Juliana Lustosa Torres

# FATORES PSICOSSOCIAIS E FUNCIONALIDADE NO ENVELHECIMENTO: EVIDÊNCIAS DA COORTE DE BAMBUÍ E DO *ENGLISH LONGITUDINAL STUDY OF AGEING*

Universidade Federal de Minas Gerais
Programa de Pós-Graduação em Saúde Pública
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Tese apresentada ao Programa de Pós-Graduação em Saúde Pública da Faculdade de Medicina da Universidade Federal de Minas Gerais, como requisito parcial para obtenção do título de Doutor em Saúde Pública.

Orientadora: Profª. Drª. Maria Fernanda Furtado de Lima e Costa

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**“Alegria é ter alguém com quem compartilhar a vida.”**

Bárbara Flones

**RESUMO**

**Introdução:** Projeções da população mundial mostram que número de pessoas com 65 anos ou mais irá aumentar de 524 milhões em 2010 para aproximadamente 1,5 bilhões em 2050, sendo que o envelhecimento é associado com a incapacidade. Considerando que um dos objetivos das políticas públicas na área da saúde é a manutenção e melhora da funcionalidade da população, mais estudos sobre este tópico tornam-se necessários. A identificação de preditores sociais e biológicos da incapacidade tem o potencial de contribuir para a identificação de grupos vulneráveis tanto para prevenção quanto para a intervenção precoce. Dentre preditores sociais, a epidemiologia social aponta que os fatores psicossociais tem um impacto considerável na saúde da população.
**Objetivos:** Esta tese teve como objetivo investigar a funcionalidade e sua associação com os fatores psicossociais entre a população inglesa e a brasileira com idade mais avançada, considerando modelos estatísticos mais elaborados. Adicionalmente, foram explorados fatores que poderiam modificar essa associação, como as iniquidades socioeconômicas, sexo e sintomas depressivos.
**Material e método:** Como fonte de informações, foram utilizados dados do Projeto Bambuí (longitudinalmente) e do *English Longitudinal Study of Ageing (ELSA)* (transversalmente). A funcionalidade foi mensurada pela dificuldade em desempenhar atividades básicas de vida diária (ABVD) e atividades instrumentais de vida diária (AIVD). A análise estatística foi baseada em modelos estatísticos avançados a fim de refinar a intepretação dos resultados: (1) utilizou-se o modelo de regressão de riscos competitivos, considerando que a morte é uma censura informativa quando estima-se o risco de incapacidade; (2) utilizou-se o modelo de regressão logística multinomial, tendo como variável resposta a interação entre incapacidade condição socioeconômica.
**Resultados:** No Brasil, a densidade de incidência de incapacidade em 15 anos foi de 359 por 1000 pessoas-ano, 347 pessoas morreram e 96 foram perdidas durante o período de seguimento. Na linha de base, a idade média dos participantes foi de 68,6 (± 6,7 anos), 23,1% apresentaram sintomas depressivos (mentais) menores, 10,4% sintomas depressivos (mentais) maiores e 40,5% relataram pouco apoio emocional da pessoa mais próxima. Pessoas com pouco apoio emocional apresentaram maior risco de desenvolver incapacidade em ABVD, após os ajustes pertinentes, ocorrendo o mesmo para sintomas depressivos (mentais) maiores. Quando combinados em um modelo para verificar modificação de efeito entre ambas, não houve interação significativa. Na Inglaterra, a idade média dos participantes foi de 66,0 (± 8,4 anos), 10,2% apresentaram sintomas depressivos e 31,3% relataram pouco apoio social de amigos, familiares ou filhos. A condição socioeconômica modificou a associação de fatores psicossociais e funcionalidade: quanto pior é a condição socioeconômica, maior é a força de associação entre sintomas depressivos e funcionalidade, em ambos sexos. Adicionalmente, dentre os homens, aqueles com incapacidades em ABVD/AIVD e pior condição socioeconômica estavam mais propensos a não terem contatos semanais com amigos, familiares ou filhos e a não apresentarem cônjuge. Dentre as mulheres, aquelas com incapacidades e piores condições socioeconômicas estavam mais propensas a relatar solidão.
**Conclusões:** Tanto no Brasil quanto na Inglaterra, longitudinal e transversalmente, respectivamente, o apoio social e os sintomas depressivos influenciaram a

funcionalidade de pessoas com idade mais avançada. Intervenções objetivando o aumento dos contatos sociais e do apoio social, além de prevenção e tratamento de sintomas depressivos tem o potencial de diminuir os aspectos negativos da incapacidade através de caminhos psicológicos. Deve-se considerar, também, que a população alvo dessas intervenções são as pessoas com piores condições socioeconômicas. Além das causas materiais, demonstramos que o ambiente social, como sugerido pela teoria psicossocial, também influencia as iniquidades em saúde.

**Palavras-chave:** Funcionalidade, Incapacidade, atividades de vida diária, apoio social, rede social, solidão, sintomas depressivos, iniquidades em saúde, envelhecimento.

## ABSTRACT

**Introduction:** World population projections showed that the number of people at the age of 65 and above will grow from 524 millions in 2010 to nearly 1.5 billion in 2050 and the ageing is associated with disability. One of the key public health concerns is the elderly functioning maintenance and improvement and more studies on this topic are necessary. The identification of social and biological preditors related to the disability onset may potentially contribute for identifying vulnerable groups. This could enhance both prevention and engagement of target groups in early rehabilitation. Among the social preditors, social epidemiology shows that psychosocial factors have a striking impact in populations health.

**Objectives:** This thesis aimed to explore the functioning and its association with psychosocial factors among older Brazilian and English adults, taking into account modern statistic models. Addictionally, we explored variables that could modificate this association, such as socioeconomic inequalities, sex and emotional support.

**Material and methods:** We used data from the Bambui Cohort Study of Ageing (longitudinally) and the English Longitudinal Study of Ageing (cross-sectionally). Functioning was measured by difficultility in carrying out basic activities of daily living (ADL) and instrumental activities of daily living (IADL). The statistical analysis was based on modern statistical models to refine the results interpretation: (1) we used the competing-risks regression, taking into account that death is an informative censoring when we estimate the disability risk; (2), we used the multinomial logistic regression using the interaction between disability and socioeconomic condiction as the outcome variable.

**Results:** In Brazil, the disability incidence rate in 15 years was 359 per 1,000 person-years, 347 people died and 96 were lost in follow-up. At baseline, mean age was 68.6 ± 6.7 years, 23.1% showed minor depressive (mental) symptoms, 10.4% major depressive (mental) symptoms and 40.5% reported low emotional support from the closest person. Persons with low emotional support from the closest person were at significant increased risk for incident ADL disability, after adjustments. The same pattern was observed for major depressive (mental) symptoms. After conjugating both in a model to assess modification effect, we did not find any significant interaction. In England, mean age was 66.0 ± 8.4 years, 10.2% showed depressive symptoms and 31.3% reported low social support from friends, family or children. The multinomial logistic regression showed that wealth modifies the association between psichosocial factors and functioning: the poorest, the stronger the association between depressive symptoms and functioning, in both sex. Adictionally, among men, those with ADL/IADL disability and the poorest showed higher odds of having no weekly contact with friends, familiy or children, and not living with partner. Among women, those with disability and the poorest showed higher odds of loneliness.

**Conclusions:** Both in England and Brazil, cross-sectionally and very long term, respectively, social support and depressive symptoms are related to functioning among older adults. Interventions that aim to enhance social contacts and support and treatment or prevention of depressive symptoms may potentially decrease negative aspects of disability by psychological pathways. Moreover, the target population are the poorest. Besisdes material causes, we showed that social environment, as suggested by psychosocial theory, is also related to health inequalities.

**Keywords:** Functioning, disability, activities of daily living, social support, social network, loneliness, depressive symptoms, health inequalities, ageing.

**SUMÁRIO**

# 1 APRESENTAÇÃO

Este volume consiste na apresentação da fundamentação teórica, justificativa, objetivos e resultados da tese de doutorado da aluna Juliana Lustosa Torres apresentada ao Programa de Pós-Graduação em Saúde Pública, da Faculdade de Medicina da Universidade Federal de Minas Gerais, como um dos requisitos parciais para a obtenção do grau de Doutor em Saúde Pública.

Este trabalho insere-se na linha de pesquisa *Epidemiologia da Saúde do Idoso* do Programa de Pós-Graduação em Saúde Pública da Universidade Federal de Minas Gerais. Estão incluídos dois artigos que abordam o tema de envelhecimento, funcionalidade e aspectos psicossocias. Esta tese é parte integrante de dois estudos maiores, intitulados “Projeto Bambuí” (*The Bambui Cohort Study of Ageing*) e *English Longitudinal Study of Ageing (ELSA),* ambos estudos prospectivos realizados, respectivamente, com idosos residentes na cidade de Bambuí – MG e adultos com idade avançada residentes na Inglaterra.

O primeiro artigo, intitulado “Psychological distress, emotional support and activities of daily living disability onset: 15 years follow-up of the Bambui (Brazil) Cohort Study of Ageing” está sob revisão no periódico *Aging & Mental Health* e foi avaliado no exame de qualificação em setembro de 2015. Este artigo, baseado na população idosa residente em Bambuí, estuda se uma única medida de sintomas depressivos, apoio social e/ou rede social, mensurados na linha de base, prediz o início da incapacidade em atividades básicas de vida diária (ABVD) a longo prazo.

O Segundo artigo, intitulado “Wealth and Disability in Later Life: The English Longitudinal Study of Ageing (ELSA)” investiga as iniquidades socioeconômicas na incapacidade, considerando o ambiente social de idosos ingleses (separadamente para homens e mulheres) participantes do estudo ELSA. Este artigo foi aceito no periódico *PLOS One* e foi publicado online em novembro de 2016.

Este volume de qualificação contém:

1. *Considerações Iniciais:* apresentação da fundamentação teórica e justificativa para a realização da tese.
2. *Objetivos:* apresentação do objetivo geral e dos objetivos específicos da tese.
3. *Artigos originais:* apresentação de dois artigos originais que respondem aos objetivos propostos.
4. *Considerações finais:* discussão de aspectos relevantes dos estudo, contribuição da tese para a saúde pública e perspectivas futuras.
5. *Apêndice:* Apresentação do segundo artigo desta tese no formato publicado no periódico *PLOS One.*
6. *Anexo:* aprovação do Projeto Bambuí, pela Comitê de Ética de Pesquisa da Fundação Oswaldo Cruz.

# 2 CONSIDERAÇÕES INICIAIS

Estimativas da estrutura etária da população mundial apontam que, pela primeira vez na história, em 2017, pessoas acima de 65 anos estarão em maior número que a população de crianças com menos de 5 anos de idade[1,2]. Projeta-se que número de pessoas com 65 anos ou mais cresça de 524 milhões em 2010 para aproximadamente 1,5 bilhões em 2050. Apesar dos países desenvolvidos apresentarem uma população mais envelhecida, o processo de envelhecimento demográfico ocorre de forma mais abrupta nos países em desenvolvimento[2]. Por exemplo, em 2014, a população idosa do Reino Unido (65 anos ou mais) era de, aproximadamente, 17%, enquanto que no Brasil essa proporção, no mesmo ano, era menor que 8%. Estima-se que, o mesmo processo de envelhecimento demográfico que perdurou por 45 anos no Reino Unido (1930-1975), é provável de acontecer no Brasil em 21 anos (2011-2032)[1]. Portanto, os países em desenvolvimento apresentam um menor tempo de adaptação à nova estrutura da população, que vem acompanhado de outras mudanças como declínio da taxa de fecundidade, rápido aumento da expectativa de vida ao nascer e dos idosos, além diminuição da prevalência das causas de morbi-mortalidade de doenças infecciosas e parasitárias e aumento da prevalência de doenças crônicas não transmissíveis[2].

Dados dos censos demográficos brasileiros de 2000 e 2010[3] mostram que a população brasileira com 60 anos ou mais aumentou 41,6% nestes dez anos (14,5 milhões em 2000 para 20,5 milhões em 2010) e projeções da população para 2017 apontam que essa população irá aumentar mais 26,8% em relação a 2010, devendo atingir 41,5 milhões, em 2030, e 73,5 milhões, em 2060. Em relação às faixas etárias, o aumento em relação a 2010 é ainda maior na faixa etária de 80 anos ou mais, em torno de 48%, comparado com 35% de 60-69 anos e 27% de 70-79 anos. A população do Reino Unido também continua envelhecendo, mas em ritmo bem menos acelerado: em 2004, a população com 65 anos ou mais correspondia a

[1] Kinsella K, He W. An Aging World: 2008 - International Population Reports. Washington, DC: US Government Printing Office, 2009.
[2] US National Institute of Aging. World Health Organization. Global Health and Aging; 2011 Oct. 32 p. NIH Publication No.: 11-7737.
[3] Instituto Brasileiro de Geografia e Estatística (IBGE). [homepage na Internet]. Indicadores sociais municipais: Uma análise dos resultados do universo do Censo Demográfico 2000 e 2010. Rio de Janeiro: IBGE [acesso em 2015 Jun 8]. Disponível em www.ibge.gov.br

15,9% da população total e a estimativa para 2039 é de 24,3%[4].

Com as pessoas vivendo mais e com o aumento da prevalência de doenças crônicas não transmissíveis, a qualidade de vida se torna uma questão crucial e um grande questionamento vem em mente: as pessoas estão vivendo mais com uma saúde melhor? Uma maneira de se analisar isso é verificar os números relativos à funcionalidade, especificamente seu aspecto negativo, a incapacidade, a qual pode gerar uma maior dependência do idoso, aumento da taxa de mortalidade e número de hospitalizações, necessidade de cuidados de longa-duração[5], aumento dos custos de saúde tanto para as famílias quanto para o Governo[5,6], além de ser um risco à boa qualidade de vida[7].

No Brasil, enquanto a população de 60 anos ou mais aumentou 41,6% de 2000 para 2010, o número de pessoas nessa faixa etária com dificuldade de andar ou subir escadas aumentou 82% no mesmo período[3] e a limitação extrema em ABVD permaneceu estável, em torno de 6,9%[8]. No Reino Unido, estudos da década de 90 mostraram tendência de aumento da limitação na mobilidade, 5% ao ano, ao passo que em relação à limitação em ABVD, os resultados são contraditórios, uns mostrando aumento de 6,8%[9], outros mostrando estagnação ou diminuição[10]. Em países como China[11] e Estados Unidos[10], esse declínio da mobilidade também é

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[3] Instituto Brasileiro de Geografia e Estatística (IBGE). [homepage na Internet]. Indicadores sociais municipais: Uma análise dos resultados do universo do Censo Demográfico 2000 e 2010. Rio de Janeiro: IBGE [acesso em 2015 Jun 8]. Disponível em www.ibge.gov.br.

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[7] Ramos LR. Fatores determinantes do envelhecimento saudável em idosos residentes em centro urbano: Projeto Epidoso, São Paulo Cad Saúde Pública 2003; 19(3):793-8.

[8] Lima-Costa MF, Matos DL, Camargos VP, Macinko J.Tendências em dez anos das condições de saúde de idosos brasileiros: evidências da Pesquisa Nacional por Amostra de Domicílios (1998, 2003, 2008). Ciênc Saúde Coletiva, 2011;16(9):3689-96.

[9] Christensen K, Dolbhammer G, Rau R, Vaupel JW. Ageing populations: the challenges ahead. Lancet. 2009; 374(9696): 1196–1208

[10] Robine J, Michel J. Looking Forward to a General Theory on Population Aging. J Gerontology A Biol Sci Med Sci 2004; 59(6):590–7.

[11] Feng Q, Zhen Z, Gu D, Wu B, Duncan PW, Purser JL. Trends in ADL and IADL disability in community-dwelling older adults in Shanghai, China, 1998–2008. J Gerontol B Pshycol Sci Soc Sci 2013; 68(3): 476–85

visto. Em 2002, a proporção de idosos que relataram dificuldade em ABVDs, na Inglaterra, foi de, aproximadamente, 25%, enquanto para mobilidade 30%[12]. Comparando dados dos dois países em questão[13], em 2008, considerando amostras representativas de pessoas com 50 anos ou mais, houve diferenças significativas em relação à prevalência de limitação em pelo menos uma ABVD (10,7% no Brasil e 9,7% na Inglaterra), limitação em duas ou mais ABVDs (36,5% no Brasil e 23,2% na Inglaterra), e limitação em subir escadas (42,9% no Brasil e 31,9% na Inglaterra), todas com maior prevalência no Brasil.

Considerando que um dos objetivos das políticas públicas na área da saúde é a manutenção e melhora da funcionalidade da população, a identificação de preditores sociais e biológicos das futuras incapacidades tem o potencial de contribuir para a identificação de grupos vulneráveis tanto para prevenção quanto para a intervenção precoce.

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[3] Instituto Brasileiro de Geografia e Estatística (IBGE). [homepage na Internet]. Indicadores sociais municipais: Uma análise dos resultados do universo do Censo Demográfico 2000 e 2010. Rio de Janeiro: IBGE [acesso em 2016 Mai 20]. Disponível em www.ibge.gov.br.

[12] Falkingham J, Evandrou M, McGowan T, Bell D, Bowes A. Demographic issues, projections and trends: Older people with high support needs in the UK . Iorque: Joseph Rowntree Foundation, 2010, 61 p.

[13] Lima-Costa MF, De Oliveira C, Macinko J, Marmot M. Socioeconomic inequalities in health in older adults in Brazil and England. Am J Public Health. 2012;102(8):1535-41.

## 2.1 FUNCIONALIDADE NO ENVELHECIMENTO

### 2.1.1 Definição

Tendo como um de seus objetivos estabelecer uma linguagem comum para descrever a saúde e dos estados a ela relacionados, a Organização Mundial de Saúde (OMS) criou a Classificação Internacional de Funcionalidade, Incapacidade e Saúde (CIF)[14]. A CIF define funcionalidade como um termo genérico que abrange todas as estruturas e funções do corpo, atividade e participação. Estruturas e funções do corpo são as partes anatômicas do corpo e suas funções fisiológicas, enquanto as atividades e a participação englobam a execução de uma tarefa ou ação por um indivíduo e o envolvimento em uma situação de vida, respectivamente. A funcionalidade indica os aspectos positivos da interação entre condições de saúde de um indivíduo e seus fatores contextuais, de acordo com a figura 1.

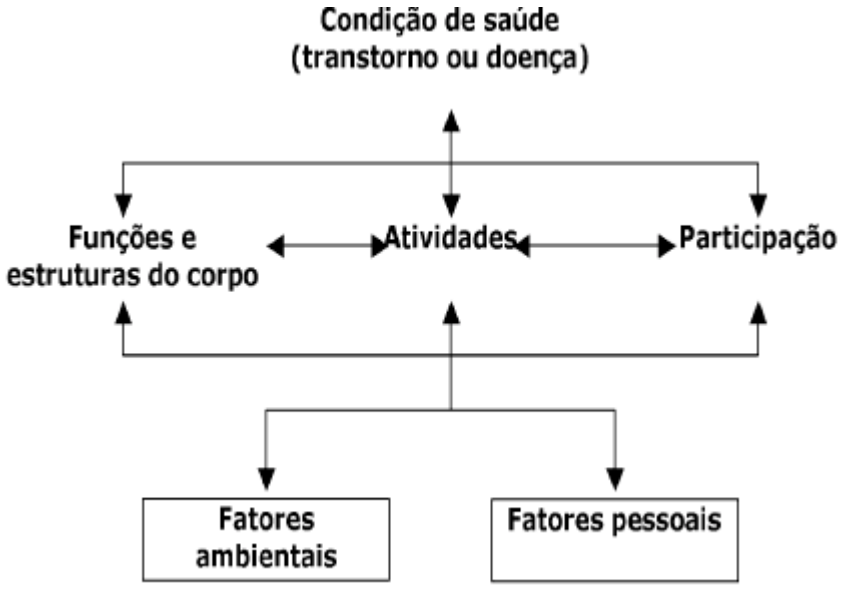


FIGURA 1 – Interação entre os componentes da funcionalidade
Fonte: Adaptado de OMS[14], p.30.

[14] Organização Mundial de Saúde. CIF - Classificação internacional de funcionalidade, incapacidade e saúde. São Paulo: Edusp, 2003. 325 p.

Os fatores contextuais representam o histórico completo da vida e do estilo de vida de um indivíduo e incluem dois componentes: os fatores ambientais e os pessoais. Os fatores ambientais, os quais constituem o ambiente físico, social e de atitudes nas quais as pessoas vivem e conduzem a sua vida, são organizados em dois níveis, o individual e o social, sendo que ambos podem atuar como barreiras ou facilitadores da funcionalidade. O nível social engloba estruturas sociais formais e informais, regras de conduta ou sistemas predominantes na comunidade que tem impacto sobre os indivíduos. Este nível inclui organizações e serviços relacionados ao ambiente de trabalho, atividades comunitárias, órgãos governamentais, serviços de comunicação e de transporte e redes sociais informais, bem como leis, regulamentações, regras formais e informais, atitudes e ideologias[14].

Entre outros, os fatores ambientais vão incluir: (1) Apoio e relacionamentos, que trata da quantidade de apoio físico ou emocional prático, proteção, educação, proteção e assistência fornecidos por pessoas ou animais; (2) Atitudes, que influenciam o comportamento individual e a vida social em todos os níveis, dos relacionamentos interpessoais e associações comunitárias às estruturas políticas, econômicas e legais, como costumes, práticas, ideologias, valores, normas, crenças fatuais e religiosas; e (3) Serviços, sistemas e políticas. Os serviços, que podem ser públicos, privados ou voluntários, representam a provisão de benefícios, programas estruturados e operações, em vários setores da sociedade, desenhados para satisfazer as necessidades dos indivíduos. Os sistemas representam o controle administrativo e mecanismos de organização e são estabelecidos por autoridades governamentais ou outras reconhecidas, de nível local, regional, nacional e internacional. E, por último, as políticas representam normas, regulamentos, convenções e padrões estabelecidos por governos e outras autoridades reconhecidas[14].

Como a funcionalidade de um indivíduo é resultado dessa interação complexa entre condições de saúde e fatores contextuais, intervenções em um elemento tem o potencial de modificar um ou mais dos outros elementos[14]. Apesar dessa

[14] Organização Mundial de Saúde. CIF - Classificação internacional de funcionalidade, incapacidade e saúde. São Paulo: Edusp, 2003. 325 p.

complexidade, geralmente, em inquéritos de base populacional, a funcionalidade é avaliada pelo relato do grau de dificuldade no desempenho de atividades de vida diária (AVD)[8], ou desempenho em tarefas de mobilidade, devido à dificuldade de operacionalização de medidas objetivas.

As AVDs podem ser divididas em Atividades Básicas de Vida Diária (ABVD), Instrumentais (AIVD) ou Avançadas (AAVD). As ABVDs avaliam funções de sobrevivência, tais como se alimentar, tomar banho, higiene pessoal, vestir-se, transferência/mobilidade de um local a outro, entre outras[15]. As AIVDs estão ligadas às atividades próprias da vida em comunidade, tais como cuidar do próprio dinheiro, atender ao telefone, fazer compras, preparar alimentos e tomar os próprios medicamentos[15,16]. As AAVDs são atividades mais elaboradas e voluntárias, ligadas à socialização, ocupação e lazer[15], sendo dependentes de motivação pessoal[17]. De modo geral, os idosos manifestam perdas em desempenho de AAVD, indicadoras da diminuição de sua funcionalidade, antes de perdas em AIVD e ABVD[18].

