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Risk of dependence associated with health, social support, and lifestyle

Riesgo de dependencia asociado a la salud, el apoyo social y el estilo de vida

ABSTRACT

OBJECTIVE: To analyze the prevalence of individuals at risk of dependence and its associated factors.

METHODS: The study was based on data from the Catalan Health Survey, Spain conducted in 2010 and 2011. Logistic regression models from a random sample of 3,842 individuals aged ≥ 15 years were used to classify individuals according to the state of their personal autonomy. Predictive models were proposed to identify indicators that helped distinguish dependent individuals from those at risk of dependence. Variables on health status, social support, and lifestyles were considered.

RESULTS: We found that 18.6% of the population presented a risk of dependence, especially after age 65. Compared with this group, individuals who reported dependence (11.0%) had difficulties performing activities of daily living and had to receive support to perform them. Habits such as smoking, excessive alcohol consumption, and being sedentary were associated with a higher probability of dependence, particularly for women.

CONCLUSIONS: Difficulties in carrying out activities of daily living precede the onset of dependence. Preserving personal autonomy and function without receiving support appear to be a preventive factor. Adopting an active and healthy lifestyle helps reduce the risk of dependence.

DESCRIPTORS: Dependence. Risk Factors. Personal Autonomy. Lifestyle. Activities of Daily Living. Aging. Logistic Models.

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RESUMEN

OBJETIVO: Analizar la prevalencia de personas en riesgo de dependencia y los factores asociados.

MÉTODOS: El estudio se basó en datos de la Encuesta de Salud de Cataluña, España, realizada de 2010 a 2011. A partir de una muestra aleatoria de 3.842 individuos, de 15 años o más, se llevaron a cabo modelos de regresión logística para clasificar a los individuos según el estado de su autonomía personal. Se plantearon modelos predictivos para identificar las variables susceptibles de intervención que permitieran distinguir a los individuos dependientes de aquellos en riesgo. Se consideraron variables acerca del estado de salud, apoyo social y estilos de vida.

RESULTADOS: El 18,6% de la población presentó riesgo de dependencia, con efecto más acusado a partir de los 65 años. En comparación con este colectivo, los individuos que se declararon dependientes (11,0%) manifestaron problemas para realizar las actividades cotidianas y obtuvieron apoyo para ello. Estilos de vida, como fumar, consumir alcohol en exceso y ser sedentario se asociaron con mayor probabilidad de dependencia, en particular para las mujeres.

CONCLUSIONES: Las dificultades para llevar a cabo las actividades cotidianas preceden a la aparición de dependencia. Preservar la propia autonomía y desenvolverse sin recibir apoyo aparecen como factores protectores. La adopción de un estilo de vida activo y saludable contribuye a reducir el riesgo de dependencia.

DESCRIPTORES: Dependencia. Factores de Riesgo. Autonomía Personal. Estilo de Vida. Actividades Cotidianas. Envejecimiento. Modelos Logísticos.

INTRODUCTION

The population of Catalonia (Spain) has one of the world's highest life expectancies. Due to the increase in longevity, the percentage of older population in Catalonia is higher than that in many other countries.[20] Catalonia had a population of almost 7.6 million people in 2011, of which 17.0% were aged ≥ 65 years, and 2.5% were aged ≥ 85 years.[a] Improvements in longevity should be accompanied by an increase in the quality of life of older adults. However, the number of individuals suffering from chronic diseases, disabilities, and functional limitations, resulting in dependence, has increased in absolute terms in recent decades.[1,18] In addition, an increase in life expectancy[22] significantly impacts the planning of health services and contributes to socioeconomic costs, because of the need of long-term care.[9,19] An in-depth analysis of the situation may reveal the trends that present a highly complex phenomenon such as aging and its relationship with the health. However, there is scant information available regarding the connection between the disorders that affect personal autonomy with health status, use of healthcare services, and different lifestyles. This knowledge is essential to anticipate and plan optimal social and health responses to allow an increase in the quality of life along with longevity.

