I can rely on my colleagues when things get tough when screening and advising for alcohol misuse	4.1±1.2	4.1±1.1
Motivation	D13 Emotion	Affect	I feel nervous when screening and advising for alcohol misuse	3.3±1.2	3.4±1.2
Capability	D14 Behavioral regulation	Automaticity	Screening and advising for alcohol misuse is something I do automatically	3.4±1.4	3.5±1.1
		Self-monitoring	I tend to notice my successes while working towards screening and advising for alcohol misuse	4.5±0.9	4.3±0.9
		Action planning	I have a clear plan when I will screen and advise for alcohol misuse	3.3±1.3	3.3±0.9
			I have a clear plan of how I will screen and advise for alcohol misuse	3.2±1.2	3.3±0.9

Table S3. Doctors’ and nurses’ views on barriers to implementing alcohol screening and brief interventions at the baseline and 12-month follow-up (intervention arm).

BCW	TDF							
Component	Domain	Construct	Item	Baseline	Follow-up	p	d	BF
Capability	D1 Knowledge	Knowledge	I know the content and objectives of the guideline on alcohol screening and brief intervention	3.7±1.4	5.3±0.9	<0.001	1.28	>100
		Procedural knowledge	I know how to screen for alcohol misuse and how to deliver a brief intervention	3.7±1.5	5.4±0.9	<0.001	1.36	>100
	D2 Skills	Skills	I have been trained on how to screen for alcohol misuse and how to deliver a brief intervention	2.9±1.7	5.1±1.6	<0.001	1.33	>100
			I have the skills to screen for alcohol misuse and to deliver a brief intervention	3.3±1.3	5.1±1.0	<0.001	1.46	>100

Motivation	D3	Professional	Screening and					
	Social/ professional role and identity	role	advising for alcohol					
			misuse are part of	5.5±1.0	5.8±0.9	0.01	0.29	2.8
			my work as a					
			doctor/nurse					
			It is my					
		responsibility as a						
		doctor/nurse to	5.6±1.0	5.8±0.9	0.02	0.26	1.5	
		screen and advise						
		for alcohol misuse						
	D4	Self-efficacy	I am confident that I					
	Beliefs about capabilities		can screen and					
			advise for alcohol	4.3±1.3	4.9±1.3	<0.001	0.40	32.8
			misuse even when					
			the patient is not					
			motivated					
			I am confident that I					
			can screen and					
			advise for alcohol	3.7±1.5	4.7±1.1	<0.001	0.77	>100
			misuse even when					
			there is little time					
		Perceived	For me, screening					
		behavioural	and advising for	4.5±1.0	3.6±1.2	<0.001	0.66	>100
		control	alcohol misuse is					
			difficult					

	D5	Optimism	With regard to screening and advising for alcohol misuse I am always optimistic about the future	3.8±1.1	4.4±0.9	<0.001	0.46	>100
	Optimism		With regard to screening and advising for alcohol misuse overall, I expect more good things to happen than bad	4.1±1.0	4.5±0.9	0.002	0.36	12.0
	D6	Outcome	If I screen and advise for alcohol misuse it will benefit public health	5.8±1.2	6.1±1.0	0.009	0.30	3.5
	Beliefs about consequences	expectancies	If I screen and advise for alcohol misuse it will have disadvantages for my relationship with the patient	3.0±1.1	2.9±1.4	0.89	0.02	0.13
Motivation	D7	Reinforcement	Whenever I screen and advise for alcohol misuse, I feel like I am making a difference	4.9±1.2	5.4±1.0	<0.001	0.42	51.9

		Whenever I screen and advise for alcohol misuse, I get recognition from professionals who are important to me	4.0±1.0	4.4±1.0	0.007	0.31	4.2
D8	Intention	I intend to screen and advise for alcohol misuse in the next appointment	4.7±1.1	5.2±0.9	<0.001	0.49	>100
		I will definitely screen and advise for alcohol misuse in the next appointment	4.4±1.0	4.9±1.1	<0.001	0.46	>100
D9	Action	I have a clear plan of how often I will screen and advise for alcohol misuse	3.7±1.0	4.2±1.0	<0.001	0.49	>100
Goals	Priority	Generally, I am more pressured to cover something else than to screen and advise for alcohol misuse	5.0±1.4	5.1±1.3	0.50	0.07	0.16

Capability	D10	Memory	Screening and advising for alcohol misuse are difficult to remember	3.7±1.1	3.4±1.1	0.07	0.21	0.63
	Memory, attention and decision processes		I often need to check the guideline on alcohol screening and brief intervention before screening and advising for alcohol misuse	4.4±1.2	3.6±1.1	<0.001	0.68	>100
Opportunity	D11	Resources/ material resources	Screening and advising for alcohol misuse have a good fit with routine practice	4.2±1.3	4.4±1.1	0.17	0.16	0.31
	Environmental context and resources		In the organization I work screening and advising for alcohol misuse is routine	3.7±1.4	4.3±1.2	0.001	0.38	18.4
			In the organization I work there is enough time to screen and advise for alcohol misuse	3.0±1.2	3.4±1.3	0.008	0.31	3.88

