The impact on health-related quality of life of mixed mental and physical multimorbidity in adults aged 60 years and older: secondary analysis of primary care data

Filipe Prazeres[1,2,3], Luiz M. Santiago[4,5], José A. Simões[1,3,6]

[1]Faculdade de Ciências da Saúde, Universidade da Beira Interior, Covilhã, Portugal
[2]USF Beira Ria, Gafanha da Nazaré, Portugal
[3]Centre for Health Technology and Services Research (CINTESIS), Porto, Portugal
[4]Faculty of Medicine, University of Coimbra, Coimbra, Portugal
[5]General Practice Family Medicine Clinic, Faculty of Medicine, University of Coimbra, Portugal
[6]USF Caminhos do Cértoma, ACeS Baixo Mondego, Portugal

Corresponding author:
Prof. Filipe Prazeres
Faculdade de Ciências
da Saúde
Universidade da Beira Interior
6200-506 Covilhã, Portugal
E-mail: filipeprazeresmd@
gmail.com

Abstract

Introduction: Given the number of patients with mental conditions who receive treatment within the primary care (PC) context, and the high prevalence of multimorbidity (especially in older people), there is a need to study mental-physical multimorbidity (MPM) in this population and context. This study sought to identify the impact on health-related quality of life (QoL) of MPM in adults aged 60 years and older.
Material and methods: Secondary analysis of data derived from 251 primary health individuals. Data were collected via a sociodemographic and clinical questionnaire. Health-related QoL was assessed using the SF-12 instrument. Multiple linear regressions were performed for physical and mental health in MPM patients and in patients with physical-only multimorbidity.
Results: Mean age of participants was 70.6 years; 57.8% were female. Quality of life was lower in MPM patients than in those with physical-only multimorbidity. Regarding MPM patients, female sex, 75 years and over, and low income were associated with worse physical health. Female sex was also associated with worse mental health.
Conclusions: This study contributes to the global knowledge of MPM in older people, illuminates health-related QoL differences among MPM and physical-only multimorbidity patients, and highlights the importance of non-modifiable characteristics associated with deterioration of health-related QoL. Team collaboration between primary care physicians, psychiatrists (and other mental health providers), and social workers may be necessary to assess psychiatric and physical symptoms and provide for the care needs of older people with MPM.

Key words: multimorbidity, geriatric psychiatry, quality of life, primary health care.

Introduction

Primary care (PC) provides treatment for many patients living with the coexistence of two or more chronic health problems, i.e. multimorbi-

AMS

dity [1, 2]. This is also true for patients with mental conditions and psychological problems [3].

The number of patients with multimorbidity is rising rapidly [4] and so is the burden it carries [5, 6]; this is even more pronounced in older people [4, 7], as life expectancy continues to increase. According to the United Nations, the growth rate of the global population aged 60 or above is estimated at 3% per year; the greatest percentage of older persons aged 60 or above dwell in Europe (25%) [8].

Prevalence of multimorbidity in old age can reach up to 98% [6]. In Portugal, 82.7% of primary care patients aged 65 or above reported having 2+ of 147 chronic health problems [1].

The presence of mental health problems in an individual increases with the number of simultaneous physical problems [9], people with multimorbidity being two to three times more likely to experience mental health problems, especially older people [10]. Depression and other mental health problems are more prevalent in patients with cardiovascular diseases, diabetes, chronic obstructive pulmonary disease, and chronic musculoskeletal disorders [11].

QoL is an extensive and subjective construct [12] that "broadly encompasses how an individual measures the 'goodness' of multiple aspects of their life" [13]. The importance of studying health-related QoL in distinct health problems is widely recognized in previously published articles in this journal [14–17]. In old age this concept is even more important since it is commonly accepted that a shorter life with quality is better than a longer one without it [12].

Mental-physical multimorbidity (MPM) is highly prevalent and increases total health care costs, but still needs a better understanding [18, 19], as does health-related quality of life (QoL) in older people [20]. Previous research shows that most QoL studies do not include mental health problems or that they were excluded from measures of QoL [21]. Given the number of patients with mental conditions who receive their care within a PC context, and the high prevalence of multimorbidity in PC (especially in older people), it is necessary to study MPM in this population and context.