This study aims to analyze the prevalence of individuals at risk of dependence and its associated factors.

The number of dependent individuals in the resident population of Catalonia in the 2010-2011 period was described, and the variables associated with the lack of personal autonomy were identified. Individuals with a high probability of having their abilities reduced to the point of needing help and support from others to carry out their daily routine were also identified. Using logistic regression models, some variables were determined to distinguish dependent individuals from those who are at risk of dependence. Such variables are predictive and modifiable indicators that can be changed by social and healthcare intervention and preventive actions. Their control can delay or prevent the need of receiving support and care.

METHODS

The data used in this study is from the 2010-2011 Catalan Health Survey (ESCA).[b] This is an official semi-annual survey which is included in the current Catalan Statistical Plan[c] and satisfies all principles of the European Code of Good Practices in Statistics.[d] In each sampling round, we selected aproximately 2,500 individuals who resided in Catalonia and were not institutionalized. They were interviewed using a computer-assisted structured questionnaire. Interviews were personal; if the person was unable to answer because of age or disability, an indirect informer gave the answers.

Data for the ESCA survey was collected beginning from the second half of 2010. The interviews conducted during that period, as well as those made in the first half of 2011, resulted in a sample of 4,873 individuals. This sample included 3,842 individuals (1,918 men and 1,924 women) aged ≥ 15 years, of whom 913 were aged over 65 years. A total of 2.9% of the answers came by means of an indirect informer. The basic set of questions were regarding health status, use of healthcare services, medication, healthy habits, and activity limitations, while also establishing the population's sociodemographic profile. In the complementary modules used in the two aforementioned semesters, particular attention was given to issues associated with older individuals, their personal autonomy, and the social support they receive.

In recent years, there has been an effort in Europe to unify health-related vocabulary and to precisely define concepts related to health and personal autonomy. The definitions used in this study were based on the recommendations from the Council of Europe[e] and the World Health Organization.[f]

Dependence is the permanent state of individuals who, due to age, illness, or disability, associated with the lack or loss of physical, mental, intellectual, or sensorial autonomy, need attention or significant help and support from others to perform activities of daily living. Autonomy is the ability to control, cope, and take voluntary personal decisions about how to live according to one's own norms and preferences, as well as to perform the basic activities of daily living. An accidental lesion may cause one to suddenly lose their personal autonomy, although that loss is normally gradual. Here, we treat "dependent population" and "population with loss of personal autonomy" as synonyms.

ESCA evaluates the lack of personal autonomy based on the individual's perception (or that of the indirect informer) about the severity of his or her limitations or the amount of help required. The survey asks whether "because of a health problem, the individual needs the help or company of others to perform the usual activities of daily living", either regularly or occasionally. The person is considered dependent if the answer is positive. Epidemiological and clinical studies use similar subjective dependence ratings,[13] as large discrepancies do not seem to exist between one's self-perception of the need for care and the objective situation.[14]

Any statistical analysis based on primary ESCA data must consider its complex sampling design. This implies the need of the following: (i) using sampling weights that assign to each individual the appropriate weight in the population, according to their sex, age group, and health district and (ii) considering the combination of strata and clusters when calculating the standard deviations of the estimators.[2,8] The SURVEYFREQ procedure of SAS 9.2. (SAS Institute Inc., 2009) was used.

The population at risk of dependence was detected and characterized (Figure). After analyzing the prevalence of dependence for the variables included in the study (Table 1), a binary logistic regression model was proposed for each sex (Figure, Model 1). That model explains the presence or absence of dependence in the Catalan population which was aged ≥ 15 years. The included explanatory variables were as follows: age group (15 to 44 years, 45 to 64 years, 65 to 74 years, 75 to 84 years, and ≥ 85 years), education level (elementary or none, secondary school, and higher education), visit to emergency services (having been treated at an emergency department up to a year before the interview), hospitalization (having been hospitalized at least once in the 12 months prior to the interview), and use of medication (having taken any medication in the days immediately before the interview).