### 2.1.2 Epidemiologia

A prevalência de incapacidade varia de acordo com a localidade e a idade da população. No Brasil, por exemplo, de acordo com a Pesquisa Nacional de Saúde de 2013[19], conduzida pelo Instituto Brasileiro de Geografia e Estatística (IBGE), aproximadamente um terço da população de idosos apresentam pelo menos alguma dificuldade para locomover-se, sendo 15,5% entre idosos de 60 a 64 anos, 23,6% entre 65 e 74 anos e 44,9% dos idosos com 75 anos ou mais.

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[8] Lima-Costa MF, Matos DL, Camargos VP, Macinko J.Tendências em dez anos das condições de saúde de idosos brasileiros: evidências da Pesquisa Nacional por Amostra de Domicílios (1998, 2003, 2008). Ciênc Saúde Coletiva, 2011;16(9):3689-96.

[15] Paixão Junior CM.; Reichenheim ME. Uma revisão sobre instrumentos de avaliação do estado funcional do idoso. Cad. Saúde Pública, 2005;21(1):7-19.

[16] Mattos IE, Carmo CN, Santiago LM, Luz LL. Factors associated with functional incapacity in elders living in long stay institutions in Brazil: a cross-sectional study. BMC Geriatrics. 2014; 14:47

[17] Oliveira EM et al. Atividades avançadas de vida diária (AAVD) e desempenho cognitivo entre idosos. Psico-USF. 2015;20(1):109-20.

[18] Kono A, Kai I, Sakato C, Rubenstein LZ. Frequency of going outdoors predicts long-range functional change among ambulatory frail elders living at home. Arc Gerontology Geriatrics 2007;45(3):233-42.

[19] Instituto Brasileiro de Geografia e Estatística (IBGE). [homepage na Internet]. Pesquisa Nacional de Saúde 2013: Percepção do estado de saúde, estilos de vida e doenças crônicas. Rio de Janeiro: IBGE [acesso em 2015 Jul 16]. Disponível em www.ibge.gov.br

Dados oficiais do Reino Unido[20] mostram que, em 2012, os adultos em idade pensionista (65 anos ou mais para homens e 60 anos ou mais para mulheres) que reportaram incapacidade somam 5,1 milhões, o que corresponde a, aproximadamente, 38% dessa população. Ainda, de 2002 a 2012, o aumento da incapacidade foi de apenas 8%.

Por outro lado, no Brasil, estudos mostram que a prevalência de incapacidade em ABVD vem permanecendo estável ao longo dos anos. Dados da Pesquisa Nacional por Amostra de Domicílios (PNAD) 1998, 2003 e 2008 apontam que a prevalência de limitação para ABVD aumentou ligeiramente nesse período (6,5% em 1998, 6,4 % em 2003 e 6,9% em 2008)[8], mas, essas mudanças não foram significativas (2003 vs 1998, Razão de Prevalência [RP]=0,95; IC95%=0,88-1,03; 2008 vs 1998, RP=1,00; IC95%=0,92-1,07). Dados do estudo SABE, em São Paulo, mostram também estabilidade e certa tendência à diminuição da expectativa de vida livre de incapacidade (EVLI) entre 2000 e 2010, passando de 8,3 para 7,6, respectivamente[21]. Entretanto, um estudo que analisou duas coortes de nascimento de 71-81 anos em Bambuí, 1997 e 2008, mostrou diferença estatística entre as prevalências de dificuldade nas tarefas de andar em um cômodo e usar o banheiro (p=0,03 e p=0,01, respectivamente) entre as coortes, sendo a prevalência maior na coorte de nascimento de 2008[22].

Em relação à incidência de incapacidade em idosos, em São Paulo, o Estudo Epidoso, iniciado em 1991, encontrou uma incidência de limitação em ABVD/AIVD em 10 anos de 17,8% (IC95% 13,6; 21,9)[23]. Apesar de uma revisão sistemática mostrar que não há diferença na incidência de incapacidade entre homens e mulheres[24], um estudo realizado em São Paulo, estudo SABE iniciado

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[8] Lima-Costa MF, Matos DL, Camargos VP, Macinko J.Tendências em dez anos das condições de saúde de idosos brasileiros: evidências da Pesquisa Nacional por Amostra de Domicílios (1998, 2003, 2008). Ciênc Saúde Coletiva, 2011;16(9):3689-96.

[20] Office for disability issues. Department for work and pensions. Disability prevalence estimates 2011/2012. Londres: 2014. Disponível em https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/321594/disability-prevalence.pdf.

[21] Campolina AG, Adami F, Santos JLF, Lebrão ML. Expansion of morbidity: trends in healthy life expectancy of the elderly population. Rev Assoc Med Bras 2014; 60(5): 434-41.

[22] Oliveira, CM, Lima-Costa, MF. Birth cohort differences in physical functioning levels among elderly Brazilians: findings from the Bambuí Cohort Study of Aging (1997-2008). Cad Saúde Pública 2011; 27(sup3): S444-53.

[23] D'olsi E, Xavier AJ, Ramos LR. Trabalho, suporte social e lazer protegem idosos da perda funcional: Estudo Epidoso. Rev Saúde Pública 2011; 45(4): 685-92.

[24] Rodrigues MAP et al Gender and incidence of functional disability in the elderly: a systematic review. Cad Saúde Pública 2009; 25(sup3): S464-76.

em 2000, mostrou uma incidência de limitação em ABVD, em 6 anos, maior em mulheres, sendo 17,5 pessoas/ano para homens (IC95% 13,1;23,6) e 42,4 pessoas/ano para mulheres (IC95% 36,0;50,1)[25]. Na Inglaterra, a análise de uma amostra representativa mostrou que a incidência de limitação da mobilidade, em oito anos, foi de 45%[26].

### 2.1.3 Iniquidades em saúde

As iniquidades em saúde são um ponto-chave de interesse da saúde pública[27], sendo que a literatura mostra um gradiente de doenças e mortalidade de acordo com a posição socioeconômica[28]. As iniquidades não são vistas apenas entre países com diferentes rendas, mas também dentro dos próprios países, principalmente entre homens e idosos jovens[29]. O gradiente da associação entre status socioeconômico e funcionalidade é bem documentado, de modo que indivíduos com maior poder aquisitivo apresentam melhor funcionalidade[30,31]. Evidências recentes das tendências socioeconômicas na EVLI em idades avançadas na Inglaterra corroboram com esses achados. Adultos ingleses em idades mais avançadas residentes em áreas de maior vulnerabilidade social vivem mais anos com incapacidade quando comparado aos que vivem em áreas mais nobres[32.] Por exemplo, na idade de 65 anos, o número de anos restantes vividos com

[25] Alexandre, TS et al. Gender differences in incidence and determinants of disability in activities of daily living among elderly individuals: SABE study. Arc Gerontol Geriatrics 2012; 55(2): 431-7.
[26] Nüesch E et al. Incident disability in older adults: prediction models based on two British prospective cohort studies. Age & Ageing 2015; 44(2): 275-82.
[27] Siegrist J, Marmot M. Health inequalities and the psychosocial environment—two scientific challenges. Soc Sci Med 2004; 58(8): 1463–73.
[28] Marmot MG, Davey Smith G, Stansfeld S, Patel C, North F, Head J, et al. Health inequalities among British civil servants: the Whitehall II study. Lancet 1991; 337:138–93.
[29] Gjonca E, Tabassum F, Breeze E. Socioeconomic differences in physical disability at older age. J Epidemiol Community Health 2009;63(11):928-935.
[30] Hosseinpoor AR, Williams JAS, Gautam J, Posarac A, Officer A, Verdes E et al. Socioeconomic Inequality in Disability among Adults: A Multicountry Study Using the World Health Survey. Am J Public Health 2013; 103(7): 1278–86.
[31] Stansfeld SA, Head J, Fuhrer R, Wardle J, Cattell V. Social inequalities in depressive symptoms and physical functioning in the Whitehall II study: exploring a common cause explanation. J Epidemiol Com- munity Health 2003; 57:361–367.
[32] Marshall A, Nazroo J, Tampubolon G, Vanhoutte B. Cohort differences in the levels and trajectories of frailty among older people in England. J Epidemiol Community Health 2015; 69:316–321.

incapacidade entre 2002-05 e 2006-09 aumentou aproximadamente 3% nos bairros mais pobres e permaneceu praticamente inalterado entre os bairros mais ricos[33]. O mesmo padrão, em relação à renda familiar também foi observado no Brasil: em relação às mesorregiões, a prevalência de incapacidade foi maior na Região Nordeste[34], região do Brasil que apresenta menor expectativa de vida; e em relação ao rendimento médio mensal familiar per capita, a prevalência entre os mais pobres variou de 20,4% a 39,3% entre as mesorregiões, enquanto que entre os mais ricos, a prevalência da incapacidade variou de 5,8% a 32,9%[3].

Portanto, as desvantagens tendem a concentram entre as mesmas pessoas e o seus efeitos na saúde se acumulam ao longo da vida. Quanto mais as pessoas vivem em circunstancias de estresse econômico e social, maior é o sofrimento psicológico, levando à pior saúde em idades mais avançadas.

As evidências dessa associação varia entre países, mas as iniquidades em saúde são mostradas entre, por exemplo, Estados Unidos, Reino Unido e Brasil. Questões sobre a interpretação dos mecanismos envolvidos nessa associação ainda permanecem. A literatura mostra que pelo menos três mecanismos podem estar envolvidos: a interpretação da renda individual (causas materiais), a interpretação do ambiente psicossocial, e a interpretação neo-material[35,36,37].

Segundo a teoria material, a relação entre renda e saúde a nível individual é uma condição suficiente para produzir diferenças em saúde entre populações com a mesma renda media mas com diferentes distribuições de renda. Essa interpretação assume que os determinantes da saúde da população são completamente especificados como atributos individuais independents e que os efeitos na saúde a nível populacional reflete meramente a soma dos efeitos individuais. Entretanto, pesquisas em iniquidades em saúde reconhecem que determinantes contextuais da saúde podem desempenhar, também, um papel importante[36].

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[3] Instituto Brasileiro de Geografia e Estatística (IBGE). [homepage na Internet]. Indicadores sociais municipais: Uma análise dos resultados do universo do Censo Demográfico 2000 e 2010. Rio de Janeiro: IBGE [acesso em 2015 Jun 8]. Disponível em www.ibge.gov.br.

[34] Rosa TEC, Benício MHA, Latorre MRDO, Ramos LR. Fatores determinantes da capacidade funcional entre idosos. Rev Saúde Pública 2003; 37(1): 40-8.

[35] Wilkinson R, Marmot M. The Solid Facts. Copenhagen: World Health Organization, 2003

[36] Lynch JW, Smith GD, Kaplan GA, House JS. Income inequality and mortality: importance to health of individual income, psychosocial environment, or material conditions. BMJ 2000; 320(7243): 1200-1204.

[37] Matthews KA, Gallo LC. Psychological perspectives on pathways linking socioeconomic status and physical health. Annu Rev Psychol 2011; 62: 501-30.

Em contraste, a teoria psicossocial propõe que os fatores psicossociais são primordiais para o entendimento das iniquidades em saúde. Segundo essa teoria, as diferenças socioeconômicas afetam a saúde através de uma percepção de seu lugar na hierarquia social baseada na sua posição relativa de acordo com sua renda. Essa percepção produz emoções negativas como vergonha e desconfiança as quais culminam em pior saúde devido a mecanismos e estresse psico-neuro-endócrino. Simultaneamente, essas percepções negativas atuam fora do indivíduo, modificando comportamentos, como tornar-se antisocial e menor capital social e coesão com a comunidade. Portanto, os fatores psicossociais teriam consequencias biológicas negativas a nível individual e social. Contudo, algumas críticas podem ser apontadas, sendo a principal delas é que o processo estrutural, politico e econômico que gera as iniquidades existe primariamente a seus efeitos vivenciados em nível individual[36].

Por ultimo, a teoria neo-material propõe que as iniquidades em saúde são resultantes da acumulação diferenciada de exposições e experiências que apresentam suas fontes no mundo material. Então, o efeito da renda nas iniquidades em saúde refletem uma combinação de exposições negativas e falta de recursos possuídos pelos indivíduos, juntamente com subinvestimentos sistemáticos em uma gama de infraestrutura humana, física, de saúde e social. A distribuição desigual de renda é, portanto, resultado de um processo histórico, cultural, politico e econômico[36].

Apesar de várias teorias tentarem explicar as iniquidades vistas no campo da saúde, nenhuma delas consegue englobar totalmente a complexidade deste processo, podendo, portanto, coexistirem. Agregando-se as ideias, tem-se que a distribuição desigual de renda é resultado de um processo histórico, cultural, político e econômico no qual o indivíduo com baixa renda irá vivenciar mais experiências negativas e privação material, levando à piores condições de saúde. Consequente a essa privação material, o indivíduo apresenta um importante componente psicossocial, como a incapacidade de participar fortemente na sociedade e a incapacidade de controle da vida de alguém. Além desses, fatores psicossociais

[36] Lynch JW, Smith GD, Kaplan GA, House JS. Income inequality and mortality: importance to health of individual income, psychosocial environment, or material conditions. BMJ 2000; 320(7243): 1200-1204.

como o apoio social e a participação social também podem contribuir para as iniquidades em saúde. O apoio social ajuda a dar as pessoas as fontes práticas e emocionais que elas precisam[35]. O ambiente social pode exercer efeitos benéficos à saúde, podendo até proteger os indivíduos dos efeitos adversos da privação material[37]. Deste modo, intervenções em saúde pública para promover o envelhecimento saudável devem considerar essas iniquidades em saúde a fim de proporcionar maior equidade entre os diferentes indivíduos com diferentes demandas. Esse princípio doutrinário do Sistema Único de Saúde preconiza que é necessária a redistribuição da oferta de ações e serviços para grupos com condições mais precárias, ou seja, as mais necessitadas, a fim de fazer valer o princípio de justiça social[38].

[35] Wilkinson R, Marmot M. The Solid Facts. Copenhagen: World Health Organization, 2003
[37] Matthews KA, Gallo LC. Psychological perspectives on pathways linking socioeconomic status and physical health. Annu Rev Psychol 2011; 62: 501–30.
[38] Paim JS, da Silva, LMV. Universalidade, integralidade, equidade e SUS. BIS, Bol. Inst. Saúde; 12(2): 109-114.

## 2.2 OS FATORES PSICOSSOCIAIS

A literatura mostra que deferentes teorias tentam explicar as iniquidades em saúde, as quais podem ser complementares. Na vertente psicossocial, destacam-se dois mecanismos: estresse e concomitante angústia psicológica, e recursos sociais e psicológicos que podem ser um caminho de mediação ou atenuação de ambientes estressantes e as respostas negativas que eles proporcionam[37].

Concomitantemente a criação da CIF, a qual considera o ambiente social como um dos fatores determinantes para a funcionalidade do indivíduo[14], observou-se um crescimento exponencial da produção científica em epidemiologia social[39], principalmente voltada para as causas psicossociais das doenças. Entre os fatores psicossociais que apresentam forte evidencias para suportar a teoria das causas psicossociais estão o apoio e a integração social, o ambiente de trabalho psicossocial, o controle e a hostilidade[40]. A presença destes fatores ao longo da vida podem influenciar a saúde em idades mais avançadas[27,40].

Um fator psicossocial pode ser definido como uma medida que relaciona, potencialmente, o fenômeno psicológico com o ambiente social e com mudanças patofisiológicas[41]. Os fatores psicossociais incluídos neste trabalho foram rede social e apoio social (relações sociais), solidão e sintomas depressivos.

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[14] Organização Mundial de Saúde. CIF - Classificação internacional de funcionalidade, incapacidade e saúde. São Paulo: Edusp, 2003. 325 p.

[27] Siegrist J, Marmot M. Health inequalities and the psychosocial environment—two scientific challenges. Soc Scie Medicine 2004; 58 (8): 1463–1473.

[37] Matthews KA, Gallo LC. Psychological perspectives on pathways linking socioeconomic status and physical health. Annu Rev Psychol 2011; 62: 501-30.

[39] Barata RB. Epidemiologia social. Rev Bras Epidemiologia. 2005; 8(1):7-17.

[4o] Marmot M. Importance of the psychosocial environment in epidemiologic Studies. Scand J Work Environ Health 1999;25 suppl 4:49-53.

[41] Hemingway H, Marmot M. Psychosocial factors in the aetiology and prognosis of coronary heart disease: systematic review of prospective cohort. BMJ 1999;318:1460–7.

### 2.2.1 Relações sociais

As relações sociais são definidas amplamente como o grau em que os indivíduos estão interconectados e inseridos nas comunidades[42,43]. Dentre as diferentes ideias englobadas na expressão relações sociais, dois conceitos se destacam: rede social e apoio social[44] . A rede social compreende a dimensão estrutural das relações sociais, enquanto o apoio social compreende a dimensão funcional[45].

A Rede social é definida como uma unidade de estrutura social composta por laços sociais e individuais e relações interpessoais[46]. As redes sociais são estáveis, mas envolvem uma estrutura relativa constituída de familiares, amigos e conhecidos, conexões de trabalho e estudo. Além disso, podem ser relativas a relações que se desenvolvem pela nossa participação formal e informal em organizações, sejam elas sociais, recreativas, religiosas, políticas, vocacionais, relativa à saúde, etc[47,48]. As redes sociais constituem a reposição da identidade, a história individual e o senso de satisfação com a vida[48]. O tamanho refere-se ao número de membros da rede social; o tipo de relação refere-se ao grau com a qual a rede é definida de acordo com a estrutura dos grupos tradicionais, como família, trabalho e vizinhos; a densidade refere-se à extensão que estes membros estão interconectados, e os contatos sociais refere-se à frequência de contatos pessoais ou por outros meios[49].

A definição de apoio social não é consensual na literatura, apesar de ser consenso que se trata de um construto multidimensional. Segundo Syme & Cohen[50] e Gottlieb & Bergen[46], apoio social é definido como os recursos oferecidos por outras pessoas. Tais recursos podem estar realmente disponíveis ou serem apenas percebidos pelas pessoas, tanto formal quanto informalmente. Ou seja, trata-se do grau com que

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[42] Kawashi I, Berkman LF. Social capital, social cohesion, and health. In: Berkman LF, Kawashi I, Glymour MM. Social Epidemiology. 2014. 2. ed. New York: Oxford University Press, p. 290-319.
[43] Adler PS, Kwon S. Social capital: Prospects for a new concept. Acad Management Review. 2002; 27(1):17-40.
[44] Curcio-Borrero CL. Soporte social informal, salud y funcionalidad en el anciano. Hacia promoc Salud 2008; 13(1): 42-58.
[45] House JS. Social support and social structure. Sociological Forum, 1987;2(1):135-46.
[46] Gottlieb BH, Bergen AE. Social support concepts and measures. J Psychos Research 2010;69(5):511-20.
[47] Lemos N, Medeiros SL. Suporte social ao idoso dependente. In: Freitas EV, Py L. Tratado de Geriatria e Gerontologia. 3 ed. Rio de Janeiro: Guanabara Koogan, 2011. p.1441-1448.
[48] Sluzki CE. Social network and the elderly: Conceptual and Clinical Issues, and a Family Consultation. Family Process 2000;39(3):271-84.
[49] Berkman LF, Glass T, Brissette I, Seeman TE. From social integration to health: Durkheim in the new millennium. Soc sci med. 2000; 51(6): 843-57.
[50] Syme l, Cohen S. Issues and the study and application of social support. In:___Social support and health. San Francisco: Academic Press, 1985. p. 3-22.

as relações interpessoais correspondem a determinadas funções (como apoio emocional, material e afetivo), com ênfase no grau de satisfação do indivíduo com a disponibilidade e qualidade dessas funções[44]. Cobb[51] define apoio social como a informação que leva o indivíduo a acreditar que é querido, amado e estimado, e que faz parte de uma rede social com compromissos mútuos.

O apoio social formal refere-se a um sistema, a um conjunto de serviços estruturados de órgãos governamentais e comunitários, sem relação direta com o usuário. Assim, correspondem a entidades privadas ou governamentais, instituídas dentro das estruturas sociopolíticas do Estado[44]. É proporcionado por profissionais como médicos, professores, fisioterapeutas, etc.[52], cuja função primária é manter o idoso na comunidade[44].

Entretanto, somente o apoio formal não pode nunca suprir todas as necessidades instrumentais, sociais e emocionais da população idosa. Portanto, outro tipo de apoio deve preencher essa demanda, o apoio social informal[51,53]. Trata-se de recursos oferecidos por todos os indivíduos (família, amigos, vizinhos, colegas de trabalho, comunidade etc.) com os quais se tem uma relação próxima e/ou envolvimento afetivo[52]. A maioria das vezes, esse apoio é oferecido aos idosos pelos familiares e uma minoria por amigos e vizinhos[54], apesar de apresentarem laços distintos. Membros da família são mais importantes para prover apoio instrumental, ajudando com tarefas práticas e necessidades físicas, além de ajudar durante períodos de doença ou incapacidade[55,56]. Ainda, provavelmente, são fisicamente mais próximos, mais comprometidos e mais envolvidos em problemas. Por outro lado, apoio de amigos é diferente, mas não menos importante, já que a amizade tende a ser recíproca e promove maior apoio emocional, além de conselhos e informações importantes[55.]

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[44] Curcio-Borrero CL. Soporte social informal, salud y funcionalidad en el anciano. Hacia promoc Salud 2008; 13(1): 42-58.
[51] Cobb S. Social Support as a Moderator of Life Stress. Psychosomatic Medicine 1976;38(5):300-14.
[52] Due P, Holstein B, Lund R, Modvig J, Avlund K. Social relations: network, support and relational strain. Social Scien Medicine 1999; 48(5): 661-73.
[53] Lipman A, Longino Junior CF. Formal and informal support: a conceptual clarification. J Applied Gerontology. 1982; 1(1): 141-6.
[54] Nocon A, Pearson M. The roles of friends and neighbours in providing support for older people. Ageing Society, 2000; 20(3): 341-67
[55] Shor E, Roelfs DJ, Yogev T. The strength of family ties: A meta-analysis and meta-regression of self-reported social support and mortality. Social Networks. 2013; 35(4):626–638.
[56] Arantes RC. Uai sô, e agora? As relações entre fatores sociodemográficos e incapacidades funcionais nas redes sociais de idosos em Belo Horizonte/MG. Belo Horizonte. Tese [Doutorado em Demografia] – Universidade Federal de Minas Gerais; 2012.

O apoio social informal pode ser de vários tipos, dentre eles pode-se destacar quatro tipos: (1) apoio emocional, que envolve expressões de amor e afeição[52,57]; (2) apoio instrumental ou material, que se refere aos auxílios concretos como provimento de necessidades materiais em geral, ajuda para trabalhos práticos (limpeza de casa, preparação de refeição, provimento de transporte) e ajuda financeira; (3) apoio de informação, que compreende informações (aconselhamentos, sugestões, orientações) que podem ser usadas para lidar com problemas e resolvê-los; e (4) integração social, que diz respeito à disponibilidade de pessoas com quem se divertir e relaxar[52].

As principais funções das relações sociais para idosos são dar e receber apoio emocional, ajuda material, serviços e informações; manter e firmar a identidade social; estabelecer novos contatos sociais; permitir às pessoas crerem que são cuidadas e amadas; dar-lhes a garantia de que pertencem a uma rede de relações comuns e mútuas; ajudá-las a encontrar sentido nas experiências vivenciadas[47]. Ainda, com o envelhecimento, há uma diminuição dos contatos sociais do idoso e, portanto, diminuição da sua rede social, resultado de um processo de seleção que ocorre durante toda a vida. Segundo Carstensen[58], os contatos sociais demandam gasto de energia e risco de experiências negativas, o que levaria o idoso a escolher principalmente experiências positivas, as quais já conhece, a fim de maximizar os ganhos sociais e emocionais e diminuir seus riscos. Deste modo, sua rede social tende a diminuir, permanecendo, principalmente a rede familiar[47,54]. Entretanto, a introdução de novas tecnologias online tem o potencial de modificar este cenário, permitindo que a rede social dos idosos se mantenha e/ou aumente o apoio social recebido pelos idosos[59].