			In the organization I work I have the tools to screen and advise for alcohol misuse	3.7±1.2	5.1±1.0	<0.001	1.13	>100
			In the organization I work I have a working network for referring patients with alcohol dependence	3.7±1.4	4.8±1.1	<0.001	0.75	>100
Opportunity	D12	Social support	I can rely on a dedicated team of professionals when things get tough when screening and advising for alcohol misuse	3.7±1.4	4.7±1.3	<0.001	0.67	>100
			I can rely on my colleagues when things get tough when screening and advising for alcohol misuse	4.1±1.2	4.8±1.1	<0.001	0.51	>100

Table S4. Doctors’ and nurses’ views on barriers to implementing alcohol screening and brief interventions at the baseline and 12-month follow-up (control arm).

BCW	TDF							
Component	Domain	Construct	Item	Baseline	Follow-up	p	d	BF
Capability	D1 Knowledge	Knowledge	I know the content and objectives of the guideline on alcohol screening and brief intervention	3.6±1.4	4.1±1.4	<0.001	0.39	33.8
		Procedural knowledge	I know how to screen for alcohol misuse and how to deliver a brief intervention	3.5±1.2	4.3±1.2	<0.001	0.71	>100
	D2 Skills	Skills	I have been trained on how to screen for alcohol misuse and how to deliver a brief intervention	2.5±1.5	3.3±1.7	<0.001	0.62	>100

			I have the skills to screen for alcohol misuse and to deliver a brief intervention	3.2±1.2	3.7±1.3	<0.001	0.43	>100
Motivation	D3	Professional role	Screening and advising for alcohol misuse are part of my work as a doctor/nurse	5.3±1.0	5.1±0.9	0.15	-0.16	0.34
	Social/professional role and identity		It is my responsibility as a doctor/nurse to screen and advise for alcohol misuse	5.3±1.0	5.2±1.0	0.53	-0.07	0.15
	D4	Self-efficacy	I am confident that I can screen and advise for alcohol misuse even when the patient is not motivated	4.3±1.0	4.5±1.0	0.17	0.15	0.31
	Beliefs about capabilities		I am confident that I can screen and advise for alcohol misuse even when there is little time	4.0±1.1	4.1±1.2	0.81	0.03	0.13

	Perceived behavioural control	For me, screening and advising for alcohol misuse is difficult	4.6±1.0	4.4±1.1	0.16	-0.16	0.32
D5	Optimism	With regard to screening and advising for alcohol misuse I am always optimistic about the future	3.9±0.9	4.1±1.0	0.14	0.17	0.36
		With regard to screening and advising for alcohol misuse overall, I expect more good things to happen than bad	4.2±1.0	4.4±0.9	0.15	0.16	0.34
D6	Outcome expectancies	If I screen and advise for alcohol misuse it will benefit public health	5.8±1.0	5.7±0.9	0.10	-0.18	0.45

			<div> <div>If I screen and advise for alcohol misuse it will have disadvantages for my relationship with the patient</div> <div>2.9±1.1</div> <div>2.8±1.1</div> <div>0.41</div> <div>-0.09</div> <div>0.17</div> </div>
Motivation	<div>D7</div> <div>Reinforcement</div>	Reinforcement	<div> <div>Whenever I screen and advise for alcohol misuse, I feel like I am making a difference</div> <div>5.0±0.9</div> <div>4.9±1.1</div> <div>0.40</div> <div>-0.09</div> <div>0.17</div> </div> <div> <div>Whenever I screen and advise for alcohol misuse, I get recognition from professionals who are important to me</div> <div>4.2±0.8</div> <div>4.2±1.0</div> <div>1.00</div> <div>0.00</div> <div>0.12</div> </div>
	<div>D8</div> <div>Intention</div>	Intention	<div> <div>I intend to screen and advise for alcohol misuse in the next appointment</div> <div>4.6±0.8</div> <div>4.7±1.0</div> <div>0.74</div> <div>0.04</div> <div>0.13</div> </div>