Model 1 allows the classification of individuals according to the probability of them losing personal autonomy. If that probability is greater than a certain threshold, the model establishes that the individual is dependent. In order to obtain the correct classification, the cut-off point that maximized the Youden index was established, i.e., the sum of the model's sensitivity and specificity, minus one unit.[16] This value minimizes the number of both false positives and false negatives, while also maximizing the area under the ROC

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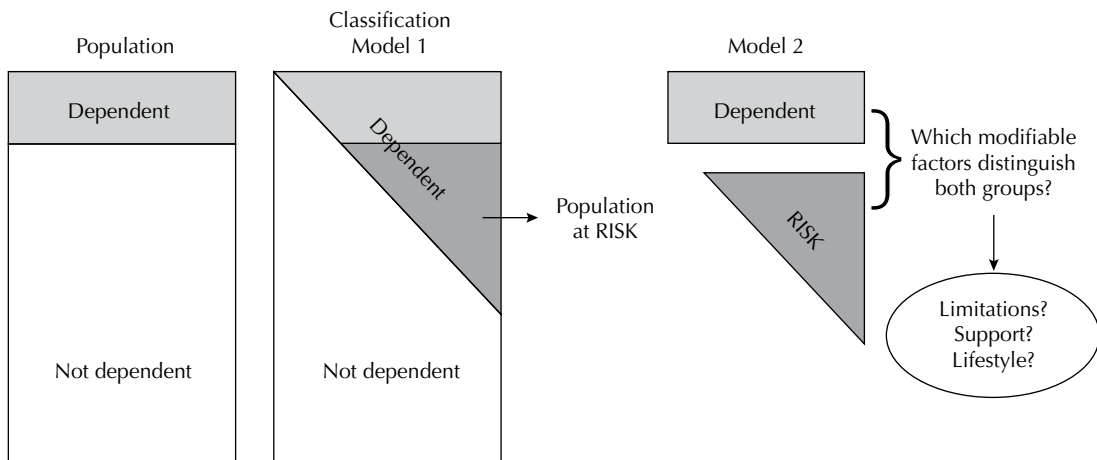
Figure. Detection and characterization of the population at risk of dependence. Catalonia, Spain, 2010 to 2011.

Table 1. Prevalence of dependence by sex. Catalonia, Spain, 2010 to 2011.

Variable	Men		Women	
	Prevalence	95%CI	Prevalence	95%CI
Dependent	7.7	6.6;8.9	14.1	12.3;15.8
Age group (years)				
15 to 44	4.2	2.9;5.5	3.8	2.3;5.4
45 to 64	6.4	4.4;8.5	11.2	8.3;14.2
65 to 74	10.2	5.6;14.7	21.2	15.2;27.1
75 to 84	26.9	18.8;35.0	45.5	37.0;53.9
85 and older	59.8	49.7;69.9	76.9	69.2;84.5
Education level				
Elementary or no education	17.6	14.2;21.0	30.5	26.8;34.2
Secondary school	4.9	3.6;6.2	8.2	6.3;10.0
University education	4.5	2.1;6.9	5.9	3.2;8.6
Use of healthcare services				
Emergency care				
Yes	11.0	8.5;13.6	20.0	16.9;23.1
No	6.3	5.1;7.5	10.6	9.0;12.3
Hospitalization				
Yes	27.4	20.2;34.6	28.0	22.5;33.5
No	6.1	5.0;7.2	12.5	10.8;14.3
Use of medication				
Yes	11.5	9.7;13.3	17.8	15.7;20.0
No	3.0	1.8;4.2	2.2	0.8;3.5
EQ-5D dimensions				
Walking problems				
Some/Many problems	43.3	36.4;50.1	57.9	52.9;62.9
No problems	3.4	2.6;4.3	4.5	3.3;5.6
Problems washing/Dressing				
Some/Many problems	80.5	71.6;89.3	85.1	80.4;89.8
No problems	4.8	3.8;5.7	8.9	7.4;10.3