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Já é descrito na literatura que a manutenção das relações sociais está associada com desfechos positivos em saúde na população idosa, como menor risco de mortalidade[60,61], doença cardiovascular[62], hipertensão arterial[63], desregulação neuroendócrina[64], mortalidade por câncer[65], depressão[66], declínio cognitivo[67], tempo de internação[68] e manutenção da saúde mental e física[69,70], podendo diferenciar entre gêneros[70]. Ainda, medidas das relações sociais são associadas com a condição socioeconômica, de modo que indivíduos em grupos sociais com maior poder aquisitivo tendem a ser casados, ter maior rede social e relatar maior apoio social (mais apoio emocional e menos aspectos negativos da pessoa mais próxima)[71]. Além desses, uma revisão sistemática de estudos de coorte conduzidos entre as décadas de 1980 e 1990[72], mostrou que a baixa frequência de contatos sociais era um dos determinantes da futura incapacidade, junto com a depressão, a presença de doenças crônicas, a limitação funcional de membros inferiores, a pior auto-avaliação da saúde e a pouca atividade física.

[60] Holt-Lustad J, Smith TB, Layton JB. Social relationships and mortality risk: A meta-analytic Review. PLoS Med. 2012; 7(7): e1000316.
[61] Robles TF, Slatcher RB, Trombello JM, McGinn MM. Marital quality and health: A meta-analytic review. Psychol Bull. 2014; 140(1): 140-87
[62] Everson-Rose SA, Lewis TT. Psychosocial factors and cardiovascular diseases. Annu Rev Public Health. 2005; 26:469-500.
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Com poucas exceções[73,74,75,76], estudos de coorte mais recentes confirmaram essas observações e acrescentaram por identificar quais componentes da rede social e do apoio social estão associados à limitação funcional subsequente. Com referência à rede social, o número de componentes da mesma (número de familiares que o idoso possui e o número de amigos e parentes com os quais se sente próximo)[75,77,78,79,80], o número de componentes da rede familiar (cônjuge, filhos e irmãos)[81], a pouca diversidade das relações sociais (número de categorias com as quais o idoso tem contato, como filhos, netos, irmãos, outros parentes e amigos)[82,83], a pouca participação social (atividades sociais fora de casa e visitas a outras pessoas)[74,76,82,84,85,86,87], assim como o menor contato com familiares[74,81] e com

[73] McLaughlin D, Leung J, Pachana N, Flicker L, Hankey G, Dobson A. Social support and subsequent disability: it is not the size of your network that counts. Age Ageing 2012; 41(5): 674-7.
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amigos[74,78,83,87] com os quais o idoso sente-se próximo apresentam associações independentes com a futura limitação funcional. Em relação ao apoio social, a insatisfação com apoio social[73,80,82], grande apoio instrumental (auxílios concretos como provimento de necessidades materiais em geral e ajuda para trabalhos práticos, como limpeza de casa, preparação de refeição e provimento de transporte)[77,78,82] e um índice de apoio social global[89,90] têm sido descritos como determinantes do pior desempenho funcional, mesmo após ajustamentos por outros fatores relevantes. Além disso, essas variáveis também estão associadas com a recuperação da incapacidade[92] e com a mortalidade de indivíduos com incapacidade[93]: dar apoio instrumental aumenta a probabilidade de recuperação parcial e/ou total da incapacidade[92] e diminui a mortalidade[93].

Um estudo de intervenção, conduzido em Taketoyo[94], pequena cidade no Japão, mostrou que a criação de espaços para idosos reunirem-se e realizarem atividades sociais e foi efetivo para diminuir o risco de desenvolver deficiência mental e física em cinco anos entre os idosos que foram ao centro pelo menos três vezes.

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[73] McLaughlin D, Leung J, Pachana N, Flicker L, Hankey G, Dobson A. Social support and subsequent disability: it is not the size of your network that counts. Age Ageing 2012; 41(5): 674-7.

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[78] Mendes de Leon CF, Gold DT, Glass TA, Kaplan L, George LK. Disability as a Function of Social Networks and Support in Elderly African Americans and Whites: The Duke EPESE 1986-1992. J Gerontol B Pshycol Sci Soc Sci 2001; 56(3): S179-90.

[80] Yu H, Chen D, Chiang T, Tu Y, Chen Y. Disability trajectories and associated disablement process factors among older adults in Taiwan. Arch Gerontol Geriatr 2015; 60(2): 272–280.

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[94] Hikichi H, Kondo N, Kondo K, Aida J, Takeda T, Kawachi I. Effect of a community intervention programme promoting social interactions on functional disability prevention for older adults: propensity score matching and instrumental variable analyses, JAGES Taketoyo study. J Epidemiol Community Health 2015; 69: 905-10

Apesar da ampla literatura sobre o assunto, a minoria dos estudos longitudinais foram conduzidos em países em desenvolvimento[80,88,89,93], e a presença de alguns resultados conflitantes sugerem que diferenças culturais entre países podem estar implicadas na interpretação dos resultados.

No Brasil, estudos de base populacional, investigando a associação entre limitações para desempenhar AVD e variáveis de relações sociais ainda são poucos. Em geral, a associação mais consistentemente observada é o menor contato com amigos, observada tanto em um estudo longitudinal[88], quanto em diferentes estudos transversais[34,95,96,97]. Associações negativas entre incapacidade e atividades sociais e/ou religiosas foram também descritas em estudos transversais[34,98,99] . Em relação ao estado civil, também em estudos transversais, a falta de um companheiro pode ser um fator associado negativamente à limitação em AIVDs[100] e positivamente com ABVDs[101] ou ambos[102], mas nem sempre

[34] Rosa TEC, Benício MHA, Latorre MRDO, Ramos LR. Fatores determinantes da capacidade funcional entre idosos. Rev Saúde Pública 2003; 37(1): 40-8.
[80] Yu H, Chen D, Chiang T, Tu Y, Chen Y. Disability trajectories and associated disablement process factors among older adults in Taiwan. Arch Gerontol Geriatr 2015; 60(2): 272–280.
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[89] Chen C, Chang W, Lan T. Identifying factors associated with changes in physical functioning in an older population. Geriatr Gerontol Int 2015; 15 (2): 156–164.
[93] Liao C, Li C, Lee S, Liao W, Liao M, Lin J et al. Social support and Mortality among the aged people with major diseases or ADL disabilities in Taiwan: A national study. Arch Gerontology Geriatrics 2015; 60(2): 317-21.
[95] Giacomin KC, Peixoto SV, Uchoa E, Lima-Costa MFF. Estudo de base populacional dos fatores associados à incapacidade funcional entre idosos na Região Metropolitana de Belo Horizonte, Minas Gerais, Brasil. Cad Saúde Pública 2008; 24(6): 1260-70.
[96] Nogueira SL, Ribeiro RCL, Rosado LEFPL, Franceschini SCC, Ribeiro AQ, Pereira ET. Fatores determinantes da capacidade funcional em idosos longevos Rev Bras Fisioter 2010; 14(4): 322-9.
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[99] Pinto JN, Neri AL. Doenças crônicas, capacidade funcional, envolvimento social e satisfação em idosos comunitários: Estudo Fibra. Ciên Saúde Coletiva 2013; 18(12):3449-60.
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[101] Castro DC et al. Incapacidade funcional para atividades básicas de vida diária de idosos: estudo populacional. Ciencia, Cuidado e Saude 2016;15(1):109-17.
[102] Barbosa BR, Almeida JM, Barbosa MR, Rossi-Barbosa LAR. Avaliação da capacidade funcional dos idosos e fatores associados à incapacidade. Ciência & Saúde Coletiva 2014; 19(8):3317-25.

essas associações são observadas[95,96,103,104,105,106].

### 2.2.2 Solidão

Ao passo que a rede social avalia quantitativamente as relações sociais, a solidão avalia-as subjetivamente, refletindo a percepção individual do isolamento social. Apesar de ambas serem associadas na mesma direção[107,108], ou nem sempre correlacionadas[109,110], a variância dos dados se explicam pouco, sugerindo que medidas objetivas e subjetivas cobrem aspectos diferentes da experiência social[107]. O sentimento de solidão envolve os sentimentos de isolamento, sentimentos de desconexão e sentimentos de não pertencimento. Estes sentimentos refletem, em tese, a discrepância entre o desejo e o atual nível de relacionamento social de cada um[107], a qual é influenciada centralmente pela cognição e por demais fatores como características da personalidade, idade e sexo[111]. Neste sentido, mulheres são mais vulneráveis a relatar solidão uma vez que vêm seus relacionamentos dentro da sua

[95] Giacomin KC, Peixoto SV, Uchoa E, Lima-Costa MFF. Estudo de base populacional dos fatores associados à incapacidade funcional entre idosos na Região Metropolitana de Belo Horizonte, Minas Gerais, Brasil. Cad Saúde Pública 2008; 24(6): 1260-70.
[96] Nogueira SL, Ribeiro RCL, Rosado LEFPL, Franceschini SCC, Ribeiro AQ, Pereira ET. Fatores determinantes da capacidade funcional em idosos longevos Rev Bras Fisioter 2010; 14(4): 322-9.
[103] Virtuoso Júnior JS, Tribess S, Menezes AS, Meneguci J, Sasaki JE Fatores associados à incapacidade funcional em idosos brasileiros. Ver And Medicina Del Esporte 2016 [Ahead of print]
[104] Alves LC, Leite IC, Machado CJ. Fatores associados à incapacidade funcional dos idosos no Brasil: análise multinível. Rev Saúde Pública 2010;44(3):11p.
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[106] Brito KQD , Menezes TN , Olinda RA. Incapacidade funcional e fatores socioeconômicos e demográficos associados em idosos. Rev Bras Enferm. 2015;68(4):633-41.
[107] Hughes ME, Waite LJ, Hawkley LC, Cacioppo JT. A short scale for measuring loneliness in large surveys. Reserch Aging. 2004; 26(6): 655-672.
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[109] Coyle CE, Dugan E. Social isolation, loneliness and health among older adults. J Aging Health. 2012 Dec;24(8):1346-63.
[110] McHugh J , Kenny RA, Lawlor DA , Steptoe A,Kee F. The discrepancy between social isolation and loneliness as a clinically meaningful metric: findings from the Irish and English longitudinal studies of ageing (TILDA and ELSA). Int J Geriatr Psychiatry. 2016 [Epub ahead of print]
[111] Beal C. Loneliness in older women: a review of the literature. Issues Mental Health Nursing 2006; 27(7):795-813.
[112] Aartsen M & Jylhä M. Onset of loneliness in older adults: results of a 28 year prospective study. Eur J Ageing. 2011 Mar; 8(1): 31–38.

rede social diferentemente dos homens, por viverem mais e por sofrerem mais frequentemente eventos como morte do companheiro e realocação[111,112]. Além

[95] Giacomin KC, Peixoto SV, Uchoa E, Lima-Costa MFF. Estudo de base populacional dos fatores associados à incapacidade funcional entre idosos na Região Metropolitana de Belo Horizonte, Minas Gerais, Brasil. Cad Saúde Pública 2008; 24(6): 1260-70.

[96] Nogueira SL, Ribeiro RCL, Rosado LEFPL, Franceschini SCC, Ribeiro AQ, Pereira ET. Fatores determinantes da capacidade funcional em idosos longevos Rev Bras Fisioter 2010; 14(4): 322-9.

[103] Virtuoso Júnior JS, Tribess S, Menezes AS, Meneguci J, Sasaki JE Fatores associados à incapacidade funcional em idosos brasileiros. Ver And Medicina Del Esporte 2016 [Ahead of print]

[104] Alves LC, Leite IC, Machado CJ. Fatores associados à incapacidade funcional dos idosos no Brasil: análise multinível. Rev Saúde Pública 2010;44(3):11p.

[104] Leite IG. Prevalência de incapacidade funcional e fatores associados em idosos de Juiz de Fora-MG. Juiz de Fora. Conclusão de curso [Bacharelado em Fisioterapia] – Universidade Federal de Juiz de Fora; 2011.

[106] Brito KQD , Menezes TN , Olinda RA. Incapacidade funcional e fatores socioeconômicos e demográficos associados em idosos. Rev Bras Enferm. 2015;68(4):633-41.

[107] Hughes ME, Waite LJ, Hawkley LC, Cacioppo JT. A short scale for measuring loneliness in large surveys. Reserch Aging. 2004; 26(6): 655-672.

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[112] Aartsen M & Jylhä M. Onset of loneliness in older adults: results of a 28 year prospective study. Eur J Ageing. 2011 Mar; 8(1): 31–38.

disso, fatores como morar sozinho, não apresentar cônjuge, falta de visitas[113], doenças crônicas[111] e baixa frequência de uso da internet[114] podem ser associados ao sentimento de solidão. Em pesquisas, normalmente a solidão é medida por uma escala desenvolvida por um grupo de pesquisas dos Estados Unidos (*UCLA Loneliness scale*)[107], recentemente adaptada e validada para a população brasileira[115,116].

Pessoas que apresentam solidão cronicamente têm potencial para desenvolver efeitos adversos nos sistemas cardiovascular, imunológico e nervoso[117] e estão susceptíveis a maior uso do sistema de saúde[68,118]. E a solidão pode ser ainda pior para a saúde do que a falta efetiva de contatos sociais. Um estudo recente conduzido em três países da Europa (Finlândia, Polônia e Espanha)[119] encontrou que a solidão, após os ajustes pertinentes, foi associada com a pior saúde em todos os países, enquanto que em relação às medidas objetivas, apenas na Polônia, a frequência dos contatos sociais foi estatisticamente associada. Além disso, a solidão apresenta um gradiente inverso com status socioeconômico[120,121] e é associada com a mortalidade[122,123].

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[68] Newall N, McArthur J, Menec VH. A Longitudinal Examination of Social Participation, Loneliness, and Use of Physician and Hospital Services. J Aging Health 2015; 27(3) 500 –518.
[107] Hughes ME, Waite LJ, Hawkley LC, Cacioppo JT. A short scale for measuring loneliness in large surveys. Reserch Aging. 2004; 26(6): 655-672.
[111] Beal C. Loneliness in older women: a review of the literature. Issues Mental Health Nursing 2006; 27(7):795-813.
[113] Hacihasanoğlu R, Yildirim A, Karakurt P. Loneliness in elderly individuals, level of dependence in activities of daily living (ADL) and influential factors. Arch Gerontol Geriatr. 2012;54(1):61-6.
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[119] Rico-Uribe LA et al Loneliness, Social Networks, and Health: A Cross-Sectional Study in Three Countries. Plos One. 2016; 11(1):e0145264.
[120] Hawkley LC, Hughes ME, Waite LJ, Masi CM, Thisted RA, Cacioppo JT. From Social Structural Factors to Perceptions of Relationship Quality and Loneliness: The Chicago Health, Aging, and Social Relations Study J Gerontol B Psychol Sci Soc Sci 2008; 63(6):S375-S384.
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[122] Luo Y, Hawkley LC, Waite LJ, Cacioppo JT. Loneliness, Health, and Mortality in Old Age: A National Longitudinal StudySoc Sci Med. 2012; 74(6): 907–914.
[123] Perissionotto CM, Cenzer IS; Covinsky KE. Loneliness in Older Persons. Arch Intern Med. 2012;172(14):1078-1083.

Em relação à incapacidade, estudos de coorte mostram que a solidão é um determinante independente para declínio motor[124], tarefas do membro superior, subir escadas[123] e outras tarefas de mobilidade[122] e dificuldade no desempenho de ABVDs[124], apesar de este último apresentar resultados conflitantes com outro estudo[125]. Além disso, a solidão está associada com barreiras para a mobilidade encontradas na comunidade, ou seja, fora da casa do idoso, como terrenos próximos com aclive e distancia longa ao comércio e serviços[126].

### 2.2.3 Sintomas depressivos

A depressão maior é uma síndrome psiquiátrica comum em idosos, caracterizada por humor deprimido, perda do interesse ou prazer, com repercussões importantes na vida do indivíduo[127]. Ela está associada com déficit cognitivo, diabetes, uso de dois ou mais medicamentos e presença de grande número de sintomas depressivos[128]. Este número depende da escala que se usa para avaliar a presença sintomas depressivos. A prevalência de sintomas depressivos varia de estudo para estudo. Em países Europeus como França, Itália e Espanha ela está em torno de 30%, enquanto que em outros países europeus em torno de 20%[129]. Na Inglaterra, dados recentes mostram uma prevalência de 19,3%[130]. No Brasil, em cidades de

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[122] Luo Y, Hawkley LC, Waite LJ, Cacioppo JT. Loneliness, Health, and Mortality in Old Age: A National Longitudinal StudySoc Sci Med. 2012; 74(6): 907–914.
[123] Perissionotto CM, Cenzer IS; Covinsky KE. Loneliness in Older Persons. Arch Intern Med. 2012;172(14):1078-1083.
[124] Buchman AS et al. Loneliness and the rate of motor decline in old age: the rush memory and aging project, a community-based cohort study. BMC Geriatrics 2010, 10:77
[125] Stessman J, Rottenberg Y, Shimshilashvili I, Ein-Mor E, Jacobs JM. Loneliness, health, and longevity. J GerontoL A Biol Sci Med Sci 2014; 69(6): 744-50.
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[128] Do Nascimento KKS, Pereira KS, Firmo JOA, Lima-Costa MF, Diniz BS, Castro-Costa E. Predictors of incidence of clinically significant depressive symptoms in the elderly: 10-year follow-up study of the Bambui cohort study of aging. Int J Geriatr Psychiatry 2015; 30(12):1171–76.
[129] Castro-Costa E et al. Prevalence of depressive symptoms and syndromes in later life in ten European countries The SHARE study. British J Psychiatry 2007, 191(5): 393-401.
[130] White J et al. Duration of depressive symptoms and mortality risk: the English Longitudinal Study of Ageing (ELSA). Br J Psychiatry. 2016 Apr; 208(4): 337–342

Minas Gerais, a prevalência variou de 21,2 a 38,5%[131,132,133].

A depressão é o fator que mais contribui para a incapacidade, responsável por 4,4% do total de anos de vida perdidos ajustados por incapacidade (*disability-adjusted life years (DALY)*) globalmente[134] e ela é, consistentemente, um preditor forte da limitação física e dificuldade de desempenhar AVDs em adultos comunitários[135]. Tem-se mostrado na literatura, consistentemente, uma associação entre sintomas depressivos e incidência e/ou mudanças na severidade da difuculdade em AVDs

[131] Diniz BS et al. The effect of gender, age, and symptom severity in late-life depression on the risk of all-cause mortality: The Bambuí Cohort Study of Aging. Depress Anxiety. 2014 Sep; 31(9): 787–795.

[132] Ramos GCF , Carneiro JA , Barbosa ATF , Mendonça JMG , Caldeira AP. Prevalência de sintomas depressivos e fatores associados em idosos no norte de Minas Gerais: um estudo de base populacional. J. Bras. Psiquiatr 2015; 64(2): 122-31.

[133] Viera RA et al. Prevalência de fragilidade e fatores associados em idosos comunitários de Belo Horizonte, Minas Gerais, Brasil: dados do estudo FIBRA. Cad. Saúde Pública 2013; 29(8): 1631-43.

[134] Ustun TB, Ayuso-Mateos JL, Chatterji S, Mathers C, Murray CJ. Global burden of depressive disorders in the year 2000. British Journal of Psychiatry 2004; 184, 386-392.

[135] Covinsky KE, Yaffe K, Lindquist K et al. Depressive symptoms in middle age and the development of later-life functional limitations: The long-term effect of depressive symptoms. J Am Geriatr Soc 2010; 58:551-556.

em idosos[25,76,136,137,138,139,140,141,142]. Entretanto, alguns estudos sugerem que a depressão é provavelmente um resultado do aumento da incapacidade ao invés de um preditor da mudança na funcionalidade[143, 144,145,146]. Esta via pode ocorrer devido à redução de participação em atividades sociais e/ou devido ao baixo apoio social recebido pelos idosos com incapacidade[145].

[25] Alexandre, TS et al. Gender differences in incidence and determinants of disability in activities of daily living among elderly individuals: SABE study. Arc Gerontol Geriatrics 2012; 55(2): 431-7.
[76] Mendes de Leon CF, Rajan KB. Psychosocial Influences in Onset and Progression of Late Life Disability. J Gerontol B Pshycol Sci Soc Sci 2014; 69(2): 287-302.
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[138] Wang L, van Belle G, Kukull WB, Larson EB. Predictors of functional change: a longitudinal study of nondemented people aged 65 and older. J Am Geriatr Soc. 2002 Sep;50(9):1525-34.
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[140] van Gool CH, Kempen GI, Penninx BW, Deeg DJ, Beekman AT, van Eijk JT. Impact of depression on disablement in late middle aged and older persons: results from the Longitudinal Aging Study Amsterdam. Soc Sci Med. 2005 Jan;60(1):25-36.
[141] Carriere I et al. Late life depression and incident activity limitations: influence of gender and symptom severity. J Affect Disord. 2011; 133(1-2):42-50.
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[143] Everson-Rose SA, Skarupski KA, Bienias JL, Wilson RS, Evans DA, Mendes de Leon CF. Do depressive symptoms predict declines in physical performance in an elderly,biracial population? Psychosom Med. 2005; 67(4):609-15.
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[145] Chao, S. Functional disability and depressive symptoms: longitudinal effects of activity restriction, perceived stress, and social support. Aging & Mental Health. 2014; 18(6): 767-776.
[146] Weil J, Hutchinson SR, Traxler K. Exploring the Relationships Among Performance-Based Functional Ability, Self-Rated Disability, Perceived Instrumental Support, and Depression: A Structural Equation Model Analysis. Research on Aging 2014; 36(6) 683–706.

## 2.3 FATORES PSICOSSOCIAIS E FUNCIONALIDADE: MECANISMOS DE AÇÃO

No plano teórico, os fatores psicossociais afetam a saúde através de um processo causal em cascata, sendo descrito três caminhos proximais principais: (1) comportamentos relacionados à saúde, (2) caminho psicológico e (3) caminho fisiológico[49].

### 2.3.1 Comportamentos relacionados à saúde

Primeiramente, evidencias sugerem que, no geral, o tamanho da rede social e o quão fortes são seus laços são inversamente relacionadas com os comportamentos de risco. Por exemplo, as redes sociais exercem uma influencia social entre seus atores, uma vez que as pessoas geram guias normativos através da comparação de suas atitudes com as atitudes de seu grupo de referencia ou seu ator de referencia. Esse compartilhamento entre normas em relação a comportamentos de saúde geram um "significado simbólico"[147] e influenciam atitudes como adesão a tratamentos, prática de atividade física e tipo de dieta[49]. Além disso, uma das consequências da solidão e da depressão nos indivíduos é a capacidade de auto-regulação diminuída. O déficit de regulação da emoção pode diminuir a capacidade de regular comportamentos de auto-controle[148], o que pode explicar a menor chance de pratica de atividade física e o maior risco de obesidade nesses indivíduos[148,149].