			I will definitely screen and advise for alcohol misuse in the next appointment	4.4±0.8	4.4±1.0	0.92	-0.01	0.12
	D9	Action	I have a clear plan					
	Goals	planning	of how often I will screen and advise for alcohol misuse	3.6±0.8	3.9±1.0	0.02	0.26	1.71
		Priority	Generally, I am more pressured to cover something else than to screen and advise for alcohol misuse	4.9±1.2	5.0±1.3	0.46	0.08	0.16
Capability	D10	Memory	Screening and advising for alcohol misuse are difficult to remember	3.7±1.2	3.8±1.2	0.35	0.10	0.18

			and decision processes	I often need to check the guideline on alcohol screening and brief intervention before screening and advising for alcohol misuse	4.3±1.1	4.2±1.2	0.74	-0.04	0.13
Opportunity	D11	Resources/ material resources	Screening and advising for alcohol misuse have a good fit with routine practice		3.9±1.0	3.9±0.9	0.55	0.07	0.14
			In the organization I work screening and advising for alcohol misuse is routine		3.5±1.0	3.8±1.1	0.02	0.26	1.55
			In the organization I work there is enough time to screen and advise for alcohol misuse		2.8±1.1	3.0±1.2	0.28	0.12	0.22

			In the organization					
			I work I have the					
			tools to screen and	3.5±1.2	3.7±1.1	0.14	0.17	0.36
			advise for alcohol					
			misuse					
			In the organization					
			I work I have a					
			working network					
			for referring	3.8±1.5	4.0±1.2	0.17	0.15	0.30
			patients with					
			alcohol					
			dependence					
Opportunity	D12	Social support	I can rely on a					
	Social		dedicated team of					
	influences		professionals					
			when things get	3.6±1.3	4.0±1.2	0.02	0.26	1.72
			tough when					
			screening and					
			advising for					
			alcohol misuse					
			I can rely on my					
			colleagues when					
			things get tough	4.1±1.1	4.4±1.1	0.01	0.29	3.22
			when screening					
			and advising for					
			alcohol misuse					

Motivation	D13	Affect	I feel nervous when screening and advising for alcohol misuse	3.4±1.2	3.4±1.2	0.62	-0.06	0.14
Capability	D14	Automaticity	Screening and advising for alcohol misuse is something I do automatically	3.5±1.1	3.8±1.1	0.07	0.20	0.61
		Self-monitoring	I tend to notice my successes while working towards screening and advising for alcohol misuse	4.3±0.9	4.5±1.0	0.25	0.13	0.23
		Action planning	I have a clear plan when I will screen and advise for alcohol misuse	3.3±0.9	3.5±0.9	0.04	0.23	0.97
			I have a clear plan of how I will screen and advise for alcohol misuse	3.3±0.9	3.5±1.1	0.10	0.18	0.45

Table S5 – Distribution of doctors’ and nurses’ correct responses to each of the questions of the knowledge section of the questionnaire

Question	Baseline		12-month follow-up	
	Intervention (N=82)	Control (N=82)	Intervention (N=78)	Control (N=82)
1	39 (47.6)	25 (30.5)	50 (64.1)	36 (43.9)
2	28 (34.1)	19 (23.2)	33 (42.3)	26 (31.7)
3	10 (12.2)	6 (7.3)	32 (41.0)	14 (17.1)
4.1	14 (17.1)	12 (14.6)	38 (48.7)	18 (22.0)
4.2	28 (34.1)	28 (34.1)	37 (47.4)	36 (43.9)
4.3	17 (20.7)	16 (19.5)	38 (48.7)	20 (24.4)
4.4	15 (18.3)	9 (11.0)	51 (65.4)	11 (13.4)
4.5	9 (11.0)	15 (18.3)	36 (46.2)	19 (23.2)

Values are N (%)

Question 1 – How many grams of pure alcohol are in a standard drink?

- a. 10 grams
- b. 12 grams
- c. 14 grams
- d. 18 grams
- e. 20 grams

Question 2 – From what daily number of standard drinks would you start advising a healthy computer programmer 45-year-old male to cut-down?

- a. 2 standard drinks
- b. 3 standard drinks
- c. 4 standard drinks
- d. 6 standard drinks
- e. 9 standard drinks

Question 3 – Which of the following is true in respect to the AUDIT questionnaire (based on the Portuguese guidelines):

- a. A man scoring 5 points on the AUDIT-C should be screened again in four years time
- b. A woman scoring 2 points on the AUDIT-C should be asked the full AUDIT questionnaire
- c. A man scoring 18 points on the full AUDIT should be diagnosed as person with a dependence on alcohol
- d. A woman scoring 14 points on the full AUDIT is considered to have a hazardous alcohol use
- e. A man scoring 23 points on full AUDIT is considered to have a harmful alcohol use

Question 4 – According to the Portuguese guidelines, and for each of the following scenarios, please indicate whether it is true or false that a brief intervention should be delivered by a primary healthcare provider:

- 4.1 A 33-year-old man scoring 29 points on the full AUDIT
- 4.2 A 69-year-old woman scoring 6 points on the full AUDIT
- 4.3 A 57-year-old man scoring 16 points on the full AUDIT
- 4.4 A 44-year-old woman scoring 8 points on the full AUDIT
- 4.5 A 74-year-old man scoring 18 points on the full AUDIT