Continue

Continuation

Problems in activities of daily living				
Some/Many problems	63.2	56.0;70.4	72.5	66.9;78.0
No problems	3.1	2.3;4.0	4.7	3.5;5.8
Pain or discomfort				
Moderate/Intense	21.1	17.4;24.9	30.0	26.6;33.4
None	3.8	2.9;4.8	3.4	2.5;4.4
Anxiety or depression				
Moderate/Intense	22.9	17.9;27.9	35.3	31.0;39.6
None	5.3	4.2;6.3	7.1	5.8;8.3
Self-evaluated chronic disorder				
Yes	15.6	12.7;18.5	28.8	25.5;32.1
No	3.8	2.8;4.8	4.0	2.9;5.1
Affective social support				
Low	27.1	14.7;39.5	23.4	14.4;32.4
Normal	7.2	6.1;8.3	13.7	12.0;15.4
Confidential social support				
Low	27.2	20.5;33.9	25.8	18.0;33.6
Normal	6.5	5.5;7.6	13.2	11.5;15.0
Support for activities of daily living				
Receive help	85.3	78.1;92.6	89.6	84.6;94.5
Do not receive/Do not need help	4.7	3.7;5.7	6.5	5.3;7.7
Risk factors				
Tobacco consumption				
Smoker	4.7	3.0;6.3	6.6	4.0;9.2
Ex-smoker/Non-smoker	7.4	5.9;8.9	13.9	11.9;15.9
Alcohol consumption				
Risk-level drinker	4.1	0.4;7.7	12.5	1.4;23.6
Non-drinker/Moderate	6.7	5.5;7.8	12.1	10.5;13.8
Sedentary lifestyle				
Yes	18.2	14.6;21.7	29.0	24.7;33.2
No	3.0	2.1;3.8	5.7	4.4;7.1
Sample size, N	1,918	–	1,924	–

Source: Catalan Health Survey (ESCA) 2010-2011. Population aged ≥ 15 years.
EQ-5D: European Quality of Life questionnaire (5 dimensions)

curve.[25] This ensures the greatest possible number of well-classified individuals. An individual is at risk if the model assigns them a probability of dependence which is > 9.0% for men and > 13.0% for women. Using this classification, one can conservatively quantify the population which shares relevant characteristics with dependent individuals while still retaining personal autonomy (Figure), and therefore, is at risk of reaching a situation of dependence.

In order to identify which modifiable factors protect non-dependent individuals from the impairment of their functions, we applied a second logistic regression model in which the response variables do not reflect whether the individual is actually dependent or not, but if they are at risk of becoming so (Figure, Model 2). We distinguished two age groups for individuals aged under and over 65 years, which is the usual age of retirement from work in Spain. Aspects related to health status, social support, and lifestyle were incorporated as explanatory variables in Model 2: presence of problems during walking, washing or dressing oneself, or performing activities of daily living; feeling pain or discomfort or being anxious or depressed (dimensions from EQ-5D, a multidimensional

standardized tool that measures quality of life relative to health using the five variables mentioned above);[10,17] self-perception of any chronic disorder from a list of 33 possible ones; receiving affective social support – that is, being the object of expressions of love and empathy (score of a total of four variables from the Duke-UNC-11 questionnaire); receiving confidential social support, meaning having others to communicate with, receiving information and advice from, or share concerns with (seven variables);[5] receiving support in activities of daily living; alcohol consumption (risk-level drinker *versus* non-drinker or moderate drinker);[7] tobacco consumption (smoker *versus* ex-smoker or non-smoker); and sedentary lifestyle (sitting down most of the day, compared with having a minimum level of physical activity).