Outro possível mecanismo pelo qual os fatores psicossociais podem influenciar a funcionalidade do idoso é a regulação do acesso individual a oportunidades na vida (recursos materiais e/ou boas fontes)[47]. A participação social, neste sentido, faz com que o indivíduo compartilhe experiências de trabalho e/ou de saúde, ou a filiação religiosa prove acessos a recursos e serviços que impactam diretamente na saúde. Portanto, além do apoio social que tais grupos podem proporcionar,

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[47] Berkman LF, Glass T, Brissette I, Seeman TE. From social integration to health: Durkheim in the new millennium. Soc sci med. 2000; 51(6): 843-57.

[146] Umberson D, Montez JK. Social Relationships and Health: A Flashpoint for Health Policy. J Health Soc Behav. 2010 ; 51(Suppl): S54–S66.

[147] Hawkley LC & Cacioppo JT. Loneliness Matters: A Theoretical and Empirical Review of Consequences and Mechanisms. Ann Behav Med. 2010 Oct; 40(2): 218-27.

[148] Ong AD, Uchino BN. Wethington E. Loneliness and Health in Older Adults: A Mini-Review and Synthesis. Gerontology 2016; 62(4):443-49.

simples engajamento nos mesmos pode gerar acesso a melhor qualidade dos serviços de saúde[150].

### 2.3.2 Caminho psicológico

Os fatores psicossociais influenciam o estado cognitivo e emocional, como a autoestima, a competência social, a autoeficácia e a depressão, que são mecanismos psicológicos relacionados à saúde[49].

O autoconceito de um indivíduo tem três diferentes componentes: a autoimagem, baseada em como o sujeito vê a si mesmo; a autoestima, baseada no valor que a pessoa si dá; e o eu ideal, o qual reflete como o individuo gostaria de ser. Esses conceitos individuais emergem das nossas interações com o ambiente social, nossos papéis sociais e nossas capacidades. O maior ajuste requerido na terceira idade é a capacidade de redefinir o seu autoconceito enquanto seus papeis sociais são removidos e substituídos pelo processo do envelhecimento (por exemplo aposentadoria, declínio funcional ou a perda do cônjuge). Esses eventos estressantes podem impactar na autoestima e autoeficácia (grau de confiança para realizar diferentes tarefas) dos idosos, aumentando o risco de incapacidades[151].

Indivíduos mais isolados tendem a ver o mundo social como um lugar mais ameaçador, imaginam mais interações sociais negativas e lembram mais de informações sociais negativas, o que são acompanhados de sentimentos como hostilidade, estresse, pessimismo, ansiedade e baixa autoestima[148]. Por outro lado, as redes sociais, o apoio social e a participação social têm uma associação positiva com a autoestima e autoeficácia, uma vez que eles contribuem com o senso de competência dos idosos[151]. Assim, o estímulo à participação e ao engajamento

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[49] Berkman LF, Glass T, Brissette I, Seeman TE. From social integration to health: Durkheim in the new millennium. Soc sci med. 2000; 51(6): 843-57.

[148] Hawkley LC & Cacioppo JT. Loneliness Matters: A Theoretical and Empirical Review of Consequences and Mechanisms. Ann Behav Med. 2010 Oct; 40(2): 218-27.

[150] Berkman LF & Krishna A. Social network epidemiology. In: Berkman LF, Kawachi I, Glymour MM. Social Epidemiology. New York: Oxford University Press, 2014, p. 234-89.

[151] Forsman AK. The importance of social capital in later life: mental health promotion and mental health disorder prevention among older adults. Gotemburgo. Tese [Doutorado em Saúde Pública] - Nordic School of Public Health NHV; 2012.

social, como juntar-se a amigos, participar de funções sociais e frequentar grupos de igreja, definem e reforçam o significado dos papeis sociais, incluindo familiar e ocupacional, e dos papeis comunitários, que fornece um senso de valor, pertencimento e conexão[49].

### 2.3.2 Caminho fisiológico

A vertente psicossocial da epidemiologia social afirma que diferenciais em saúde são resultados da interação com o ambiente social[152], o que levaria em um aumento da resposta ao estresse[27,152]. Essa resposta ao estresse depende da percepção subjetiva do estresse de cada indivíduo, a qual é influenciada pela experiência, comportamento e genética de cada indivíduo. Quando o cérebro percebe uma experiência estressante, respostas fisiológicas e comportamentais são iniciadas, levando a uma alostase e adaptação. Com o tempo, a carga alostática vai se acumulando e a elevada exposição a mediadores do estresse neurais, endócrinos e imunológicos pode ocasionar efeitos adversos em vários sistemas do organismo, levando a pior saúde[147,153]. Os fatores psicossociais tem o potencial de influenciar na quebra deste ciclo por reduzirem o impacto do estresse ou por alimentarem o senso de significado da vida[130]. Por exemplo, o isolamento social e a solidão pode alterar os níveis sanguíneos de cortisol[49,148,149], epinefrina e norepinefrina[49,154], enquanto que a qualidade do casamento e a solidão estão associados com a imunocompetencia[49].

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[27] Siegrist J, Marmot M. Health inequalities and the psychosocial environment—two scientific challenges. Social Science & Medicine 2004; 58 (8): 1463–1473.

[49] Berkman LF, Glass T, Brissette I, Seeman TE. From social integration to health: Durkheim in the new millennium. Soc sci med. 2000; 51(6): 843-57.

[147] Umberson D, Montez JK. Social Relationships and Health: A Flashpoint for Health Policy. J Health Soc Behav. 2010; 51(Suppl): S54–S66.

[148] Hawkley LC & Cacioppo JT. Loneliness Matters: A Theoretical and Empirical Review of Consequences and Mechanisms. Ann Behav Med. 2010 Oct; 40(2): 218-27.

[149] Ong AD, Uchino BN. Wethington E. Loneliness and Health in Older Adults: A Mini-Review and Synthesis. Gerontology 2016; 62(4):443-49.

[152] Cassel J. The contribution of the social environment to host resistance. Am J Epidemiol. 1976;104(2):107-23

[153] McEwen BS. Protective and damaging effects of stress mediators. N Engl J Med.1998; 338(3):171-9.

[154] Cacioppo JT, Cacioppo S, Capitanio JP, Cole SW. The neuroendocrinology of social isolation. Annu Rev Psychol. 2015;66:733-67.

A fim de se analisar a associação entre fatores psicossociais e funcionalidade, utilizou-se dados de um estudo brasileiro, o Projeto Bambuí (*The Bambui Cohort Study of Ageing*), e um estudo inglês, o *English Longitudinal Study of Ageing* (*ELSA*). A descrição de cada um deles, bem como as variáveis analisadas, serão explicitadas a seguir.

## 2.4 O PROJETO BAMBUÍ (*THE BAMBUI COHORT STUDY OF AGEING*)

O Projeto Bambuí é um estudo longitudinal realizado na cidade de Bambuí, situada a 215km de Belo Horizonte-MG, com uma população estimada de 21 mil habitantes. A escolha desta cidade para estudo foi baseado em quatro critérios: (1) baixa taxa de imigração (a fim de reduzir perdas durante seguimento); (2) características sócio-demograficas; (3) perfil de mortalidade; (4) viabilidade do estudo em termos de cooperação dos residentes e facilidade para seguimento da população[155]. Seu principal objetivo é examinar os efeitos isolados e em conjunto da infecção crônica do T. cruzi e doenças não comunicáveis na saúde dos idosos[156].

Em 1996, foi realizado um censo na cidade de Bambuí, que possuía, na época, aproximadamente 15.000 habitantes na zona urbana, para identificação dos participantes. A população que apresentava 60 anos ou mais em 01/01/1997, residente na zona urbana de Bambuí (1742) foi convidada a participar do estudo e 1606 (92,2%) concordaram em participar. Os dados da linha de base foram coletados de fevereiro a maio de 1997. Os membros da coorte são seguidos anualmente, consistindo de entrevistas padronizadas e verificação das declarações de óbito[157]. O Projeto Bambuí foi aprovado pelo Comitê de Ética do Instituto de Pesquisas René Rachou da Fundação Oswaldo Cruz, Belo Horizonte, Minas Gerais (anexo 1).

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[155] Lima-Costa MF, Firmo JOA, Uchôa E. The Bambuí Cohort Study of Aging: methodology and health profile of participants at baseline. Cad Saúde Pública. 2011; 27(sup3): S327-S35.
[156] Lima-Costa MF, Firmo JOA, Uchôa E. Cohort Profile: The Bambui (Brazil) Cohort Study of Ageing. Int J Epidemiol. 2011; 40(4): 862-7.
[157] Lima-Costa MF, Uchôa E, Guerra HL, Firmo JOA, Vidigal PG, Barreto SM. The Bambuí health and ageing study (BHAS): methodological approach and preliminary results of a population-based cohort study of the elderly in Brazil. Rev Saúde Pública. 2000; 34(2): 126-35.

### 2.4.1 Mensuração da funcionalidade

Como em outros estudos epidemiológicos de base populacional, o Projeto Bambuí (*The Bambui Cohort Study of Ageing*) não tem medidas objetivas para a mensuração da funcionalidade devido à dificuldade de operacionalização dessas medidas. Assim, as medidas de funcionalidade foram avaliadas através do autorrelato da dificuldade de desempenhar ABVDs. Medidas de autorrelato são métodos comuns de avaliar a função de idosos e envolvem a perspectiva do idoso em relação a sua mudança. Essas medidas diferem substancialmente de medidas objetivas de desempenho físico, as quais envolvem uma quantificação e são influenciadas pela dor[158], apesar de serem fortemente associadas[159].

As ABVDs correspondem aos níveis mais graves de deficiência das aptidões físicas e envolvem funções de sobrevivência[15]. Uma escala foi proposta para avaliar ABVDs, a escala de Katz[160], adaptada para a população brasileira[161], sendo que estudos também tem utilizado a sua versão modificada[162,163,164].

No Projeto Bambuí, o idoso foi indagado em relação à facilidade ou dificuldade para desempenhar as atividades, segundo a escala de Katz modificada, com quatro opções de resposta (nenhuma dificuldade, alguma dificuldade, muita dificuldade ou não consegue). As ABVD consideradas foram: ir ao banheiro; tomar banho; vestir-se, incluindo calçar sapatos, fechar zíper, fechar e abrir botões; comer segurando um garfo, cortando alimentos, bebendo um copo; deitar ou levantar da cama; e caminhar de um quarto ao outro, em um mesmo andar.

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[15] Paixão Junior CM.; Reichenheim ME. Uma revisão sobre instrumentos de avaliação do estado funcional do idoso. Cad. Saúde Pública, 2005;21(1):7-19.

[158] Reiman MP, Manske RC. The assessment of function: How is it measure? A clinical perspective. J Man Manip Ther. 2011; 19(2): 91–99.

[159] Young Y, Boyd CM, Guralnik JM, Bandeen-Roche K, Fried LP. Does Self-Reported Function Correspond to Objective Measures of Functional Impairment? Am Med Dir Assoc. 2010;11(9):645–53.

[160] Katz S, Ford AB, Moskowitz RW, Jackson BA, Jaffe MW. Studies of illness in the aged. The index of ADL: a standardized measure of biological and psychological function. JAMA. 1963; 185(12): 914–9.

[161] Lino VTS, Pereira SRM, Camacho LAB, Ribeiro Filho ST, Buksman S. Adaptação transcultural da Escala de Independência em Atividades da Vida Diária (Escala de Katz) Cad Saúde Pública. 2008; 24(1):103-112.

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[163] Reynolds SL, Silverstein M. Observing the onset of disability in older adults. Soc Sci Medicine 2003; 57(10): 1875–89.

[164] Freedman VA, Aykan H, Martin LG. Another look at aggregate changes in severe cognitive impairment: further investigation into the cumulative effects of three survey design issues. J Gerontol Soc Sci. 2002;57B:S126–S131.

### 2.4.2 Mensuração de fatores psicossociais

O construto relações sociais é complexo e envolve subdivisões, conforme já descrito anteriormente. Para o objetivo deste estudo, foram consideradas a dimensão estrutural (presença de cônjuge e contatos sociais) e a dimensão funcional (apoio emocional positivo da pessoa mais próxima). A presença de cônjuge foi codificada em casado/morando com companheiro, divorciado/solteiro e viúvo. Os contatos sociais foram avaliados através do número de amigos ou parentes encontrados uma ou mais vezes no último mês, codificados em nenhum, 1-2, 3-5 ou 6 ou mais). A fim de se mensurar o apoio emocional, foi utilizado o *The Close Persons Questionnaire*[165], o qual avalia aspectos positivos do relacionamento com a pessoa considerada mais próxima (indicada pelo próprio participante). Este questionário engloba o compartilhamento de informações, sugestões e orientações úteis; compartilhamento de interesses, diversões e lazer; e sentir-se melhor consigo mesmo, todos nos últimos doze meses. As opções de resposta foram nunca, as vezes, quase sempre ou sempre, totalizando um escore de 9. O escore final foi dividido em tercis, sendo classificado em menor que 6 (pouco apoio social), 6-7 (apoio social intermediário) e 8 ou mais (grande apoio social).

Os sintomas depressivos foram mensurados através da versão de doze itens do General Health Questionnaire (GHQ-12)[166]. Foram utilizados a distribuição em quartis para definir os escores totais em sintomas menores (5-8) e maiores (maior ou igual a 9)[167].

[165] Stansfeld S & Marmot M. Deriving a survey measure of social support: the reliability and validity of the Close Persons Questionnaire. Soc Sci Med. 1992; 35(8):1027-35.
[166] Castro-Costa E, Barreto SM, Uchoa E, Firmo JO, Lima-Costa MF, Prince M. Is the GDS-30 better than the GHQ-12 for screening depression in the elderly people in the community? The Bambui Health Aging Study (BHAS). Int Psychogeriatr, 2006;18(3):493-503.
[167] Diniz BS et al.The effect of gender, age, and symptom severity in late-life depression on the risk of all cause mortality: the Bambui Cohort Study of Aging. Depress Anxiety. 2014; 31(9):787-95.

## 2.5 *ENGLISH LONGITUDINAL STUDY OF AGEING* (*ELSA*)

O *ELSA* é um estudo longitudinal, composto de uma amostra representativa de pessoas com 50 anos ou mais, residentes na comunidade da Inglaterra[168]. Este projeto tem três objetivos principais: (1) entender o que significa envelhecer no novo século, (2) examinar a interelação entre diferentes áreas da vida, e (3) promover o entendimento através de base científica para guiar políticas públicas[169].

A amostra desta pesquisa foi delineada a partir dos domicílios os quais já haviam participado previamente do *Health Survey for England (HSE)* (1998 e 2001 e, posteriormente, 1999), pesquisa anual conduzida pelos *Joint Health Surveys Unit* do *Department of Epidemiology and Public Health*, *University College London*, e *The National Centre for Social Research*, sob comando do *Department of Health*. A seleção amostral foi conduzida em dois estágios: primeiro, o código de endereçamento postal (CEP) foi estratificado pela autoridade de saúde e pela proporção de domicílios no grupo socioeconômico. Os endereços foram, então, selecionados sistematicamente de cada setor e um número específico de adultos e crianças em cada domicílio foram considerados elegíveis para a entrevista. Para o ELSA, foram incluídos apenas os domicílios que havia pessoas com 50 anos ou mais, totalizando uma amostra de 12.100 pessoas, com uma taxa de resposta em torno de 67%. Os dados da linha de base foram coletados de março de 2002 a março de 2003. Os membros da coorte são seguidos a cada dois anos, consistindo de entrevistas padronizadas[170]. A pesquisa foi aprovada pelo *London multicentre research ethics committee*[168].

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[168] Taylor R, Conway L, Calderwood L, Lessof C. Methodology. In: Marmot M, Banks J, Blundell R, Lessof C, Nazroo J. Health, wealth and lifestyles of the older population in England: The 2002 English Longitudinal Study of Ageing. Londres: Institute for Fiscal Studies, 2004, p. 357-74

[169] Marmot M, Banks J, Blundell R, Lessof C, Nazroo J. Introduction. In: Marmot M, Banks J, Blundell R, Lessof C, Nazroo J. Health, wealth and lifestyles of the older population in England: The 2002 English Longitudinal Study of Ageing. Londres: Institute for Fiscal Studies, 2004, p. 1-8.

[170] Steptoe A, Breeze E, Banks J, Nazroo J. Cohort Profile: The English Longitudinal Study of Ageing. International Journal of Epidemiology 2013; 42(6):1640-1648

### 2.5.1 Mensuração da Funcionalidade

Foram utilizadas as mesmas medidas de ABVD em relação ao Projeto Bambuí (uso do vaso sanitário, incluindo levantar e assentar; tomar banho de banheira ou chuveiro; vestir-se, incluindo calçar sapatos e meias; comer cortando alimentos; assentar ou levantar da cama; e caminhar ao redor de quarto), acrescidas de medidas de AIVDs. Estas incluíram sete atividades: utilizar um mapa para se locomover em um local estranho, preparar uma refeição quente, comprar mantimentos, uso do telefone, tomar medicações, fazer serviços de casa ou jardim e gerenciar o próprio dinheiro. Todas elas foram dicotomizadas, considerando se o participante realiza ou não realizada a atividade.

### 2.5.2 Medidas psicossociais

Considerando as relações sociais, foi avaliado a dimensão estrutural (presença de cônjuge e frequência de contatos sociais) e a dimensão funcional (apoio social positivo). A presença de cônjuge foi codificada em sim (casado ou com cônjuge) e não (solteiro, divorciado ou viúvo). A frequência de contatos sociais pelo menos uma vez na semana (tanto face a face quanto pelo telefone, email ou mensagem de texto) com amigos, parentes ou filhos que não coabitam com o participantes foi dicotomizada. O objetivo foi identificar os indivíduos que não tiveram nenhum contato frequente com pessoas fora de casa. O apoio social positivo recebido por filhos, amigos ou parentes foi avaliado por três perguntas, com opções de resposta “muito”, “algum”, “pouco” e “nenhum”: o quanto eles entendem o jeito que o participante se sente; o quanto o participante pode contar com eles; e o quanto o participante pode se abrir com eles. O apoio social positivo foi considerado como presente quando o participante respondeu “muito” nas três perguntas ou “muito” em duas e “algum” em uma, para cada uma das três redes sociais. Então, elas foram combinadas e o apoio social baixo foi considerado quando o participante não tinha apoio social de nenhuma das três redes sociais.

A solidão foi avaliada através da *Three-item Loneliness Scale*[107], derivada de uma

[107] Hughes ME, Waite LJ, Hawkley LC, Cacioppo JT. A short scale for measuring loneliness in large surveys. Reserch Aging. 2004; 26(6): 655-672.

escala de 20 itens *UCLA Loneliness Scale*[171]. A escala contem três perguntas, com opções de resposta “nunca ou quase nunca”, “algumas vezes” e “frequentemente”: sentir-se que não tem companhia; sentir-se deixado de lado; e sentir-se isolado das outras pessoas. O escore total varia de 1 a 9 e foi dividido em tercis, comparando-se o tercil superior de solidão com os demais tercis.

Os sintomas depressivos foram avaliados pela versão curta do *Center for Epidemiological Studies-Depression (CES-D) scale*[172], a qual inclui oito questões sobre a presença de sintomas depressivos na última semana. A variável foi dicotomizada considerando o ponto de corte validado de quatro ou mais sintomas depressivos[173].

[171] Russell DW. UCLA loneliness scale (version 3): reliability, validity, and factor structure. J Personality Assessment 1996; 66(1): 20-40.
[172] Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. Applied Psych Measurement 1977; 1(3): 385-401.
[173] Steffick DE. Documentation of Affective Functioning Measures in the Health and Retirement Study, HRS Health Working Group, Ann Arbor, MI, DR-005, 2000.

## 2.6 JUSTIFICATIVA

O Brasil e a Inglaterra têm passado por um processo de envelhecimento, consequente da queda da fecundidade e da mortalidade[174], sendo que o ritmo da transição demográfica é mais acelerado no Brasil[2]. Concomitante a essa transição demográfica, apesar de estudos mostrarem uma tendência de manutenção da prevalência de incapacidade em ambos[8,10], estudos de coorte de nascimento mostram, no Brasil, prevalência maior de dificuldade nas tarefas de andar em um cômodo e usar o banheiro na coorte de nascimento mais jovem[22], enquanto que na Inglaterra, a prevalência de limitação severa em atividades é maior em coortes mais velhas[175]. Além disso, a prevalência de dificuldade em ABVDs no Brasil, quando comparada com a da Inglaterra, é maior[13], seja por diferença de fatores ambientais, fatores psicossociais e/ou políticas públicas.

A identificação de preditores da incapacidade pode contribuir não somente para um melhor entendimento dos mecanismos de seu surgimento, mas também para a identificação de grupos vulneráveis a fim de realizar programas de prevenção e/ou reabilitação precoce. Dentre estes preditores, encontram-se os fatores psicossociais, que englobam o ambiente social.

Seguindo o referencial teórico explicitado anteriormente, os fatores psicossociais podem estar associados com a incapacidade por pelo menos três

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[2] US National Institute of Aging. World Health Organization. Global Health and Aging; 2011 Oct. 32 p. NIH Publication No.: 11-7737.

[8] Lima-Costa MF, Matos DL, Camargos VP, Macinko J.Tendências em dez anos das condições de saúde de idosos brasileiros: evidências da Pesquisa Nacional por Amostra de Domicílios (1998, 2003, 2008). Ciênc Saúde Coletiva, 2011;16(9):3689-96.

[10] Robine J, Michel J. Looking Forward to a General Theory on Population Aging. J Gerontology A Biol Sci Med Sci 2004; 59(6):590–7.

[13] Lima-Costa MF, De Oliveira C, Macinko J, Marmot M. Socioeconomic inequalities in health in older adults in Brazil and England. Am J Public Health. 2012;102(8):1535-41.

[22] Oliveira, CM, Lima-Costa, MF. Birth cohort differences in physical functioning levels among elderly Brazilians: findings from the Bambuí Cohort Study of Aging (1997-2008). Cad Saúde Pública 2011; 27(sup3): S444-53.

[174] Ervatti LG, Borges GM, Jardim AP. Mudança demográfica no Brasil no início do século XXI: subsídios para as projeções da população. Instituto Brasileiro de Geografia e Estatística (IBGE). Rio de Janeiro, 2015.

[154] Zaninotto P, Nazroo J, Banks J. Trends in disability. In: Banks J, Lessof C, Nazroo J, Rogers N, Stafford M,Steptoe A. Financial circumstances, health and well-being of the older population in England THE 2008 ENGLISH LONGITUDINAL STUDY OF AGEING (Wave 4). Londres: Institute for fiscal studies, 2010. p. 254-74.

mecanismos de ação:

1) O compartilhamento entre normas no tocante à **comportamentos relacionados à saúde** geram um "significado simbólico" e influenciam atitudes positivas como adesão a tratamentos, prática de atividade física e tipo de dieta, além de aumentarem acesso individual a oportunidades na vida;

2) Os fatores psicossociais influenciam o estado cognitivo e emocional, como a autoestima, a competência social, a autoeficácia e a depressão, **mecanismos psicológicos** relacionados à saúde;

3) **Respostas fisiológicas** e comportamentais são iniciadas como reação a uma experiência estressante, levando a uma alostase e adaptação. Com o tempo, a carga alostática vai se acumulando e a elevada exposição a mediadores do estresse neurais, endócrinos e imunológicos pode ocasionar efeitos adversos em vários sistemas do organismo.

Apesar da ampla literatura investigando a associação entre fatores psicossociais e incapacidade em pessoas com idade avançada, algumas lacunas ainda persistem. Primeiramente, a maioria dos estudos, tanto transversais como longitudinais, foram conduzidos em países desenvolvidos. Em segundo lugar, uma minoria de estudos investigaram a interação entre status socioeconômico e incapacidade[176], sendo aquele utilizado quase sempre como um fator de ajuste. E em terceiro lugar, a maioria dos estudos conduzidos no Brasil são de caráter transversal, o que impossibilita conclusões sobre a direção dos mecanismos de ação citados anteriormente e teste de possível causa e efeito.

[176] Nilson CJ, Avlund K, Lund R. Onset of mobility limitations in old age: the combined effect of socioeconomic position and social relations. Age Ageing 2011; 40(5): 607–614

# 3 OBJETIVOS

## 3.1 Objetivo geral

O objetivo geral deste trabalho foi Investigar a funcionalidade e sua associação com os fatores psicossociais nas populações inglesa e brasileira participantes, respectivamente, da coorte de Bambuí e do ELSA, considerando pessoas com idade avançada.

## 3.2 Objetivos específicos

- Investigar os efeitos a longo prazo de fatores psicossociais, considerando apoio social, contatos sociais, estado civil e sintomas depressivos, na incidência de dificuldade em ABVDs de idosos da Coorte de Bambuí (ARTIGO 1);

- Investigar possível modificação de efeito dos sintomas depressivos na associação entre funcionalidade e apoio social em idosos da Coorte de Bambuí (ARTIGO 1);

- Investigar a possível modificação de efeito do status socioeconômico na associação entre funcionalidade e fatores psicossociais, considerando apoio social, contatos sociais, estado civil, sintomas depressivos e solidão, entre mulheres com 50 anos ou mais vivendo na Inglaterra (ARTIGO 2);

- Investigar a possível modificação de efeito do status socioeconômico na associação entre funcionalidade e fatores psicossociais, considerando apoio social, contatos sociais, estado civil, sintomas depressivos e solidão, entre homens com 50 anos ou mais vivendo na Inglaterra (ARTIGO 2);

## 4 ARTIGO ORIGINAL 1

**Psychological distress, emotional support and activities of daily living disability onset: 15 years follow-up of the Bambui (Brazil) Cohort Study of Ageing**

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## ABSTRACT

**Objectives:** Psychosocial factors appear to be associated with increased risk of physical disability in later life. However, there is a lack of evidence based on long-term longitudinal data from Western low-middle income countries. We investigated whether psychosocial factors at baseline predict new-onset disability in long term in a population-based cohort of older Brazilian adults.

**Methods:** We used 15-year follow-up data from 1,014 participants aged 60 years and older of the Bambui Study. Limitations on Activities of Daily Living (ADL) were measured annually, comprising 9,252 measures. Psychosocial factors included psychological distress, social support and social network. Potential covariates included socio-demographic characteristics, lifestyle, cognitive function and a physical health score based on 10 self-reported and objectively measured medical conditions. Statistical analysis was based on competitive-risk framework, having death as the competing risk event.

**Results:** Baseline psychological distress and emotional support from the closest person were both associated with future ADL disability, independently of a wide range of potential covariates. The findings showed a clear graded association in that the risk increased gradually from low emotional support alone (Sub-hazard ratio (SHR): 1.11; 95% confidence interval (CI): 1.01, 1.45) to psychological distress alone (SHR: 1.51; 95% CI: 1.13, 2.01) and then to both factors combined (SHR = 1.61 95% CI: 1.18, 2.18). Marital status and social network size were not associated with incident disability.

**Conclusion:** In a population of older Brazilian adults, lower emotional support and psychological distress have independent predictive value for subsequent disability in very long term.


**Keywords:** Disability; social support; psychological distress; GHQ-12; cohort studies; ageing

## INTRODUCTION

Disability in later-life is a public health concern worldwide and a new challenge in middle income countries where the demographic ageing of the population is occurring at an unprecedented pace (US National Institute of Aging, 2011). Identifying predictors of disability can potentially contribute not only to a better understanding of underlying mechanisms, but also to target vulnerable groups for the purposes of prevention and early rehabilitation. Psychosocial factors, particularly depression and social resources, appear to be associated with increased risk of physical disability in later life (Alexandre Tda et al., 2012; Carrière et al., 2011; Fauth, Gerstorf, Ram, & Malmberg, 2012; Mendes de Leon & Rajan, 2014). However, the exact role of these characteristics on the association remains uncertain (Mendes de Leon & Rajan, 2014).

Depressive symptoms have been reported to be associated with new onset or changes in severity of activity of daily living (ADL) disability in a number of studies [e.g., (Alexandre Tda et al., 2012; Carrière et al., 2011; Fauth et al., 2012; Mendes de Leon & Rajan, 2014)]. Others, however, have suggested that depression is more likely to be the result of increase in disability rather than a predictor of changes in functional status (Everton-Rose et al., 2005; Yang & George, 2005). Social resources have also been linked to increased risk, but the kind of resource implicated on the association is debatable. For example, social network and/or social engagement were found to be associated with physical decline in some studies (James, Boyle, Buchman, & Bennett, 2011; Lund, Nilsson, & Avlund, 2010; Mendes de Leon & Rajan, 2014) while in others, social support (Chen, Chang, & Lan, 2015; Fauth et al., 2012; McLaughlin et al., 2012) and loneliness (Perissionotto, Cenzer, & Covinsky, 2012) showed an association. Furthermore, a recent report has suggested that the association between social support and physical decline is bidirectional (Hakulinen et al., 2016). Additionally, social support might be confounded or modified by other factors like depression (Uchino, Bowen, Carlisle, & Birmingham, 2012). To our knowledge, no previous study has examined the prognostic value of psychological distress, as assessed by the General Health Questionnaire, for physical decline.

Current evidence on the prognostic value of psychosocial factors and physical

decline is based on short (up to 5 years) (Chen et al., 2015; Fauth et al., 2012; James et al., 2011; Lund et al., 2010; McLaughlin et al., 2012; Perissionotto et al., 2012) and medium term (up to 9 years) follow-up data (Chen et al., 2015; Fauth et al., 2012; James et al., 2011; Lund et al., 2010; McLaughlin et al., 2012; Perissionotto et al., 2012). Therefore, there is a lack of studies examining the association between those factors with incident ADL disability in very long term. Additionally, there is a lack of research based on robust long-term longitudinal data on this topic from Western low-middle income countries. Given that those characteristics are likely to be influenced by social, cultural and environmental factors (Field & Jette, 2007), this gap in the literature is particularly relevant.

There are also methodological issues to be considered. For example, in the Bambui cohort population death is associated with many age-related outcomes, such as ADL disability, cognitive function, psychological distress and cardiovascular risk factors, among others (Diniz et al, 2014; Lima-Costa et al, 2011; Lima-Costa et al, 2010). Thus, death may represent an informative censoring of the longitudinal outcome that may result in biased estimates of the associations (Murphy et al., 2011). This raises the challenge of how to account for participants who have died without experiencing disability. Traditional statistical approaches to calculate disease risk such as the Cox Proportional Hazard regression can overestimate the risk of disease by failing to account for the competing risk of death (Barry, Ngo, Samelson, & Kieal, 2010; Murphy et al., 2011). Therefore, using a competing risk approach is critical to accurately assess predictors of disability in later life (Barry et al., 2010). To our knowledge, no previous study has considered the competing risk of death to examine the association between psychosocial factors and incident ADL disability.

We used 15-year follow-up data from the Bambui Cohort Study of Ageing, the longest community-based cohort study of ageing in Brazil (Lima-Costa, Firmo, & Uchoa, 2011), to examine the ability of baseline measures of social support, social network and psychological distress to predict onset of ADL disability in long term. The use of a competing risk framework, a well-defined community-dwelling sample of older adults, the availability of information from a wide range of health conditions that could confound the association and a long follow-up provide a rare opportunity to investigate these questions in a Western middle-income country.

## Methods

### *Study design and population*

The Bambui Cohort Study of Ageing was designed to examine the prevalence and incidence of age-related health outcomes in an older population with low schooling and income levels. Bambui, where the study was conducted, is a city of approximately 15,000 inhabitants located in the state of Minas Gerais in Southeastern Brazil. The cohort procedures have been described in detail elsewhere (Lima-Costa et al., 2011). Briefly, the baseline cohort population comprised all residents aged 60 and over in January 1997 (1,606 from 1,742 older residents participated). Cohort members underwent subsequent annual follow-up by face-to-face interview. Deaths were reported by next of kin during the annual follow-up (death certificates were obtained for 95% of all deceased participants). Blood collection and other procedures were performed at baseline and in selected subsequent waves. The Bambui Cohort Study of Ageing was approved by the Ethics Research Committee of the Oswaldo Cruz Foundation, Brazil.

### *Outcome variable*

Annually, from 1997 to 2011, cohort participants were asked about their functioning level based on their difficulty to perform six ADLs, namely showering, toileting, dressing, eating, getting in/out of a bed and walking across a room. The questions had four possible answers: no difficulty, some difficulty, great difficulty and unable to perform. New onset disability was considered when a participant reported, for the first time, great difficulty or inability to perform at least one ADL. The year when the new onset occurred was considered the date of onset.

### *Main predictor variables*

Psychological distress was assessed by the 12-item General Health Questionnaire (GHQ-12) (Goldberg & Blackwell, 1970). In our initial analysis, we used the quartiles of the distribution of GHQ-12 scores to define “major” (scores above the third quartile; i.e. scores ≥ 9) and “minor” mental symptoms (scores below

the third quartile; i.e. scores between 5 and 8), as described elsewhere (Costa et al, 2006; Diniz et al., 2014).

Psychosocial resources were assessed at baseline and comprised marital status, social support (assessed by positive emotional support) and social network. Marital status was coded as married/cohabiting, divorced/single and widowed. The Close Persons Questionnaire (Stansfeld & Marmot, 1992) was used to assess positive aspects of the relationship with the closest person (named by respondents), that encompasses suggestions and guidance, reliance, making the responded to feel good and sharing interests. The five-point Likert-scaled response was summed and divided into three groups based on tertile cut-points (<6, 6-7 and ≥ 8 represent low, intermediate and high support, respectively). Social network was based on the number of friends or relatives seen on a monthly basis (coded as none, 1-2, 3-5 and ≥ 6)

***Covariates***

The covariates measured at baseline were socio-demographic characteristics (age, gender, schooling years and monthly household income per capita), lifestyle (current smoking and physical activity during previous 3 months), cognitive function (Mini-Mental State Examination, MMSE), and physical health (see below). Because some of the health measures were correlated, we used principal component analysis (Ismail, 2008; Vyas & Kumaranayake, 2012) to create a latent variable, i.e. a health score, that included the following conditions: arthritis (any joint diseases), myocardial infarction and stroke (both assessed by a medical diagnosis of the condition), angina pectoris and intermittent claudication (WHO Rose's questionnaire) (Rose, 1962), overweight (body mass index ≥ 25 kg/$m^2$), diabetes mellitus (fasting blood glucose ≥ 126 mg/dL and/or treatment) and heart failure (B-Type Natriuretic Peptic level >100pg/mL) (all as dichotomous variables), systolic blood pressure and total cholesterol level (both as continuous variables). Scores could range from - ∝ to + ∝. Higher scores indicated worse health status. The health score was divided into ten groups based on cut-points tentiles.

***Statistical analysis***

We used competing-risk regression (Fine & Gray, 1999) to estimate the multivariate sub-hazard ratios (SHR) and their 95% confidence intervals to model 15-year survival-time disability data, after confirming that the assumption of proportionality of sub-hazards was met. To consider death that could be related to disability, we used death (i.e. date of death) as a competing risk event. Therefore, our analyses were based on the cumulative incidence function i.e. $C_k(t)$, that gives the proportion of subjects at time *t* who have suffer the event *k* accounting for the fact that subjects can suffer other events, as follows:

$$C_k(t) = \sum_{t_j \leq t} h_k(t_j) S(t_{j-1})$$

Where $h_k(t_j)$ is the specific risk for the event *k* at time $t_j$, and $S(t_{j-1})$ is the probability to survive at time $t_{j-1}$. Similar to the Kaplan-Meier's estimations, the general survival probability *S(t)* is defined as:

$$S(t) = \prod_{t_j \leq t} \left( \frac{R(t_j) - d(t_j)}{R(t_j)} \right)$$

Where $R(t_j)$ is the number of individuals at risk at time $t_j$ and $d(t_j)$ is the total number of all events occurred.

The main advantage of using competing risk regression models is that the risk group $R(t_j)$ includes not only those individuals who have not suffer any event but also those who had suffer the competing event. With this structure, a different hazard function is defined as the probability of the event given that an individual has survived up to time *t* without any event or had had the competing event prior to time *t*. This is the sub distribution hazard (SHR) (Lau, Cole, & Gange, 2009).

First, we implemented separate competing-risk regression models for each psychosocial variable (psychological distress, marital status, emotional support, and relatives and friends network - all categorized as previously described) to estimate its association with new-onset disability. All models were adjusted for age (continuous),

sex, schooling years (<4, 4-7 and ≥ 8), monthly household income per capita (<240, 241-479 and ≥ 480.00 USD), current smoking (dichotomous), leisure-time physical activities for 20-30 minutes in previous 3 months (never, < 3 times per week and ≥ 3 times per week), physical health score (divided into tentile cut-off points) and MMSE score (continuous). Further, we mutually adjusted these psychosocial variables by each other.

Additionally, we used the fully adjusted competitive-risk regression models to examine the separate and combined association of baseline psychological distress and emotional support with onset disability. Because “minor” and “major” mental symptoms showed similar SHRs for the outcome, both categories were collapsed and psychological distress was categorized into yes or no (score ≥ 5 or lower). Similarly, given that only low emotional support showed a statistically significant association with new onset disability, intermediate and high support levels were collapsed, and emotional support was categorized into low and high (score < 6 or higher). Based on this fully adjusted competitive-risk model, we estimated cumulative incidence rates for disability by year, according to separate and joint psychological distress and emotional support categories, and plotted the results.

Statistical analyses were conducted using STATA 13.0 statistical software (Stata Corporation, College Station, Texas).

**Results**

Of 1,606 cohort participants, 283 had ADL disability at baseline and were excluded from the current analysis. Thus, the current analysis was based on cohort participants who reported no disability at baseline and who had complete information for all study variables (309 excluded due to missing data), summing 1,014 participants (mean age = 68.6 years). During the study period, 9,252 measures of ADL were collected, 347 participants died, 359 developed ADL disability (incident rate = 38.8 per 1,000 person-years) and 96 were lost to follow-up. Socio-demographic and other baseline characteristics of study participants are displayed in Table 1 [table 1 near here].

As shown in Table 2, “minor” and “major” mental symptoms and low emotional

support showed positive statistically significant ($p<0.05$) associations with incident disability in the model adjusted for socio-demographic, health characteristics and in the model mutually adjusted for psychosocial factors. Marital status and the size of relatives and friends network did not show statistically significant associations with incident disability in any model [table 2 near here].

Table 3 shows the results of the multivariate analysis of the separate and combined association of psychological distress and emotional support with onset of ADL disability. Relative to those with no psychological distress and high support, low emotional support and psychological distress alone increased the risk of disability (SRH = 1.11; 95%CI 1.01, 1.45 and SRH = 1.53; 95% CI 1.13, 2.01, respectively). The presence of both factors increased the risk of disability by 1.61 (95% CI 1.18, 2.18). No statistically significant interaction ($p>0.05$) between those two factors on the risk of disability was found [table 3 near here].

Figure 1 shows the cumulative probability of disability by year, according to separate and combined baseline psychological distress and emotional support. The clearly separated lines highlights the graded association between those factors and the risk of disability showed in Table 3 [figure 1 near here].

## Discussion

The key findings from our analysis are that baseline measures of both psychological distress and emotional support (as assessed by emotional relationship with the closest person), have predictive value for incident disability in long term, independently of an array of potential confounding variables. Moreover, when combined, the association between those factors and incident ADL disability showed a clear graded association in that the risk increases from low emotional support alone to psychological distress alone and then to both factors together. Marital status and the size of social network were not associated with incident disability. The absence of these associations is in agreement with previous research suggesting that it is the quality but not the size of the network that counts for the prediction of disability in late life (Chen et al., 2015; Fauth et al., 2012; Perissionotto et al., 2012).

Depression has been postulated as an important underlying mechanism for physical decline in late-life, but the direction of the association between depression and disability is controversial (Alexandre Tda et al,2012; Carrière et al., 2011; Everton-Rose et al., 2005; Fauth et al., 2012; Mendes de Leon & Rajan, 2014; Yang & George, 2005). For example, results from three recent large longitudinal studies reported that: (1) depression is an independent predictor of incident limitations in mobility and instrumental ADL (Carrière et al., 2011); (2) depressive symptoms slightly increase with approaching disability, increase at onset, and decline in the post disability phase (Fauth et al., 2012); (3) depressive symptoms are associated with new-onset ADL disability but not with progression of disability (Mendes de Leon & Rajan, 2014); (4) the association between depressive symptoms with disability appears to be bidirectional (Everton-Rose et al., 2005; Yang & George, 2005). In the present study depressive symptoms were not measured directly. Instead, we used an instrument (i.e. GHQ-12) which was designed to assess common mental disorders or psychological distress (Goldberg & Blackwell, 1970). In our study population, the GHQ-12 has been shown to have similar accuracy as the 30-item Geriatric Depression Scale (GDS-30) to screen for depressive symptoms, considered as gold standard for the diagnosis of major depression ascertained by the Schedules for Clinical Assessment in Neuropsychiatry (SCAN) (Castro-Costa et al., 2006). The validity of GHQ-12 for screening depressive disorders has been also recently demonstrated in Sweden (Lundin et al., 2016). In the current analysis, a single baseline measure of psychological distress showed predictive value for future ADL disability in long term.

There is a vast literature, as indicated by a comprehensive meta-analysis (Holt-Lunstad, Smith, & Layton, 2010), that social support is a robust predictor of future morbidity and mortality. However, there is a concern that social support might be confounded with other factors, especially those related to mental health (Uchino, Bowen, Carlisle, & Birmingham, 2012). This is because psychological mechanisms, such as depression and perceived stress, are the mostly common postulated pathways linking social support to health. An additional concern is that depression might bias perception of support (Uchino et al., 2012). Low emotional support in our analysis was associated with the onset of disability after controlling for psychological

distress, other psychosocial factors and a wide range of relevant conditions.

To our knowledge, no previous study has specifically examined the predictive value of positive emotional support from the closest person for disability. Negative emotional support from the closest person has been reported to predict several conditions that may predispose to physical disability and cognitive functioning decline (Liao et al., 2014), sleep problems (Steptoe, O'Donnell, Marmot, & Wardle, 2008), maintenance of recommended levels of physical activity (Watt et al., 2014) and coronary events (De Vogli, Chandola, Marmot, 2007). Despite controlling for lifestyle variables and important health indicators, we do not know how these measures have changed in the subsequent wave. Thus, the effect of longitudinal changes of those variables on the association between psychological distress, social support and physical decline is a matter of future research.

Strengths of the present study include its well-defined community-dwelling sample of older adults followed for a long period, annual measures of functioning, and minimal follow-up loss. A limitation in our study is inherent to all longitudinal studies of ageing. Older adults are at increased risk of death, which in turn might lead to differential censoring, that is, persons who died are more or less likely to undergo the event of interest than those who have survived (Murphy et al., 2011). As an attempt to overcome this potential source of bias, we used a competing risk framework in our analysis (Fine & Gray, 1999). As above mentioned, we did not consider changes on psychological factors and potential confounding variables over time. Eventual changes on these variables would tend to weaken or strength the associations we found. However, we believe that the objective of our study was accomplished, that is, to examine whether a single measure of psychological factors has predictive value for future disability. Despite considering an array of potential confounding variables in our analysis, residual confounding is always a possibility. Besides, one cannot discard the possibility of the existence of external and unrecognized variables affecting our results.

In conclusion, there has been a recent interest in the usefulness of identifying psychosocial factors to screen people at increased risk of disability for the purposes of prevention and early rehabilitation (Perissionotto et al., 2012). Our results show that psychological distress and lower emotional support from the closest person have

strong predictive value for subsequent ADL disability in a cohort of Brazilian older adults with low schooling and income levels, independently of an array of relevant covariates. This suggests that older adults reporting psychological distress and lower emotional support deserve further attention in clinical setting, especially when both conditions are present.

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Table 1 - Characteristics of participants, Bambui (Brazil) cohort study of aging (1997-2011), N=1,014

| Characteristics | All |
|---|---|
| **Baseline data** | |
| Age, mean (SD) | 68.6 (6.7) |
| Female gender, % | 57.8 |
| Schooling < 4 years, % | 58.2 |
| Monthly household income per capita < USD 480.00, % | 62.7 |
| Current smoker, % | 17.3 |
| Leisure-time physical activities more than 3 times a week, % | 12.8 |
| Mini-Mental State Examination score, median (IQR) | 22 (4) |
| Self-reported arthritis, % | 23.7 |
| Self-reported myocardial infarction, % | 4.8 |
| Self-reported stroke, % | 2.5 |
| Angina pectoris (Rose's questionnaire), % | 8.7 |
| Intermittent claudication (Rose's questionnaire), % | 2.7 |
| Overweight (body mass index ≥ 25 kg/m$^2$), % | 48.1 |
| Diabetes mellitus (blood fasting glucose ≥ 126 mg/dL and/or treatment, % | 14.5 |
| Heart failure ( B-Type Natriuretic Peptic level >100pg/mL), median (IQR) | 38.6 |
| Systolic blood pressure in mmHg, mean (SD) | 137 (21.7) |
| Total cholesterol in mg/dL, mean (SD) | 235 (49.0) |
| Physical health score, median (IQR) | 0.06 (-0.85, 0.92) |
| **Follow-up data** | |
| Interviews, n | 9,252 |
| Deaths, n (%) | 347 (34.2) |
| Loss to follow-up, n (%) | 96 (9.5) |
| New-onset of ADL disability, n ( rate per 1,000 pyrs) | 359 (38.8) |

Abbreviations: SD (standard deviation), IQR: interquartile range, pyrs: person-years

Table 2 - Baseline psychosocial measures and their association with 15-year onset of ADL disability, Bambui (Brazil) cohort study of aging, (1997-2011)

| Measures | Prevalence at the baseline (n=1014) | Number of onsets (incident rate per 1,000 pyrs) | SHR (95% CI) adjusted for sociodemographic and health variables[1] | SHR (95% CI) adjusted for sociodemographic and health variables and mutually adjusted for psychosocial factors listed in the Table |
|---|---|---|---|---|
| **Psychological distress (GHQ-12 cut-off points)** | | | | |
| No (<5) | 66.6 | 208 (31.8) | 1.0 | 1.0 |
| Minor (5-8) | 23.1 | 104 (54.6) | 1.45 (1.14, 1.83) | 1.41 (1.11, 1.79) |
| Major (≥9) | 10.4 | 47 (57.9) | 1.49 (1.08, 2.04) | 1.43 (1.03, 1.98) |
| **Marital status** | | | | |
| Married/cohabiting | 52.6 | 167 (32.5) | 1.0 | 1.0 |
| Divorced/single | 14.6 | 51 (40.0) | 0.94 (0.68, 1.29) | 0.89 (0.64, 1.23) |
| Widowed | 32.8 | 141 (50.0) | 0.97 (0.75, 1.25) | 0.96 (0.74, 1.24) |
| **Emotional support in tertiles (cut-off points)** | | | | |
| High (≥ 8) | 32.5 | 97 (31.3) | 1.0 | 1.0 |
| Intermediate (6-7) | 27.0 | 106 (42.2) | 1.34 (1.02, 1.75) | 1.26 (0.95, 1.67) |
| Low (< 6) | 40.5 | 156 (42.8) | 1.34 (1.04, 1.73) | 1.31 (1.01, 1.69) |
| **Number of relatives seen once a month or more** | | | | |
| None | 15.7 | 60 (46.1) | 1.0 | 1.0 |
| 1-2 | 15.9 | 51 (34.4) | 0.79 (0.55, 1.14) | 0.82 (0.57, 1.19) |
| 3-5 | 32.9 | 122 (40.0) | 0.90 (0.67, 1.21) | 0.96 (0.71, 1.30) |
| ≥ 6 | 35.5 | 121 (37.1) | 0.97 (0.72, 1.29) | 1.06 (0.78, 1.45) |
| **Number of friends seen once a month or more** | | | | |
| None | 5.4 | 23 (32.8) | 1.0 | 1.0 |
| 1-2 | 11.1 | 51 (47.0) | 1.04 (0.65, 1.67) | 1.04 (0.64, 1.69) |
| 3-5 | 32.4 | 110 (40.0) | 0.83 (0.54, 1.30) | 0.82 (0.53, 1.29) |
| ≥ 6 | 51.2 | 175 (33.7) | 0.83 (0.54, 1.28) | 0.81 (0.57, 1.19) |

Abbreviations: Pyrs, person-years. SHR (95% CI): sub-hazard ratios and 95% confidence intervals estimated by competing-risk regression

[1] : Adjusted for age (continuous), sex, schooling years (<4, 4-7 and ≥ 8) and monthly household income per capita (<240, 241-479 and ≥ 480.00 USD), current smoking (dichotomous), leisure-time physical activities for 20-30 minutes in previous 3 months (never, < 3 times per week and ≥ 3 times per week), physical health score (based on medical conditions shown in Table 1 and divided into tentile cut-off points) and MMSE score (continuous)

Table 3 – Separate and combined association of baseline psychological distress and emotional support level with 15-year onset of ADL disability, Bambui (Brazil) cohort study of aging (1997-2011)

| Variables[1] | Prevalence at the baseline (n=1014) | Number of onsets (incident rate per 1,000 pyrs) | SHR (95% CI) adjusted for sociodemographic, health and psychosocial factors [2] |
|---|---|---|---|
| No psychological distress and high support | 41.0 | 119 (29.2) | 1.0 |
| No psychological distress and low support | 25.5 | 89 (36.1) | 1.11 (1.01, 1.45) * |
| Psychological distress and high support | 18.4 | 18.4 (54.6) | 1.52 (1.13, 2.01) * |
| psychological distress and low support | 15.0 | 67 (57.0) | 1.61 (1.18, 2.18) * |

Abbreviations: Pyrs, person-years. SHR (95% CI): sub-hazard ratios and 95% confidence intervals estimated by competing-risk regression. * p<0.05

[1] Psychological distress was categorized into GHQ=12 score ≥ 5 or less. Low support was defined as score <6.