RESULTS

A total of 7.7% of men and 14.1% of women aged ≥ 15 years were declared to be dependent, because they needed help in their activities of daily living (Table 1). The percentage of dependent individuals increased rapidly with age, and the prevalence of dependent women was significantly higher than dependent men in the 65 to 84 years age range. Greater percentages of dependence were found in groups with less education, particularly women, except in the group with university education. Dependent individuals, especially women, needed emergency services more often than the non-dependent population. More than 27.0% of the hospitalized population was dependent, with no significant differences between sexes. Use of medication, limited mobility, pain, anxiety or depression, and the self-perception of having a chronic disorder were associated with dependence, particularly in women. When social support was low or when help was received for activities of daily living, propensity for dependence was higher in both sexes. Sedentary lifestyle was also associated with dependence (18.2% and 29.0% for men and women, respectively). The percentages of smokers and drinkers at risk levels among dependent individuals were lower than those in the general population.

Dependent individuals were older compared with non-dependent ones (odds ratio [OR] = 2.9 / OR = 12.7 and OR = 13.1 / OR = 55.4, respectively for men and women aged 75 to 84 years/≥ 85 years), had less education (OR = 0.5 for secondary and university level studies), had been hospitalized in the previous 12 months (OR = 3.5 for men and OR = 2.3 for women), and had taken medication in the previous two days (OR = 2.2 for men and OR = 3.5 for women) (Model 1; Table 2). The use of emergency services was significant only for women (OR = 2.2).

About 702,000 individuals aged ≥ 15 years in Catalonia were declared to be dependent in the 2010 to 2011 biennium (11.0% of the total population) (Table 3). Individuals who did not have loss of autonomy in spite of having been

Table 2. Logistic regression for the presence of dependence by sex (odds-ratios). Catalonia, Spain, 2010 to 2011.

Variable	Men	Women
Age group (years)		
15 to 44	–	–
45 to 64	1.1	3.0[a]
65 to 74	1.1	5.2[a]
75 to 84	2.9[a]	13.1[a]
85 and older	12.7[a]	55.4[a]
Education level		
Elementary and no education	–	–
Secondary	0.4[a]	0.6[b]
University education	0.3[a]	0.6[c]
Emergencies	1.2	2.2[a]
Hospitalization	3.5[a]	2.3[a]
Use of medication	2.2[a]	3.5[a]
N	1,917	1,923
LR p-value	< 0.001	< 0.001
% correct classification	80.9	83.3

Source: Catalan Health Survey, 2010-2011.
LR: likelihood ratio
OR significance: [a]1.0%; [b]5.0%; [c]10.0%.
(–) Reference category.

assigned a significant risk by the model, totaling almost 1.2 million (18.6% of the population), were those who were in danger of having their abilities impaired until losing personal autonomy, since they shared characteristics with the population that already needed help (Figure). On the other hand, more than 4.5 million individuals were neither dependent nor at risk for eing dependent.

The risk of dependence was greater for individuals aged > 65 years and those who had ended their professional life. A total of 55.7% of them shared characteristics with individuals who were already dependent. Differences between sexes were significant above 65 years of age: 40.0% of women and a little more than 20.0% of men declared to need help; 2.2% of women aged ≥ 65 years had no risk, *versus* 25.7% of men. The situation was more favorable for individuals aged < 65 years: 9.5% were at risk for dependence, whereas 5.8% declared to suffer from a lack of personal autonomy, without significant differences between men and women.

The variables from the EQ-5D questionnaire were associated with physical and mental deterioration. The presence of problems in walking was a distinguishing feature between individuals with established dependence and those who were at risk of becoming dependent. Such mobility problems appeared earlier in males (OR = 3.7; in males aged 15 to 64 years) than in females (OR = 2.9; starting at age 65). Men who declared to be dependent exhibited more problems washing and

Table 3. Estimated population (in thousands of individuals) according to the presence or risk of dependence by age groups and sex. Catalonia, Spain, 2010 to 2011.