[2] : Adjusted for age (continuous), sex, schooling years (<4, 4-7 and ≥ 8) and monthly household income per capita (<240, 241-479 and ≥ 480.00 USD), current smoking (dichotomous), leisure-time physical activities for 20-30 minutes in previous 3 months (never, < 3 times per week and ≥ 3 times per week), physical health score (based on medical conditions shown in Table 1 and divided into tentile cut-off points), MMSE score (continuous) , marital status, and number of relatives and number of friends seen once a month, as specified in Table 2.

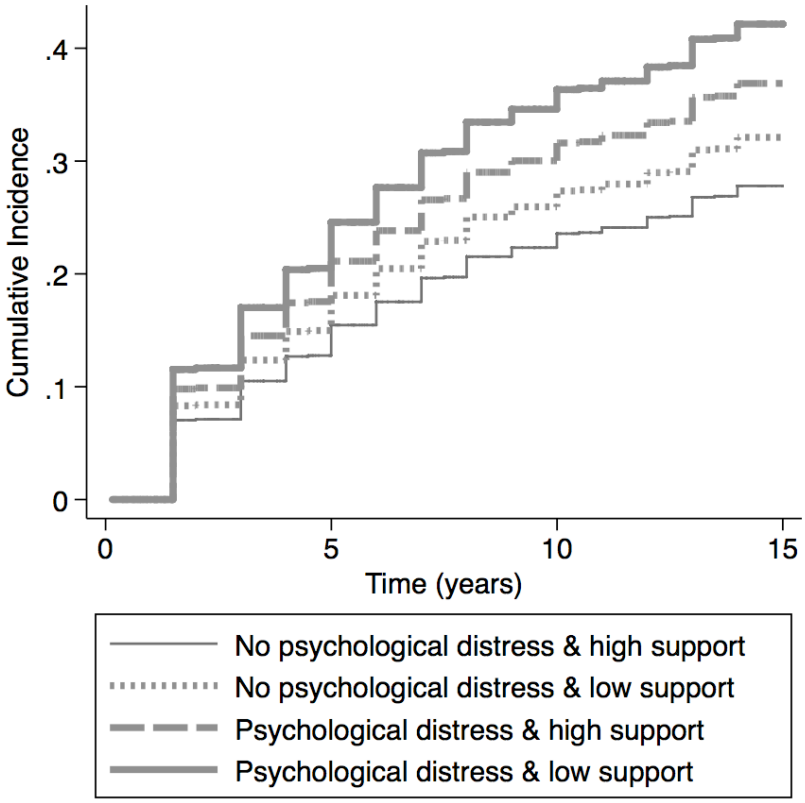


Figure 1 – Fully adjusted incidence rates[1] of 15-year onset of ADL disability, according to baseline separate and combined psychological distress and emotional support level Bambui (Brazil) cohort study of aging (1997-2011).

[1] Incidence rates were estimated by competing-risk regression and adjusted for socio-demographic variables, lifestile and physical health score, as specified in Table 2. Number of participants is equal to 1,014.

## 5 ARTIGO ORIGINAL 2

**Wealth and Disability in Later Life: The English Longitudinal Study of Ageing (ELSA)**

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## ABSTRACT

We examined wealth inequalities in disability, taking into account the effect of both depression and social support among older English adults using data from 5,506 community-dwelling people aged 50 years and over from the English Longitudinal Study of Ageing (ELSA). Disability was measured as self-reported limitations in the Basic Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL). Depressive symptomatology was measured using the 8-item Center for Epidemiological Studies-Depression (CES-D) scale. Social support was assessed by marital status and frequency of contact with friends, relatives or children. Multinomial logistic regression models were used to assess the role of social support and depressive symptoms on disability by total household wealth, which is a measure of accumulated assets over the course of life. Our findings showed that the poorest men with disability were more likely to live without a partner and have no weekly contact with children, family or friends compared to the wealthiest. Among women with disability, the poorest were more likely to report loneliness and have no partner while the wealthiest and the intermediate groups were more likely to be living with a partner. There was a strong inverse dose-response association between wealth and depressive symptoms among all participants with disability. This study shows a clear wealth gradient in disability among older English adults, especially for those with elevated depressive symptoms.


**Keywords:** socioeconomic inequalities, disability, social support, depression, aging

## INTRODUCTION

Socioeconomic inequality in health is a key public health concern [1] with many studies showing gradients in physical ill health and mortality by socioeconomic position [2]. The gradient in the association between socioeconomic status (SES) and functioning is well documented, with individuals from higher SES experiencing better functioning [3]. The association between SES, negative emotions and

depressive symptoms has also been investigated [4, 5]. In most conceptual models, possible pathways connecting low SES with poor health can be distilled roughly into two categories: stress and concomitant psychological distress, and psychological and social resources [6].

The literature also reports that some psychosocial factors i.e. measurements that potentially relate psychological phenomena to the social environment and to pathophysiological changes [7] are associated with disability. These psychosocial factors included depression [8,9], loneliness [10], social networks [11] and social support [12]. Measures of social networks have been shown to be associated with SES, in the sense that individuals in higher socioeconomic groups are more likely to be married, have more friends and report higher levels of social support (more emotional support and less negative aspects of close relationships) [13].

Depression is a major contributor to disability, accounting for 4.4% of total disabilityadjusted life years (DALY) globally [14] and it has consistently been shown to be a strong predictor of physical limitation and difficulty performing activities of daily living (ADLs) in community-dwelling adults [15]. Its relationship with SES has been explored previously [5].

Previous research has shown an inverse SES gradient in depressive symptoms and poor physical functioning [5]. However, it is still unclear from the literature in health inequalities whether the association between psychosocial factors and functioning is consistent throughout different SES groups or whether there are interactions. This is because poor social resources are hypothesized to lead to disability by influencing health-damaging behaviours and psychological and physiological systems [13], and, on the other hand, high SES groups have the potential to attenuate these effects due to less stress levels accumulated in the life course [6]. In addition, most of the literature considers linearity in the associations among SES, psychosocial pathways, and health (mainly functioning), reporting adjusted coefficients that might represent merely the average coefficients across the SES categories. That is, psychosocial factors could potentially have a greater impact at certain levels of SES than at others, or different psychosocial factors may be important for determining health of lower versus higher SES individuals [16]. For example, men in the lowest SES group are less likely to live with a partner [13] and,

consequently, experiencing more stress since their social support is heavily focused on their spouses who are less present. Therefore, the main aim of this study is to explore socioeconomic inequalities in disability, taking into account the effect of both depression and social support among different socioeconomic groups of older English adults.

## METHODS

### Study Population

The English Longitudinal Study of Ageing (ELSA) is a representative sample of the population aged 50 and over, living in private households in England. Its participants were recruited from households that had earlier participated in the Health Survey for England. ELSA is a wide data source including information on sociodemographic and health characteristics, social participation and biomarkers and a detailed description of the study can be found elsewhere [17]. Of 9,169 ELSA core participants who took part in wave 6 (2012–13), 5,506 had complete data on all study variables. Those who were excluded tended to be older females with disability from the lowest socioeconomic group ($p<0.001$). Wave 6 was used for this analysis because we wanted to reflect the current ELSA participants' wealth and disability circumstances.

### Assessment of disability

Disability was measured as self-reported limitations in the Basic Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) [18]. ADL included six activities: dressing, walking across a room, bathing or showering, eating, getting in or out of bed, using the toilet. IADL included seven activities: using a map to get around in a strange place, preparing a hot meal, shopping for groceries, making telephone calls, taking medications, doing work around the house or garden and managing money. Disability was defined as having limitation in one or more activities, including ADL and IADL.

**Assessment of household wealth**

Total non-pension household wealth included financial wealth (savings and investments), the value of any home and other property (less mortgage), the value of any business assets and physical wealth such as artwork and jewellery owned by the household (i.e., a single respondent or a responding couple along with any dependent individuals) minus any debt. Wealth is the most robust indicator of socioeconomic circumstances in ELSA, and has been found to be more strongly associated with the risk of death than any other socioeconomic position indicator at older ages [19]. The estimation of this variable was based on 22 different wealth and debt components, which were either observed or imputed. A detailed description of wealth and its components can be found at: http://bit.ly/1yrRgHd and http://bit.ly/1awp6iZ.

**Assessment of social support**

Marital status was categorized in having a partner and not having a partner (single, widowed, separated or divorced). The frequency of contact at a weekly rate or more often (either face to face, over the phone, email or text messages) with friends, relatives or children who did not live with the respondent was assessed and used as a dichotomous variable (yes/no). The objective was to identify respondents who had no frequent contact with anyone outside their household. Positive social support received by children/friends/family was measured by three questions on participant's perceptions of support availability and used as a dichotomous variable (high/low). By each network type, we defined that the participants had positive social support if they reported 'a lot' in three questions or 'a lot' in two questions and 'some' in one. Then, we combined the three network types. High positive social support was defined by having support in at least one network type and low positive social support by having no support of each network type.

**Assessment of loneliness**

Loneliness was assessed by the Three-Item Loneliness Scale [20] derived from the 20-item revised UCLA loneliness scale [21], with reliability reported as 0.72 [20]. The scale includes questions about feeling lack of companionship, feeling left

out and feeling isolated from others. The three-point response scale ranged from 1 (hardly ever/never) to 3 (often) and a score ranging from 1 to 9 was obtained and divided into tertiles: those in the highest loneliness tertile were compared to the intermediate/lower tertile.

**Assessment of depressive symptoms**

Depressive symptoms were measured by the shortened version of the Center for Epidemiological Studies-Depression (CES-D) scale [22]. The scale included eight questions about depressive symptoms experienced during the week before the ELSA interview. A dichotomous variable distinguishing between those with and without depressive symptoms was derived, considering the validated cut-off point of four or more depressive symptoms [23].

**Covariates**

Potential confounders included in this analysis were age and number of comorbidities. The number of comorbidities was assessed by self-reported doctor diagnosed chronic diseases, including diabetes, cancer, stroke, arthritis, lung disease, Parkinson and cardiovascular diseases (high blood pressure, angina, heart attack, heart failure, heart murmur or heart rhythm). The number of comorbidities was categorized into none, one or two or more.

**Statistical analysis**

Univariate analysis was conducted first, using Pearson's chi-square test for categorical variables and ANOVA for continuous variables. We used Multinomial Logistic Regression to estimate the odds ratio (OR) and their 95% confidence intervals to assess the association of psychosocial aspects with disability and wealth. Four outcomes were considered in the multinomial logistic regressions: without disability (reference category), disability in highest wealth tertile (Wealthiest), disability in intermediate wealth tertile (Intermediate) and disability in lowest wealth tertile (Poorest). This type of analysis was used to firstly test the effect of disability (with/without) and secondly the interaction between disability and household wealth. Multivariate analysis was performed using sequential models. First, we estimated the

association between psychosocial aspects and disability and wealth by adjusting for age. Then we added the number of comorbidities and lastly, depressive symptoms. The analysis was stratified by gender, as psychosocial factors are different between men and women, using STATA 13.0 (Stata Corp LLP, College Station, TX).

**Ethics Approval and Informed Consent**

All participants gave written informed consent. The English Longitudinal Study of Ageing has been approved by the National Research Ethics Service (London Multicentre Research Ethics Committee (MREC/01/2/91)).

## RESULTS

Of 9,169 ELSA core participants who took part in wave 6 (2012–13), we had information about wealth and disability outcomes for 8,945, and among those, complete information regarding psychosocial variables for 5,506, which were included in the current analysis. Characteristics of the study population by ADL/IADL limitation are showed in Table 1. The prevalence of disability was 20.9% and among these, 47.6% were in the lowest socioeconomic group. The mean age of participants was 66.0 years (SD = 8.4), with a majority of these female (54.1%) and 37.6% with one comorbidity. Depressive symptoms were reported in 10.2%. The group with disability was poorer (47.6%), with a majority of females (57.4%), with two or more comorbidities (50.9%), more depressive symptoms (24.3%), were not living with a partner (35.5%) and reported more loneliness (39.5%).

Table 2 shows the prevalence of each covariate by disability status and household wealth tertile among men and women. Among men, the poorest reported more elevated depressive symptoms (28%), were not currently living with a partner (43.1%), were more likely to report no weekly contact with their children, family or friends (9.3%) and experienced more loneliness (36.4%). Among women, the same pattern was observed for the poorest: more depressive symptoms (38%), not currently living with a partner (52.5%) and experienced more loneliness (49.7%). Additionally, we tested whether there was any difference in disability severity (number of activities reported with limitation) across wealth groups and we found a

statistically significant gradient among women. The prevalence of limitations in four or more activities reported by the wealthiest, intermediate and the poorest women were 10.2%, 22% and 29.6% respectively (data not shown).

The results from the multinomial logistic regression showed that the poorest men with disability were more likely to have no partner (OR = 1.78; 95% CI 1.29, 2.45) and to report no weekly contact with their children, family or friends (OR = 1.79; 95% CI 1.01, 3.16). The wealthiest men experienced more loneliness (OR = 1.59; 95% CI 1.01, 2.49), even after adjusting for multiple variables. Among women, the poorest with disability were more likely to report loneliness (OR = 1.52; 95% CI 1.15, 2.01) and not having a partner (OR = 1.88; 95% CI 1.44, 2.44). On the other hand, the wealthiest and the intermediate groups were more likely to be living with a partner. There was a strong inverse dose-response association between wealth and elevated depressive symptoms among men and women with disability (Table 3). The odds ratios adjusted for age, chronic diseases and psychosocial characteristics and their 95% CIs for this association are displayed in Fig 1. Participants without disability are the reference category.

## DISCUSSION

Our main findings showed a clear wealth gradient in disability in later life, with better levels of social resources among those who were better off. Depressive symptoms emerged as the most significant psychosocial indicator investigated. The poorest participants with disability reported more depressive symptoms and this aspect was particularly severe among the poorest women. Loneliness was associated with functioning independently of wealth, but, after adjusting for depressive symptoms, this association lost strength and remained statistically significant only for some wealth groups. Finally, for both men and women the poorest were more likely to be without a partner, whilst the poorest men were more likely to report no weekly contact with friends, family or children, and poor women to be lonelier.

Current evidence on socioeconomic trends in the disability-free life expectancy of older ages in England supports the clear wealth gradient in disability found in this

study. Older English adults in the least affluent areas spent more years with disability compared to those living in wealthier areas [24]. In the past three decades, income inequality in England increased steeply and it has been sustained at historically high levels [24]. In addition, there is evidence suggesting a linking between the growth in health inequality and the observed trends in wealth inequality [25].

We found that depressive symptoms are an important aspect when investigating functioning in older adults. It was not only associated with functioning, but also show heterogeneity across household wealth groups among those reporting disability: the odds of the association between disability and depressive symptoms are nearly three times higher among the poorest. Previous results from the Whitehall II Study [5] showed that there is an inverse gradient in both depressive symptoms and in poor functioning by SES and the current findings provide further evidence of the interactive effect of depressive symptoms and SES on functioning. This pathway makes sense, corroborating cohort studies that have explored the effect of depressive symptoms on the onset of disability [18]. On the other hand, since this is a cross-sectional analysis, it is reasonable to consider another pathway: disability [8,9] and lower SES [5,26] leads to depressive symptoms. Previous studies that had explored the association between depressive symptoms and health outcomes [5,11,12,13,15,27,28] reported adjusted coefficients by SES that might represent merely the average coefficients across the SES categories rather than its real meaning considering this interaction. In order to test whether the heterogeneity found was due to a differential intensity of depressive symptoms across SES categories, we performed the Kruskal-Wallis test to see any potential difference between the numbers of positive depressive symptoms by the three disability categories. We found only statistical differences among women, indicating that this apparent interaction might be due to more severe levels of depressive symptoms among the poorest women.

According to psychosocial theory [1,29], disability inequalities linked to depressive symptoms could be partially explained by social support or social integration. Ours findings show that the lack of weekly contact with children, family or a friend and the absence of a partner are related factors among men and, among women, the related factors are loneliness and the absence of a partner. Indeed, it

has been noted that those most in need of support from their social networks, such as in the event of disability, are often those least likely to receive support [30]. Our results show that men report lower levels of support from children, family or friends than women. This finding could be explained by the fact that for men social support is heavily focused on their spouses, whereas women are much more likely to rely on a child, close relative, or a friend as their confidant and mobilize more social supports during periods of stress. Therefore, the idea that married people have the best health seems to apply mostly to men and the absence of a partner seems to be more mentally detrimental among men, demonstrated by higher odds of depressive symptoms in all SES groups, regardless of having a lower prevalence amongst women. Social networks, especially partners, could help to attenuate patterns of health inequalities in functioning among older adults [31].

Reviews published recently show that marriage has a protective effect for survival considering younger [32] and older adults [33]. Considering disability, married older adults are less likely to experience ADL decline and more likely to experience ADL recovery [34]. Our results partly corroborate with these findings showing that this occur for both the poorest men and women. Strikingly, for women with disability from the other socioeconomic groups, the pattern is just the opposite: they have more odds to live with a partner compared to the group without disability. As mentioned before, women tend to have more extensive social sources than men, not focusing only on a spouse, as they report more social support from other sources (children, family or friends) in all groups (data not shown). Unmarried women reported their children most frequently as a source of social support in managing a chronic illness [35] and our descriptive analysis show that the wealthiest and poorest groups have a bit more social support from friends, family or children than the disability-free group. These might attenuate the absence of a partner for health-related social control among women. On the other hand, married women tend to accumulate more wealth than single women, which could overinflate the number of married women in more wealthy groups [36].

Old age gives rise to the feeling of loneliness due to the increase in the number of experienced losses. One of these losses, according to ours results, could be disability. We observed that older adults that have reported disability are more

likely to report loneliness, independently of SES group. Disability could lead to a feeling of loneliness because difficulties in managing independent daily life impede on engagement in social relationships and fulfillment of social roles and could lead to emotional stress [37]. However, after adjustment for depressive symptoms, reported to be associated with loneliness [10], this association does not apply to all SES groups. This suggest that the link between loneliness and disability/SES status is due to depressive symptoms, despite studies showing that loneliness is itself a risk factor for physical functioning limitations [38]. Poorest women report more loneliness, have more severe depressive symptoms and are more likely to have disability. This pattern is not the same for men. It seems that qualitative psychosocial factors account more for disability among women while quantitative psychosocial factors account more for men.

To the best of our knowledge, this is one of the first studies to explore wealth inequalities in disability taking into account both depression and social support in older adults. The combined effect of psychosocial factors and SES on physical functioning has been explored before, concluding that social participation and living arrangements might alleviate the negative effects of lower SES [39]. Other studies have found that among lower SES groups, psychosocial factors are more significant indicators of self-rated health [30,31] than in higher SES groups. More studies are needed to explore the interaction found between depressive symptoms and SES on disability.

The use of a national sample of community-dwellers and the richness of the data from a well-established study are strengths of our study. The former makes our findings more generalizable to the English population aged 50 years and older, and the latter allowed a better adjustment of confounding and mediating factors. The quality of the measurement of wealth minimised the possibility of measurement bias for SES. Additionally, further adjustment for level of education as another indicator of SES has been done without substantial changes on the results. We are however aware of some limitations. Firstly, due to subjective measures used as exposure and outcome and the measure of SES as outcome, nearly half of participants was excluded of which were older females with disability from the lowest socioeconomic group. This might have generated sub estimated odds ratios for the poorest group

and mainly for marginal confidence intervals, such as for loneliness. Secondly, it is also not possible to rule out a same-source bias, that is, the exclusive use of self-reported variables to measure both functioning and social support and loneliness [40]. This bias is difficult to eliminate, since social support and loneliness are by definition subjective evaluations. Finally, it is a cross-sectional design, which impedes establishing temporal relations between the independent variables and the dependent variable.

## CONCLUSIONS

Our findings showed a clear wealth gradient in disability with better levels of social resources found among those who were better off. Qualitative psychosocial factors account more for disability among women while quantitative psychosocial factors account more for disability amongst men. The strong inverse dose-response association between wealth and depressive symptoms among participants with disability suggests an interaction, highlighting the importance of prevention and control of depression when making new policies in order to decrease disability and health inequalities. Initiatives to increase social participation and social support among older adults especially those from vulnerable areas and living in care homes should also be encouraged.