Variable		Dependent		Not dependent but at risk		Not dependent and not at risk	
		N	%	N	%	N	%
15 to 64 years old	Men	131	5.0	275	10.4	2,225	84.6
	Women	166	6.6	217	8.6	2,144	84.8
	Total	297	5.8	492	9.5	4,369	84.7
≥ 65 years old	Men	114	21.4	282	52.9	137	25.7
	Women	291	40.0	420	57.8	16	2.2
	Total	405	32.1	702	55.7	153	12.2
Total	Men	245	7.7	557	17.6	2,362	74.7
	Women	457	14.1	637	19.6	2,160	66.4
	Total	702	11.0	1,194	18.6	4,522	70.4

Source: Catalan Health Survey (ESCA) 2010-2011. Population aged ≥ 15 years.
Percentages added up to 100% in each row.

dressing themselves (OR = 5.1; at age ≥ 65); there was no correlation for women.

Difficulties in performing activities of daily living significantly increased the probability of declaring themselves dependent (OR = 2.7 and OR = 3.2 for men and women, respectively), with a particularly high value for women aged between 15 and 64 years (OR = 6.9). The younger dependent population suffered more from pain or discomfort than the corresponding at-risk population (OR = 2.0 for men and OR = 2.4 for women), with no difference observed for older individuals. Only after age 65 did dependent women suffer more from anxiety or depression than the corresponding at-risk population (OR = 2.0).

The self-perception of chronic disorders was associated with dependence (OR = 2.7). Available affective social support correlated with dependence for both sexes. While dependent men received less expressions of love and empathy than men at risk (OR = 0.9), women received more (OR = 1.1), with no difference between age groups except for males aged 15 to 64 years (OR = 0.8). Confidential social support was a significant influence in older women, who received less support than the corresponding risk population (OR = 0.9). Receiving help in activities of daily living was strongly associated with consolidated situations of lack of personal autonomy in all age groups (OR = 11.7 for men and OR = 11.3 for women) (Model 2; Table 4).

The three risk factors considered – alcohol, tobacco, and sedentary lifestyle – were differential factors between the dependent population and the at-risk population, especially for females (OR = 2.2 for the smoking habit, OR = 12.2 for drinkers at risk, and OR = 3.4 for sedentary lifestyle). Women aged between 15 and 64 years showed an intense association between dependence and excessive alcohol consumption (OR = 24.4). No

significant differences were observed regarding tobacco or alcohol consumption among men. Dependent individuals were more often sedentary than the at-risk population aged between 15 and 64 years (OR = 1.9).

DISCUSSION

A significant percentage of the Catalan population aged ≥ 15 years is at risk for dependence, even if the need for help has not yet been manifested. This condition affects almost one-fifth of the population, whereas after the age of 65, 25.7% of men and 2.2% of women can be considered to be at a low risk of becoming dependent. Women are the group most vulnerable to aging, while also living longer, according to other studies.[24]

The condition of dependence is strongly associated with an increased use of healthcare services – visits to emergency services and hospitalizations – and to a high consumption of medication in both sexes, especially in women. Healthcare is public in Spain. In 2014, the Ministry of Health, Social Services, and Equality assigned 61.0% of its credit to the Program for Personal Autonomy and Care for Dependency.[g] Thus, the costs generated by healthcare, including those related to long-term care, represent a significant part of the Ministry's budget.

In men, dependence starts with problems in walking, pain or discomfort, low affective social support, and sedentary lifestyle. If this conjunction of factors is not detected and not changed in time, the individual at risk will undergo a progressive decline until losing their autonomy after the age of 65. The clinical evolution could include a greater difficulty in taking care of their personal hygiene and performing activities of daily living, a limitation that has been associated with a severe state of dependence.[11] In addition, they

Table 4. Logistic regression models to explain the differences between the population who declares itself dependent and its respective at-risk population (odds-ratios), by age groups and sex. Catalonia, Spain, 2010 to 2011.

Variable	15 to 64 years old		≥ 65 years old		Total	
	Men	Women	Men	Women	Men	Women
Problems						
Walking	3.7[b]	0.8	1.1	2.9[b]	1.3	1.3
Washing and dressing	2.0	0.2	5.1[b]	2.0	3.7[b]	1.2
Activities of daily living	0.6	6.9[a]	5.0[b]	2.0[c]	2.7[b]	3.2[a]
Pain or discomfort	2.0[c]	2.4[c]	0.7	1.2	1.2	1.6[c]
Anxiety or depression	1.4	1.4	1.7	2.0[c]	1.3	2.0[b]
Self-reported chronic disorder	1.2	0.8	2.7[c]	0.7	1.7[c]	0.8
Affective social support	0.8[b]	1.1	0.9	1.1	0.9[c]	1.1[c]
Confidential social support	1.1	1.0	0.9	0.9[b]	1.0	0.9[c]
Support for activities of daily living	—[d]	—[d]	14.5[a]	11.5[a]	11.7[a]	11.3[a]
Risk factors						
Smoking	0.6	1.7	0.7	1.8	1.0	2.2[b]
Alcohol consumption	0.6	24.4[a]	0.1	0.7	0.5	12.2[a]
Sedentary lifestyle	1.9[c]	2.0	1.3	5.1[a]	1.3	3.4[a]
N	250	233	307	413	557	646
LR p-value	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
% correct classification	82.2	83.2	91.6	84.9	86.1	83.8

Source: Catalan Health Survey (ESCA) 2010-2011. Population aged ≥ 15 years.
LR: likelihood ratio
OR significance: [a]1.0%; [b]5.0%; [c]10.0%.
[d] In the studied subsample, all dependent individuals and only those who receive support for activities of daily living.

are expected to suffer from more chronic illnesses and to need help from caregivers to perform their routine. Health professionals must carefully observe for symptoms that precede the onset of dependence. Improving the patient's mobility will be particularly important for them to be able to have a more active lifestyle. The possibility of moving without pain will also allow them to increase social interactions, seeking the affective support needed to feel well.

Likewise, problems in performing activities of daily living, like working or housekeeping, and pain or discomfort are factors for the early detection of risk for dependence in the female population. A very revealing item that is not observed in men is excessive alcohol consumption. Although moderate alcohol ingestion is beneficial for the cardiovascular system and cognitive functions in older individuals,[12] its consumption at risk levels is strongly associated with dependence among women aged between 15 to 64 years. Moderation in the consumption of alcoholic beverages may be a relevant factor to slow down the loss of personal autonomy. If the latter ends up manifesting itself, a dependent woman will show a significant impairment in her quality of life regarding health factors starting at age 65. She will also take up a sedentary lifestyle, which leads to muscular weakness in the legs and an increased risk of falls,[23] as well as a reduction in her mobility.[15] She will suffer from anxiety or depression. She will have a low frequency of social contacts and will need help from other people for attention and care.

No recent data are available about institutionalized individuals. This is an extremely vulnerable group, whose inclusion in the study would increase the prevalence of the studied disorders, particularly in older ages, as shown in the 2006 Catalan Survey of the Institutionalized Population (ESPI).[h] On the other hand, since no information about the severity of dependence is provided by the ESCA, this has not been taken into consideration, contrary to what has been undertaken by other authors,[3] based on more specific disabilities.

Despite these limitations, this study demonstrates the parameters that help identify risk factors to observe in order to delay the onset of dependence. Identifying

these early indications for each sex is essential to delay the functional decline[4] and the social deprivation suffered by individuals at risk.[21] Adequate planning of preventive strategies is an effective approach to preserve the health and autonomy of older adults,[6]

without incurring socio-health costs that would be difficult to overcome. Healthcare policies should be used as protective tools to facilitate and promote healthy aging with more years of enhanced quality of life for all population groups.

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