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Table 1 - Characteristics according to disability status at wave 6 (2012-13) of 5,506 participants aged 50 and older from the English Longitudinal Study of Ageing (ELSA)

| Characteristic | All (n=5,506) | Disability | | *P* value |
|---|---|---|---|---|
| | | Yes (n=1,153) | No (n=4,353) | |
| Age (years), mean (SD) | 66.0 (8.4) | 68.9 (9.0) | 65.3 (8.1) | <0.001 |
| Women, (%) | 54.1 | 57.4 | 53.3 | 0.012 |
| Household wealth, (%) | | | | <0.001 |
| Wealthiest | 33.4 | 21.9 | 36.5 | |
| Intermediate | 33.6 | 30.4 | 34.4 | |
| Poorest | 33.0 | 47.6 | 29.1 | |
| Number of comorbidities*, (%) | | | | <0.001 |
| None | 36.5 | 14.7 | 42.3 | |
| One | 37.6 | 34.4 | 38.5 | |
| Two or more | 25.8 | 50.9 | 19.2 | |
| Marital status (not living with partner), (%) | 32.7 | 35.5 | 32.0 | 0.025 |
| No weekly contact with friends, family or children, (%) | 5.2 | 5.5 | 5.2 | 0.689 |
| Loneliness (highest tertile), (%) | 28.2 | 39.5 | 25.2 | <0.001 |
| Low social support from friends, family or children, (%) | 31.3 | 33.0 | 30.9 | 0.154 |
| Depressive symptoms (≥4 CES-D symptoms), (%) | 10.2 | 24.3 | 6.5 | <0.001 |

* Self-reported doctor diagnosed chronic diseases = diabetes, cancer, stroke, arthritis, lung disease, Parkinson and CVD conditions (high blood pressure, angina, heart attack, heart failure, heart murmur or heart rhythm)

Table 2 - Characteristics according to disability status by household wealth in 5,506 men and women, the English Longitudinal Study of Ageing (ELSA), wave 6 (2012-13)

| **Characteristic** | **Without disability % (n=4,353)** | **Disability** | | | ***P* value** |
|---|---|---|---|---|---|
| | | **Wealthiest % (n=253)** | **Intermediate % (n=351)** | **Poorest % (n=549)** | |
| ***Men*** | | | | | |
| Age, mean (SD) | 66.0 (8.3) | 71.2 (9.0) | 71.4 (8.9) | 68.4 (9.1) | <0.001 |
| Number of comorbidities* | | | | | <0.001 |
| None | 39.2 | 19.8 | 13.8 | 11.1 | |
| One | 40.1 | 39.6 | 33.1 | 32.0 | |
| Two or more | 20.7 | 40.6 | 53.1 | 56.9 | |
| Marital status (not living with partner) | 28.1 | 26.4 | 20.6 | 43.1 | <0.001 |
| No weekly contact with friends, family or children | 5.0 | 0.9 | 5.0 | 9.3 | 0.008 |
| Loneliness (highest tertile) | 22.5 | 34.0 | 31.9 | 36.4 | <0.001 |
| Low social support from friends, family or children | 39.6 | 44.3 | 38.1 | 39.6 | 0.769 |
| Depressive symptoms (≥4 CES-D symptoms) | 4.2 | 11.3 | 15.0 | 28.0 | <0.001 |
| ***Women*** | | | | | |
| Age, mean (SD) | 64.5 (7.8) | 69.4 (8.7) | 68.9 (8.4) | 66.9 (8.9) | <0.001 |
| Number of comorbidities* | | | | | <0.001 |
| None | 45.0 | 15.7 | 18.9 | 13.3 | |
| One | 37.1 | 41.5 | 36.1 | 30.6 | |
| Two or more | 17.9 | 42.9 | 45.0 | 56.2 | |
| Marital status (not living with partner) | 35.4 | 21.1 | 26.2 | 52.5 | <0.001 |
| No weekly contact with friends, family or children | 5.4 | 4.1 | 5.2 | 5.3 | 0.931 |
| Loneliness (highest tertile) | 27.6 | 36.7 | 37.2 | 49.7 | <0.001 |
| Low social support from friends, family or children | 23.2 | 29.9 | 24.6 | 28.7 | 0.058 |
| Depressive symptoms (≥4 CES-D symptoms) | 8.5 | 15.0 | 18.9 | 38.0 | <0.001 |

* Self-reported doctor diagnosed chronic diseases = diabetes, cancer, stroke, arthritis, lung disease, Parkinson and CVD conditions (high blood pressure, angina, heart attack, heart failure, heart murmur or heart rhythm)

Table 3 - Multinomial Logistic regression analyses of older adults without disability (n=1,153) aged 50 years and over in England by wealth tertiles, English Longitudinal Study of Ageing (ELSA), wave 6 (2012-13)

| | Model[a] Disability | | | Model[b] Disability | | |
|---|---|---|---|---|---|---|
| | **Wealthiest (n=253) OR (95%CI)** | **Intermediate (n=351) OR (95%CI)** | **Poorest (n=549) OR (95%CI)** | **Wealthiest (n=253) OR (95%CI)** | **Intermediate (n=351) OR (95%CI)** | **Poorest (n=549) OR (95%CI)** |
| ***Men*** | | | | | | |
| Marital status (not living with partner) | 1.01 (0.64-1.60) | 0.65 (0.43-0.99)* | 1.71 (1.26-2.33)** | 1.02 (0.65-1.62) | 0.66 (0.43-1.01) | 1.78 (1.29-2.45)** |
| No weekly contact with friends, relatives or children | 0.25 (0.33-1.82) | 1.50 (0.69-3.29) | 1.80 (1.05-3.10)* | 0.25 (0.03-1.83) | 1.52 (0.69-3.34) | 1.79 (1.01-3.16)* |
| Loneliness (highest tertile) | 1.80 (1.17-2.78)** | 1.75 (1.21-2.53)** | 1.72 (1.26-2.35)** | 1.59 (1.01-2.49)* | 1.42 (0.97-2.11) | 1.09 (0.77-1.55) |
| Low social support from friends, family or children | 1.36 (0.90-2.04) | 1.09 (0.77-1.55) | 1.15 (0.85-1.56) | 1.33 (0.88-2.01) | 1.07 (0.75-1.53) | 1.12 (0.82-1.53) |
| Depressive symptoms (≥4 CES-D symptoms) | - | - | - | 2.44 (1.24-4.83)* | 3.43 (2.00-5.86)** | 7.47 (4.90-11.37)** |
| ***Women*** | | | | | | |
| Marital status (not living with partner) | 0.52 (0.34-0.79)** | 0.67 (0.48-0.95)* | 1.97 (1.53-2.54)** | 0.52 (0.34-0.79)** | 0.66 (0.47-0.94)* | 1.88 (1.44-2.44)** |
| No weekly contact with friends, family or children | 0.94 (0.40-2.21) | 1.11 (0.56-2.19) | 0.84 (0.48-1.47) | 0.94 (0.40-2.22) | 1.13 (0.57-2.23) | 0.90 (0.51-1.60) |
| Loneliness (highest tertile) | 1.59 (1.10-2.29)* | 1.65 (1.19-2.28)** | 2.22 (1.72-2.87)** | 1.45 (0.99-2.11) | 1.42 (1.01-1.98)* | 1.52 (1.15-2.01)** |
| Low social support from friends, family or children | 1.38 (0.94-2.02) | 1.03 (0.73-1.49) | 1.16 (0.88-1.54) | 1.36 (0.93-2.00) | 1.02 (0.71-1.45) | 1.09 (0.82-1.47) |
| Depressive symptoms (≥4 CES-D symptoms) | - | - | - | 1.78 (1.07-2.96)* | 2.39 (1.57-3.64)** | 5.15 (3.78-7.00)** |

Models using participants without disability as reference category: Model[a] = adjusted for age, number of chronic diseases and psychosocial characteristics; Model[b] = Model[a] + depressive symptoms.
$p<0.05$; ** $p<0.001$

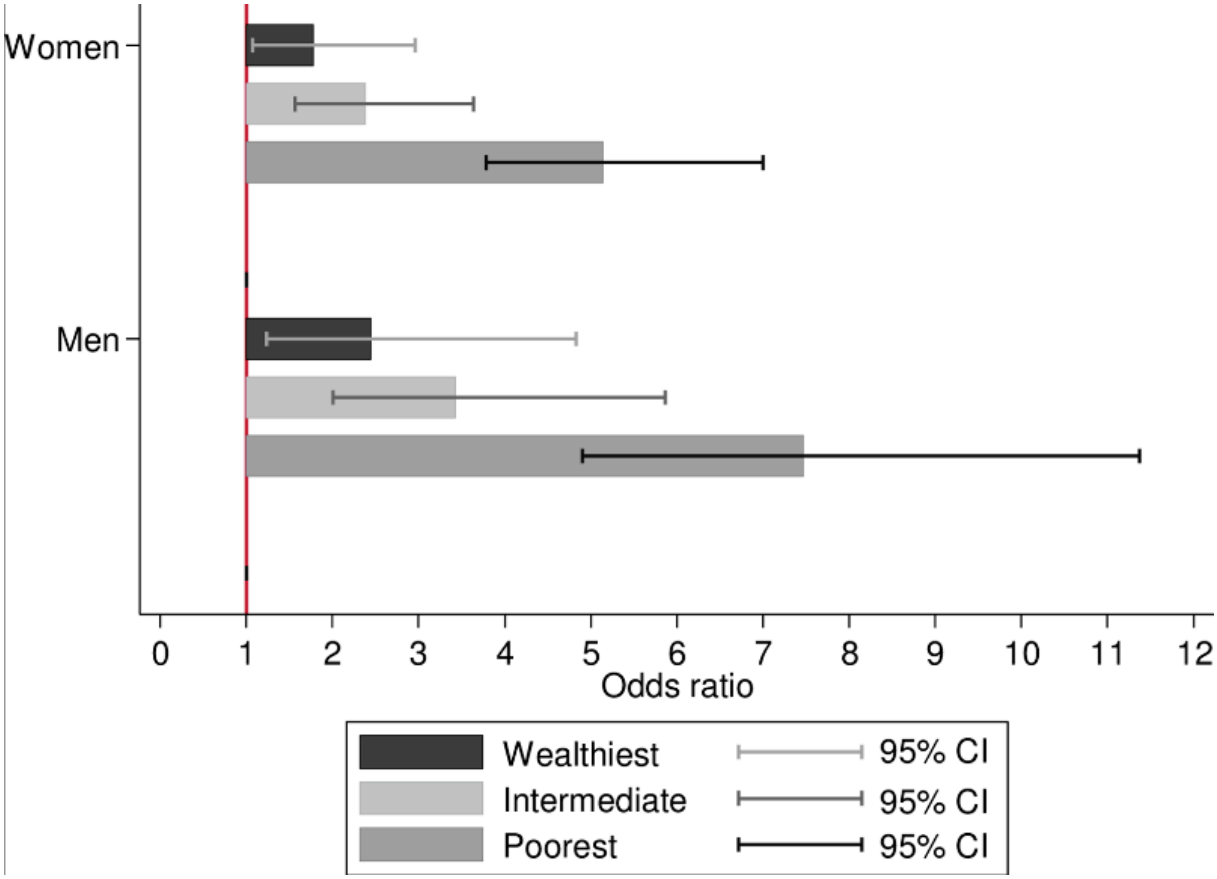


Fig 1. Fully adjusted odds ratios and 95% CI of depressive symptoms among men and women with disability, according to wealth tertiles. English Longitudinal Study of Ageing, wave 6 (2012-13).

# 6 CONSIDERAÇÕES FINAIS

Nesta tese, utilizando estratégias analíticas mais elaboradas, encontramos que a funcionalidade foi associada com o fatores psicossociais como o apoio social e a presença de sintomas depressivos, tanto no contexto brasileiro como no contexto britânico, isto é, em um país em desenvolvimento e em um pais desenvolvido. Apesar de diferenças culturais serem implicadas, um ambiente social favorável, nestes dois países, estão associados com o envelhecimento mais saudável, considerando a melhor funcionalidade.

Nós demonstramos que o baixo apoio emocional da pessoa mais próxima e os sintomas depressivos predizem a incapacidade funcional a longo prazo no contexto brasileiro. Ainda, considerando o contexto britânico, vimos que os contatos sociais entre os homens são menos frequentes entre aqueles com incapacidade funcional e piores condições de saúde, ao passo que, entre as mulheres com essas mesmas condições, há maior relato de solidão. Portanto, intervenções que maximizem os contatos sociais em pessoas com idade mais avançada e que aumentem o apoio social recebido pelos mesmos têm o potencial de minimizar os impactos negativos da funcionalidade, seja por caminhos psicológicos, fisiológicos ou comportamentais. A natureza subjetiva das medidas que foram associados com a funcionalidade sugere que as emoções e o humor (caminho psicológico) podem previnir os efeitos deletérios da perda da funcionalidade. Contudo, isso não exclui a possibilidade da influencia e/ou coexistência das demais vias.

Além disso, verificamos que a condição socioeconômica modifica o efeito da associação entre alguns fatores psicossociais e funcionalidade, sendo que quanto pior é a condição socioeconômica, maior é a força de associação entre esses fatores e a incapacidade funcional. Portanto, demonstramos que o ambiente social, como sugerido pela teoria psicossocial, também influencia as iniquidades em saúde. O principal fator psicossocial associado à condição socioeconômica foi os sintomas depressivos, para ambos os sexos. Entre os homens, observamos, também associação com contatos sociais e entre mulheres, com a solidão. Apesar dessas associações terem sido demonstradas transversalmente, quer seja a direção dessas

associações, intervenções em populações vulneráveis que visem a promoção funcionalidade, a prevenção de sintomas depressivos e solidão e o maior contato social, serão mutualmente benéficas.

Este trabalho contribui para a saúde pública uma vez que mostrou que os grupos de pessoas com idade avançada que estão mais suscetíveis a apresentarem incapacidade funcional são as mulheres que apresentam sintomas depressivos, relatos de solidão, sem cônjuge e com piores condições socioeconômicas, e os homens que apresentam sintomas depressivos, poucos contatos sociais, sem cônjuge e com piores condições socioeconômicas. Intervenções que visem a prática de atividade física, como a academia da cidade, e incentivo à socialização, por exemplo grupos de atividade para a terceira idade englobando dança, jogos de tabuleiro, esportes, etc, serão benéficos para a prevenção da incapacidade funcional principalmente para esta população alvo.

Concluindo, a utilização de diferentes tecnologias analíticas e a combinação de diferentes bases de dados podem contribuir para a melhor compreensão de fatores psicossociais que podem influenciar a funcionalidade e possibilitar ações de intervenção que tenham como objetivo manter ou melhorar a funcionalidade em idades mais avançadas, considerando o ambiente social que o individuo está inserido. Mais estudos longitudinais que avaliem os mecanismos de ação envolvidos nessa associação também tornam-se fundamentais.

# APÊNDICE

**Artigo original 2 no formato publicado no periódico PLOS One**

PLOS ONE

RESEARCH ARTICLE

# Wealth and Disability in Later Life: The English Longitudinal Study of Ageing (ELSA)

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## Abstract

We examined wealth inequalities in disability, taking into account the effect of both depression and social support among older English adults using data from 5,506 community-dwelling people aged 50 years and over from the English Longitudinal Study of Ageing (ELSA). Disability was measured as self-reported limitations in the Basic Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL). Depressive symptomatology was measured using the 8-item Center for Epidemiological Studies-Depression (CES-D) scale. Social support was assessed by marital status and frequency of contact with friends, relatives or children. Multinomial logistic regression models were used to assess the role of social support and depressive symptoms on disability by total household wealth, which is a measure of accumulated assets over the course of life. Our findings showed that the poorest men with disability were more likely to live without a partner and have no weekly contact with children, family or friends compared to the wealthiest. Among women with disability, the poorest were more likely to report loneliness and have no partner while the wealthiest and the intermediate groups were more likely to be living with a partner. There was a strong inverse dose-response association between wealth and depressive symptoms among all participants with disability. This study shows a clear wealth gradient in disability among older English adults, especially for those with elevated depressive symptoms.



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**Data Availability Statement:** Data are from the English Longitudinal Study of Ageing (ELSA) and are available from the UK Data Service for researchers who meet the criteria for access to confidential data, under conditions of the End User License http://ukdataservice.ac.uk/media/455131/cd137-enduserlicence.pdf. The data can be accessed from: http://discover.ukdataservice.ac.uk/series/?sn=200011. Contact with the UK data service regarding access to the English Longitudinal Study of Ageing can be made through the website http://ukdataservice.ac.uk/help/get-in-

## Introduction

Socioeconomic inequality in health is a key public health concern [1] with many studies showing gradients in physical ill health and mortality by socioeconomic position [2]. The gradient in the association between socioeconomic status (SES) and functioning is well documented, with individuals from higher SES experiencing better functioning [3]. The association between SES, negative emotions and depressive symptoms has also been investigated [4, 5]. In most conceptual models, possible pathways connecting low SES with poor health can be distilled roughly into two categories: stress and concomitant psychological distress, and psychological and social resources [6].

touch.aspx, by phone +44 (0)1206 872143 or by email at help@ukdataservice.ac.uk.

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The literature also reports that some psychosocial factors i.e. measurements that potentially relate psychological phenomena to the social environment and to pathophysiological changes [7] are associated with disability. These psychosocial factors included depression [8,9], loneliness [10], social networks [11] and social support [12]. Measures of social networks have been shown to be associated with SES, in the sense that individuals in higher socioeconomic groups are more likely to be married, have more friends and report higher levels of social support (more emotional support and less negative aspects of close relationships) [13].

Depression is a major contributor to disability, accounting for 4.4% of total disability-adjusted life years (DALY) globally [14] and it has consistently been shown to be a strong predictor of physical limitation and difficulty performing activities of daily living (ADLs) in community-dwelling adults [15]. Its relationship with SES has been explored previously [5].

Previous research has shown an inverse SES gradient in depressive symptoms and poor physical functioning [5]. However, it is still unclear from the literature in health inequalities whether the association between psychosocial factors and functioning is consistent throughout different SES groups or whether there are interactions. This is because poor social resources are hypothesized to lead to disability by influencing health-damaging behaviours and psychological and physiological systems [13], and, on the other hand, high SES groups have the potential to attenuate these effects due to less stress levels accumulated in the life course [6]. In addition, most of the literature considers linearity in the associations among SES, psychosocial pathways, and health (mainly functioning), reporting adjusted coefficients that might represent merely the average coefficients across the SES categories. That is, psychosocial factors could potentially have a greater impact at certain levels of SES than at others, or different psychosocial factors may be important for determining health of lower versus higher SES individuals [16]. For example, men in the lowest SES group are less likely to live with a partner [13] and, consequently, experiencing more stress since their social support is heavily focused on their spouses who are less present. Therefore, the main aim of this study is to explore socioeconomic inequalities in disability, taking into account the effect of both depression and social support among different socioeconomic groups of older English adults.

## Methods

### Study Population

The English Longitudinal Study of Ageing (ELSA) is a representative sample of the population aged 50 and over, living in private households in England. Its participants were recruited from households that had earlier participated in the Health Survey for England. ELSA is a wide data source including information on sociodemographic and health characteristics, social participation and biomarkers and a detailed description of the study can be found elsewhere [17]. Of 9,169 ELSA core participants who took part in wave 6 (2012–13), 5,506 had complete data on all study variables. Those who were excluded tended to be older females with disability from the lowest socioeconomic group ($p<0.001$). Wave 6 was used for this analysis because we wanted to reflect the current ELSA participants' wealth and disability circumstances.

### Assessment of disability

Disability was measured as self-reported limitations in the Basic Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) [18]. ADL included six activities: dressing, walking across a room, bathing or showering, eating, getting in or out of bed, using the toilet. IADL included seven activities: using a map to get around in a strange place, preparing a hot meal, shopping for groceries, making telephone calls, taking medications, doing

work around the house or garden and managing money. Disability was defined as having limitation in one or more activities, including ADL and IADL.

## Assessment of household wealth

Total non-pension household wealth included financial wealth (savings and investments), the value of any home and other property (less mortgage), the value of any business assets and physical wealth such as artwork and jewellery owned by the household (i.e., a single respondent or a responding couple along with any dependent individuals) minus any debt. Wealth is the most robust indicator of socioeconomic circumstances in ELSA, and has been found to be more strongly associated with the risk of death than any other socioeconomic position indicator at older ages [19]. The estimation of this variable was based on 22 different wealth and debt components, which were either observed or imputed. A detailed description of wealth and its components can be found at: http://bit.ly/1yrRgHd and http://bit.ly/1awp6iZ.

## Assessment of social support

Marital status was categorized in having a partner and not having a partner (single, widowed, separated or divorced). The frequency of contact at a weekly rate or more often (either face to face, over the phone, email or text messages) with friends, relatives or children who did not live with the respondent was assessed and used as a dichotomous variable (yes/no). The objective was to identify respondents who had no frequent contact with anyone outside their household. Positive social support received by children/friends/family was measured by three questions on participant's perceptions of support availability and used as a dichotomous variable (high/low). By each network type, we defined that the participants had positive social support if they reported 'a lot' in three questions or 'a lot' in two questions and 'some' in one. Then, we combined the three network types. High positive social support was defined by having support in at least one network type and low positive social support by having no support of each network type.

## Assessment of loneliness

Loneliness was assessed by the Three-Item Loneliness Scale [20] derived from the 20-item revised UCLA loneliness scale [21], with reliability reported as 0.72 [20]. The scale includes questions about feeling lack of companionship, feeling left out and feeling isolated from others. The three-point response scale ranged from 1 (hardly ever/never) to 3 (often) and a score ranging from 1 to 9 was obtained and divided into tertiles: those in the highest loneliness tertile were compared to the intermediate/lower tertile.

## Assessment of depressive symptoms

Depressive symptoms were measured by the shortened version of the Center for Epidemiological Studies-Depression (CES-D) scale [22]. The scale included eight questions about depressive symptoms experienced during the week before the ELSA interview. A dichotomous variable distinguishing between those with and without depressive symptoms was derived, considering the validated cut-off point of four or more depressive symptoms [23].

## Covariates

Potential confounders included in this analysis were age and number of comorbidities. The number of comorbidities was assessed by self-reported doctor diagnosed chronic diseases, including diabetes, cancer, stroke, arthritis, lung disease, Parkinson and cardiovascular

diseases (high blood pressure, angina, heart attack, heart failure, heart murmur or heart rhythm). The number of comorbidities was categorized into none, one or two or more.

### Statistical analysis

Univariate analysis was conducted first, using Pearson's chi-square test for categorical variables and ANOVA for continuous variables. We used Multinomial Logistic Regression to estimate the odds ratio (OR) and their 95% confidence intervals to assess the association of psychosocial aspects with disability and wealth. Four outcomes were considered in the multinomial logistic regressions: without disability (reference category), disability in highest wealth tertile (Wealthiest), disability in intermediate wealth tertile (Intermediate) and disability in lowest wealth tertile (Poorest). This type of analysis was used to firstly test the effect of disability (with/without) and secondly the interaction between disability and household wealth. Multivariate analysis was performed using sequential models. First, we estimated the association between psychosocial aspects and disability and wealth by adjusting for age. Then we added the number of comorbidities and lastly, depressive symptoms. The analysis was stratified by gender, as psychosocial factors are different between men and women, using STATA 13.0 (Stata Corp LLP, College Station, TX).

### Ethics Approval and Informed Consent

All participants gave written informed consent. The English Longitudinal Study of Ageing has been approved by the National Research Ethics Service (London Multicentre Research Ethics Committee (MREC/01/2/91)).

## Results

Of 9,169 ELSA core participants who took part in wave 6 (2012–13), we had information about wealth and disability outcomes for 8,945, and among those, complete information regarding psychosocial variables for 5,506, which were included in the current analysis. Characteristics of the study population by ADL/IADL limitation are showed in Table 1. The prevalence of disability was 20.9% and among these, 47.6% were in the lowest socioeconomic group. The mean age of participants was 66.0 years (SD = 8.4), with a majority of these female (54.1%) and 37.6% with one comorbidity. Depressive symptoms were reported in 10.2%. The group with disability was poorer (47.6%), with a majority of females (57.4%), with two or more comorbidities (50.9%), more depressive symptoms (24.3%), were not living with a partner (35.5%) and reported more loneliness (39.5%).

Table 2 shows the prevalence of each covariate by disability status and household wealth tertile among men and women. Among men, the poorest reported more elevated depressive symptoms (28%), were not currently living with a partner (43.1%), were more likely to report no weekly contact with their children, family or friends (9.3%) and experienced more loneliness (36.4%). Among women, the same pattern was observed for the poorest: more depressive symptoms (38%), not currently living with a partner (52.5%) and experienced more loneliness (49.7%). Additionally, we tested whether there was any difference in disability severity (number of activities reported with limitation) across wealth groups and we found a statistically significant gradient among women. The prevalence of limitations in four or more activities reported by the wealthiest, intermediate and the poorest women were 10.2%, 22% and 29.6% respectively (data not shown).

The results from the multinomial logistic regression showed that the poorest men with disability were more likely to have no partner (OR = 1.78; 95% CI 1.29, 2.45) and to report no weekly contact with their children, family or friends (OR = 1.79; 95% CI 1.01, 3.16). The

**Table 1. Characteristics according to disability status at wave 6 (2012–13) of 5,506 participants aged 50 and older from the English Longitudinal Study of Ageing (ELSA).**

| Characteristic | All (n = 5,506) | Disability | | *P* value |
|---|---|---|---|---|
| | | Yes (n = 1,153) | No (n = 4,353) | |
| Age (years), mean (SD) | 66.0 (8.4) | 68.9 (9.0) | 65.3 (8.1) | <0.001 |
| Women, (%) | 54.1 | 57.4 | 53.3 | 0.012 |
| Household wealth, (%) | | | | <0.001 |
| Wealthiest | 33.4 | 21.9 | 36.5 | |
| Intermediate | 33.6 | 30.4 | 34.4 | |
| Poorest | 33.0 | 47.6 | 29.1 | |
| Number of comorbidities*, (%) | | | | <0.001 |
| None | 36.5 | 14.7 | 42.3 | |
| One | 37.6 | 34.4 | 38.5 | |
| Two or more | 25.8 | 50.9 | 19.2 | |
| Marital status (not living with partner), (%) | 32.7 | 35.5 | 32.0 | 0.025 |
| No weekly contact with friends, family or children, (%) | 5.2 | 5.5 | 5.2 | 0.689 |
| Loneliness (highest tertile), (%) | 28.2 | 39.5 | 25.2 | <0.001 |
| Low social support from friends, family or children, (%) | 31.3 | 33.0 | 30.9 | 0.154 |
| Depressive symptoms (≥4 CES-D symptoms), (%) | 10.2 | 24.3 | 6.5 | <0.001 |

* Self-reported doctor diagnosed chronic diseases = diabetes, cancer, stroke, arthritis, lung disease, Parkinson and CVD conditions (high blood pressure, angina, heart attack, heart failure, heart murmur or heart rhythm)

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wealthiest men experienced more loneliness (OR = 1.59; 95% CI 1.01, 2.49), even after adjusting for multiple variables. Among women, the poorest with disability were more likely to report loneliness (OR = 1.52; 95% CI 1.15, 2.01) and not having a partner (OR = 1.88; 95% CI 1.44, 2.44). On the other hand, the wealthiest and the intermediate groups were more likely to be living with a partner. There was a strong inverse dose-response association between wealth and elevated depressive symptoms among men and women with disability (Table 3). The odds ratios adjusted for age, chronic diseases and psychosocial characteristics and their 95% CIs for this association are displayed in Fig 1. Participants without disability are the reference category.

## Discussion

Our main findings showed a clear wealth gradient in disability in later life, with better levels of social resources among those who were better off. Depressive symptoms emerged as the most significant psychosocial indicator investigated. The poorest participants with disability reported more depressive symptoms and and this aspect was particularly severe among the poorest women. Loneliness was associated with functioning independently of wealth, but, after adjusting for depressive symptoms, this association lost strength and remained statistically significant only for some wealth groups. Finally, for both men and women the poorest were more likely to be without a partner, whilst the poorest men were more likely to report no weekly contact with friends, family or children, and poor women to be lonelier.

Current evidence on socioeconomic trends in the disability-free life expectancy of older ages in England supports the clear wealth gradient in disability found in this study. Older English adults in the least affluent areas spent more years with disability compared to those living in wealthier areas [24]. In the past three decades, income inequality in England increased steeply and it has been sustained at historically high levels [24]. In addition, there is evidence

**Table 2. Characteristics according to disability status by household wealth in 5,506 men and women, the English Longitudinal Study of Ageing (ELSA), wave 6 (2012–13).**

| Characteristic | Without disability % (n = 4,353) | Disability | | | *P* value |
|---|---|---|---|---|---|
| | | Wealthiest % (n = 253) | Intermediate % (n = 351) | Poorest % (n = 549) | |
| ***Men*** | | | | | |
| Age, mean (SD) | 66.0 (8.3) | 71.2 (9.0) | 71.4 (8.9) | 68.4 (9.1) | <0.001 |
| Number of comorbidities* | | | | | <0.001 |
| None | 39.2 | 19.8 | 13.8 | 11.1 | |
| One | 40.1 | 39.6 | 33.1 | 32.0 | |
| Two or more | 20.7 | 40.6 | 53.1 | 56.9 | |
| Marital status (not living with partner) | 28.1 | 26.4 | 20.6 | 43.1 | <0.001 |
| No weekly contact with friends, family or children | 5.0 | 0.9 | 5.0 | 9.3 | 0.008 |
| Loneliness (highest tertile) | 22.5 | 34.0 | 31.9 | 36.4 | <0.001 |
| Low social support from friends, family or children | 39.6 | 44.3 | 38.1 | 39.6 | 0.769 |
| Depressive symptoms (≥4 CES-D symptoms) | 4.2 | 11.3 | 15.0 | 28.0 | <0.001 |
| ***Women*** | | | | | |
| Age, mean (SD) | 64.5 (7.8) | 69.4 (8.7) | 68.9 (8.4) | 66.9 (8.9) | <0.001 |
| Number of comorbidities* | | | | | <0.001 |
| None | 45.0 | 15.7 | 18.9 | 13.3 | |
| One | 37.1 | 41.5 | 36.1 | 30.6 | |
| Two or more | 17.9 | 42.9 | 45.0 | 56.2 | |
| Marital status (not living with partner) | 35.4 | 21.1 | 26.2 | 52.5 | <0.001 |
| No weekly contact with friends, family or children | 5.4 | 4.1 | 5.2 | 5.3 | 0.931 |
| Loneliness (highest tertile) | 27.6 | 36.7 | 37.2 | 49.7 | <0.001 |
| Low social support from friends, family or children | 23.2 | 29.9 | 24.6 | 28.7 | 0.058 |
| Depressive symptoms (≥4 CES-D symptoms) | 8.5 | 15.0 | 18.9 | 38.0 | <0.001 |

* Self-reported doctor diagnosed chronic diseases = diabetes, cancer, stroke, arthritis, lung disease, Parkinson and CVD conditions (high blood pressure, angina, heart attack, heart failure, heart murmur or heart rhythm)

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suggesting a linking between the growth in health inequality and the observed trends in wealth inequality [25].

suggesting a linking between the growth in health inequality and the observed trends in wealth inequality [25].

We found that depressive symptoms are an important aspect when investigating functioning in older adults. It was not only associated with functioning, but also show heterogeneity across household wealth groups among those reporting disability: the odds of the association between disability and depressive symptoms are nearly three times higher among the poorest. Previous results from the Whitehall II Study [5] showed that there is an inverse gradient in both depressive symptoms and in poor functioning by SES and the current findings provide further evidence of the interactive effect of depressive symptoms and SES on functioning. This pathway makes sense, corroborating cohort studies that have explored the effect of depressive symptoms on the onset of disability [18]. On the other hand, since this is a cross-sectional analysis, it is reasonable to consider another pathway: disability [8,9] and lower SES [5,26] leads to depressive symptoms. Previous studies that had explored the association between depressive symptoms and health outcomes [5,11,12,13,15,27,28] reported adjusted coefficients by SES

**Table 3. Multinomial Logistic regression analyses of older adults without disability (n = 1,153) aged 50 years and over in England by wealth tertiles, the English Longitudinal Study of Ageing (ELSA), wave 6 (2012–13).**

| | Model[a] | | | Model[b] | | |
|---|---|---|---|---|---|---|
| | Disability | | | Disability | | |
| | Wealthiest (n = 253) OR (95% CI) | Intermediate (n = 351) OR (95%CI) | Poorest (n = 549) OR (95%CI) | Wealthiest (n = 253) OR (95% CI) | Intermediate (n = 351) OR (95%CI) | Poorest (n = 549) OR (95%CI) |
| ***Men*** | | | | | | |
| Marital status (not living with partner) | 1.01(0.64–1.60) | **0.65 (0.43–0.99)** | **1.71 (1.26–2.33)** | 1.02 (0.65–1.62) | 0.66 (0.43–1.01) | **1.78 (1.29–2.45)** |
| No weekly contact with friends, relatives or children | 0.25 (0.33–1.82) | 1.50 (0.69–3.29) | **1.80 (1.05–3.10)** | 0.25 (0.03–1.83) | 1.52 (0.69–3.34) | **1.79 (1.01–3.16)** |
| Loneliness (highest tertile) | **1.80 (1.17–2.78)** | **1.75 (1.21–2.53)** | **1.72 (1.26–2.35)** | **1.59 (1.01–2.49)** | 1.42 (0.97–2.11) | 1.09 (0.77–1.55) |
| Low social support from friends, family or children | 1.36 (0.90–2.04) | 1.09 (0.77–1.55) | 1.15 (0.85–1.56) | 1.33 (0.88–2.01) | 1.07 (0.75–1.53) | 1.12 (0.82–1.53) |
| Depressive symptoms (≥4 CES-D symptoms) | - | - | - | **2.44 (1.24–4.83)** | **3.43 (2.00–5.86)** | **7.47 (4.90–11.37)** |
| ***Women*** | | | | | | |
| Marital status (not living with partner) | **0.52 (0.34–0.79)** | **0.67 (0.48–0.95)** | **1.97 (1.53–2.54)** | **0.52 (0.34–0.79)** | **0.66 (0.47–0.94)** | **1.88 (1.44–2.44)** |
| No weekly contact with friends, family or children | 0.94 (0.40–2.21) | 1.11 (0.56–2.19) | 0.84 (0.48–1.47) | 0.94 (0.40–2.22) | 1.13 (0.57–2.23) | 0.90 (0.51–1.60) |
| Loneliness (highest tertile) | **1.59 (1.10–2.29)** | **1.65 (1.19–2.28)** | **2.22 (1.72–2.87)** | 1.45 (0.99–2.11) | **1.42 (1.01–1.98)** | **1.52 (1.15–2.01)** |
| Low social support from friends, family or children | 1.38 (0.94–2.02) | 1.03 (0.73–1.49) | 1.16 (0.88–1.54) | 1.36 (0.93–2.00) | 1.02 (0.71–1.45) | 1.09 (0.82–1.47) |
| Depressive symptoms (≥4 CES-D symptoms) | - | - | - | **1.78 (1.07–2.96)** | **2.39 (1.57–3.64)** | **5.15 (3.78–7.00)** |

Models using participants without disability as reference category: Model[a] = adjusted for age, number of chronic diseases and psychosocial characteristics; Model[b] = Model[a] + depressive symptoms.

Bold: p<0.05

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that might represent merely the average coefficients across the SES categories rather than its real meaning considering this interaction. In order to test whether the heterogeneity found was due to a differential intensity of depressive symptoms across SES categories, we performed the Kruskal-Wallis test to see any potential difference between the numbers of positive depressive symptoms by the three disability categories. We found only statistical differences among women, indicating that this apparent interaction might be due to more severe levels of depressive symptoms among the poorest women.

According to psychosocial theory [1,29], disability inequalities linked to depressive symptoms could be partially explained by social support or social integration. Ours findings show that the lack of weekly contact with children, family or a friend and the absence of a partner are related factors among men and, among women, the related factors are loneliness and the absence of a partner. Indeed, it has been noted that those most in need of support from their social networks, such as in the event of disability, are often those least likely to receive support [30]. Our results show that men report lower levels of support from children, family or friends than women. This finding could be explained by the fact that for men social support is heavily focused on their spouses, whereas women are much more likely to rely on a child, close relative, or a friend as their confidant and mobilize more social supports during periods of stress.

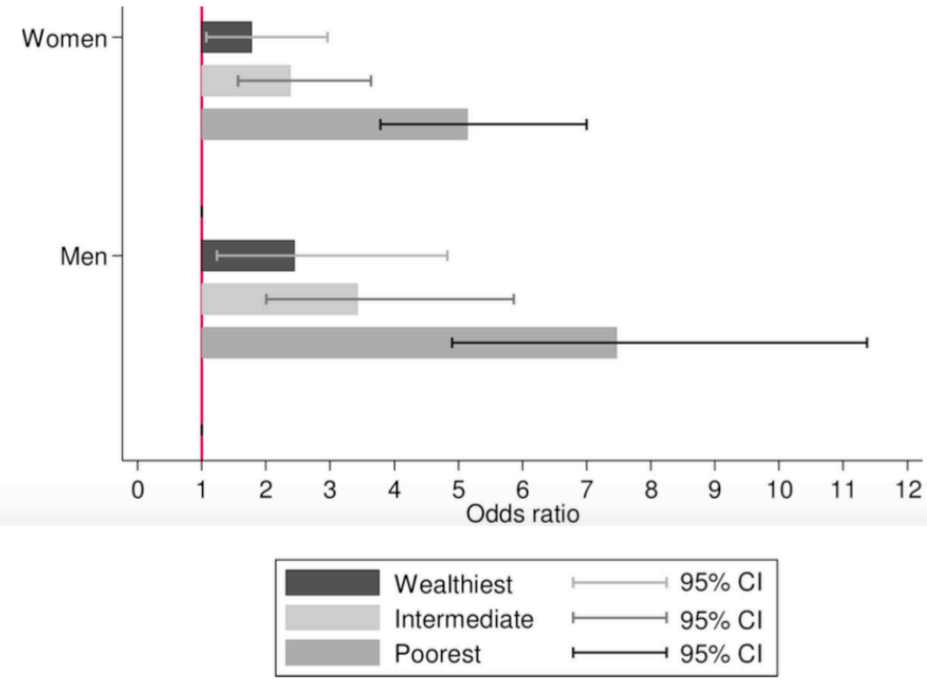


**Fig 1. Fully adjusted odds ratios and 95% CI of depressive symptoms among men and women with disability, according to wealth tertiles.** The English Longitudinal Study of Ageing, wave 6 (2012–13).

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Therefore, the idea that married people have the best health seems to apply mostly to men and the absence of a partner seems to be more mentally detrimental among men, demonstrated by higher odds of depressive symptoms in all SES groups, regardless of having a lower prevalence amongst women. Social networks, especially partners, could help to attenuate patterns of health inequalities in functioning among older adults [31].

Reviews published recently show that marriage has a protective effect for survival considering younger [32] and older adults [33]. Considering disability, married older adults are less likely to experience ADL decline and more likely to experience ADL recovery [34]. Our results partly corroborate with these findings showing that this occur for both the poorest men and women. Strikingly, for women with disability from the other socioeconomic groups, the pattern is just the opposite: they have more odds to live with a partner compared to the group without disability. As mentioned before, women tend to have more extensive social sources than men, not focusing only on a spouse, as they report more social support from other sources (children, family or friends) in all groups (data not shown). Unmarried women reported their children most frequently as a source of social support in managing a chronic illness [35] and our descriptive analysis show that the wealthiest and poorest groups have a bit more social support from friends, family or children than the disability-free group. These might attenuate the absence of a partner for health-related social control among women. On the other hand, married women tend to accumulate more wealth than single women, which could overinflate the number of married women in more wealthy groups [36].

Old age gives rise to the feeling of loneliness due to the increase in the number of experienced losses. One of these losses, according to ours results, could be disability. We observed

that older adults that have reported disability are more likely to report loneliness, independently of SES group. Disability could lead to a feeling of loneliness because difficulties in managing independent daily life impede on engagement in social relationships and fulfillment of social roles and could lead to emotional stress [37]. However, after adjustment for depressive symptoms, reported to be associated with loneliness [10], this association does not apply to all SES groups. This suggest that the link between loneliness and disability/SES status is due to depressive symptoms, despite studies showing that loneliness is itself a risk factor for physical functioning limitations [38]. Poorest women report more loneliness, have more severe depressive symptoms and are more likely to have disability. This pattern is not the same for men. It seems that qualitative psychosocial factors account more for disability among women while quantitative psychosocial factors account more for men.

To the best of our knowledge, this is one of the first studies to explore wealth inequalities in disability taking into account both depression and social support in older adults. The combined effect of psychosocial factors and SES on physical functioning has been explored before, concluding that social participation and living arrangements might alleviate the negative effects of lower SES [39]. Other studies have found that among lower SES groups, psychosocial factors are more significant indicators of self-rated health [30,31] than in higher SES groups.

More studies are needed to explore the interaction found between depressive symptoms and SES on disability.

The use of a national sample of community-dwellers and the richness of the data from a well-established study are strengths of our study. The former makes our findings more generalizable to the English population aged 50 years and older, and the latter allowed a better adjustment of confounding and mediating factors. The quality of the measurement of wealth minimised the possibility of measurement bias for SES. Additionally, further adjustment for level of education as another indicator of SES has been done without substantial changes on the results. We are however aware of some limitations. Firstly, due to subjective measures used as exposure and outcome and the measure of SES as outcome, nearly half of participants was excluded of which were older females with disability from the lowest socioeconomic group. This might have generated sub estimated odds ratios for the poorest group and mainly for marginal confidence intervals, such as for loneliness. Secondly, it is also not possible to rule out a same-source bias, that is, the exclusive use of self-reported variables to measure both functioning and social support and loneliness [40]. This bias is difficult to eliminate, since social support and loneliness are by definition subjective evaluations. Finally, it is a cross-sectional design, which impedes establishing temporal relations between the independent variables and the dependent variable.

## Conclusions

Our findings showed a clear wealth gradient in disability with better levels of social resources found among those who were better off. Qualitative psychosocial factors account more for disability among women while quantitative psychosocial factors account more for disability amongst men. The strong inverse dose-response association between wealth and depressive symptoms among participants with disability suggests an interaction, highlighting the importance of prevention and control of depression when making new policies in order to decrease disability and health inequalities. Initiatives to increase social participation and social support among older adults especially those from vulnerable areas and living in care homes should also be encouraged.

## Author Contributions

**Conceptualization:** JLT MFLC CO.

**Data curation:** JLT CO.

**Formal analysis:** JLT MFLC CO.

**Funding acquisition:** JLT CO.

**Investigation:** JLT MFLC CO MM.

**Methodology:** JLT MFLC CO.

**Project administration:** JLT CO.

**Resources:** JLT MFLC CO MM.

**Software:** JLT MFLC CO.

**Supervision:** JLT MFLC CO MM.

**Validation:** JLT CO.

**Visualization:** JLT MFLC CO MM.

**Writing – original draft:** JLT MFLC CO MM.

**Writing – review & editing:** JLT MFLC CO MM.

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# ANEXO 1

## APROVAÇÃO DO PROJETO BAMBUÍ PELA COMISSÃO DE ÉTICA EM PESQUISA DA FUNDAÇÃO OSWALDO CRUZ

CONFIDENC

Ministério da Saúde
**Fundação Oswaldo Cruz**
COMISSÃO DE ÉTICA EM PESQUISA

FIOCRUZ

Av. Brasil, 4365 - Manguinhos
Cx. Postal 926 - CEP 20000
Tel. (021) 280-6787 PABX
Rio de Janeiro - RJ - BRASIL

Rio de Janeiro, 04 de novembro de 1996.

Ilustríssima Senhora
Doutora MARIA FERNANDA FURTADO DE LIMA E COSTA
DD. Chefe do Laboratório de Epidemiologia e Antrologia Médica
Centro de Pesquisas René Rachou - FIOCRUZ
Att. Prof. Dr. Naftale Katz - DD. Diretor

Senhora Pesquisadora,

Tenho a satisfação de informar a Vossa Senhoria que esta Comissão aprovou, em sua reunião de 04/11/96, o projeto de pesquisa " Projeto Bambuí: Sistemas de Informações em Saúde, Diagnóstico de Saúde e Estudo Prospectivo em Idosos, com ênfase em Doenças Cardiovasculares e Aspectos Psico-Sociais".

Formulando votos de completo sucesso em sua investigação.

Atenciosamente,

MÁRIO ANTONIO SAYEG
Presidente da Comissão
de Ética da FIOCRUZ

# ANEXO 2

## FOLHA DE APROVAÇÃO DE TESE

UNIVERSIDADE FEDERAL DE MINAS GERAIS

PROGRAMA DE PÓS-GRADUAÇÃO EM SAÚDE PÚBLICA

# FOLHA DE APROVAÇÃO

**FATORES PSICOSSOCIAIS E FUNCIONALIDADE NO ENVELHECIMENTO: EVIDÊNCIAS DA COORTE DE BAMBUI E DO ENGLISH LONGITUDINAL STUDY OF AGEING**

## JULIANA LUSTOSA TORRES

Tese submetida à Banca Examinadora designada pelo Colegiado do Programa de Pós-Graduação em SAÚDE PÚBLICA, como requisito para obtenção do grau de Doutor em SAÚDE PÚBLICA, área de concentração SAÚDE PÚBLICA.

Aprovada em 30 de junho de 2017, pela banca constituída pelos membros:

Prof(a). Maria Fernanda Furtado de Lima e Costa - Orientador
UFMG

Prof(a). Fabiane Ribeiro Ferreira
UFMG

Prof(a). Luana Giatti Gonçalves
UFMG

Prof(a). Marilisa Berti de Azevedo Barros
Unicamp

Prof(a). Fernando Augusto Proietti
Fiocruz-MG

# ANEXO 3

## ATA DA DEFESA DE TESE

**UNIVERSIDADE FEDERAL DE MINAS GERAIS**

**PROGRAMA DE PÓS-GRADUAÇÃO EM SAÚDE PÚBLICA**

UFMG

# ATA DA DEFESA DE TESE DA ALUNA
# JULIANA LUSTOSA TORRES

Realizou-se, no dia 30 de junho de 2017, às 14:00 horas, Sala 526, Faculdade de Medicina, da Universidade Federal de Minas Gerais, a defesa de tese, intitulada *FATORES PSICOSSOCIAIS E FUNCIONALIDADE NO ENVELHECIMENTO: EVIDÊNCIAS DA COORTE DE BAMBUI E DO ENGLISH LONGITUDINAL STUDY OF AGEING*, apresentada por JULIANA LUSTOSA TORRES, número de registro 2013715999, graduada no curso de FISIOTERAPIA, como requisito parcial para a obtenção do grau de Doutor em SAÚDE PÚBLICA, à seguinte Comissão Examinadora: Prof(a). Maria Fernanda Furtado de Lima e Costa - Orientadora (UFMG), Prof(a). Fabiane Ribeiro Ferreira (UFMG), Prof(a). Luana Giatti Gonçalves (UFMG), Prof(a). Marilisa Berti de Azevedo Barros (Unicamp), Prof(a). Fernando Augusto Proietti (Fiocruz-MG).

A Comissão considerou a tese:

(X) Aprovada

( ) Reprovada

Finalizados os trabalhos, lavrei a presente ata que, lida e aprovada, vai assinada por mim e pelos membros da Comissão.
Belo Horizonte, 30 de junho de 2017.

Prof(a). Maria Fernanda Furtado de Lima e Costa ( Doutora )

Prof(a). Fabiane Ribeiro Ferreira ( Doutora )

Prof(a). Luana Giatti Gonçalves ( Doutora )

Prof(a). Marilisa Berti de Azevedo Barros ( Doutora )

Prof(a). Fernando Augusto Proietti ( Doutor )