The present study aims to identify the impact on health-related QoL of MPM in adults aged 60 years and older within primary care.

Material and methods

Data used for this secondary analysis were collected from phase II of the MM-PT project (Multimorbidity in primary care in Portugal), a multicentre cross-sectional study conducted in the Centre Region of Portugal, which has been previously described elsewhere [22, 23]. In a few words, general practitioners (GPs) from 13 primary care centres were enrolled to collect information regarding demographic, clinical, and health-related QoL from 521 adult patients presenting for primary care consultations; written informed consent was always given. All patients were multimorbid, with at least 2 chronic health problems out of a list of 147 conditions [24], of which at least one was required to be hypertension, diabetes, asthma or osteoarthritis [23]. The institutional ethics committee approved the original study and it was performed in accordance with the ethical standards of the Declaration of Helsinki. Written consent was obtained from study participants.

The dataset was previously stripped of all identifying information and consequently did not generate identifiable data. The current analysis was performed in 251 individuals, 60 years and older. All adults aged under 60 years were excluded as the current analysis focused on older people with multimorbidity alone. No missing data were found for the included patients.

For the current study, the number of chronic health problems was obtained and categorized as 2–5 conditions and 6+ conditions. Health-related QoL was estimated for the entire sample using the Portuguese Short Form-12 Health Status Questionnaire (SF-12) [25]. The SF-12 is a generic measure of health status. SF-12 measures eight health aspects, namely physical functioning (PF), role limitations due to physical health problems (RP), bodily pain (BP), general health perceptions (GH), vitality (VT), social functioning (SF), role limitations due to emotional problems (RE), and mental health (psychological distress and psychological well-being) (MH). Two summary measures are derived from the SF-12: physical health (Physical Component Summary – PCS) and mental health (Mental Component Summary – MCS). Higher scores represent better health [25, 26].

The studied sample was divided into 2 groups of patients: (i) patients with 2+ chronic physical health problems but no mental health problems (physical-only multimorbidity, POM), and (ii) patients with 2+ chronic health problems including at least 1 physical and 1 mental (mental-physical multimorbidity – MPM).

Statistical analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 21.0. Summary statistics were calculated according to variable type and distribution. Comparisons between categorical data were analysed using the χ^2 test. Numerical variables were analysed using the Mann-Whitney U-test when the dependent variable was not normally distributed. Multiple linear regressions were performed for the two summary measures (PCS and MCS) using vari-

Filipe Prazeres, Luiz M. Santiago, José A. Simões

ables significant in the univariate analysis and a stepwise selection method (for MPM patients and POM patients). All tests considered a significance threshold of $p < 0.05$.

Results

Patient characteristics are presented in Table I. Mental-physical multimorbidity patients were mostly women (81%) and on average were younger than those with POM; 81% were less than 75 years old. The mean number of chronic health problems in MPM patients was higher than in those with POM (5.9 vs. 5.2; $p = 0.006$); the majority of MPM had 6+ conditions (60.3%; $p = 0.003$).

Table II shows that MPM patients and those with POM had low mean SF-12 scores. These scores were even lower in MPM patients than those with POM. The scores that load heavily on mental health (SF and MH) were statistically significantly lower in the MPM group than in the POM group. The Mental Component Summa-

ry score was also significantly lower in the MPM group. However, regarding PCS no significant difference between the two groups of patients was evident.

Table III shows that in MPM patients SF-12 scores were related to patients' characteristics. Scores that load heavily on physical health were statistically related to sex, age, living arrangements and income. Scores that load heavily on mental health were statistically related to sex and living arrangements. SF-12 scores of MPM patients were not related to the number of chronic health problems. Contrarily, the number of chronic conditions was related to SF-12 scores in POM patients, particularly the PCS.

Table IV shows that in MPM patients, female sex, 75+ years, and low income were associated with statistically significantly lower PCS score. Female sex was also associated with statistically significantly lower MCS score. Regarding POM patients, female sex, 75+ years, and 6+ chronic conditions were associated with statistically significantly lower PCS score. Female sex, living alone,

Table I. Characteristics of the 251 Portuguese primary care patients with multimorbidity aged 60 years and older (2014–2015)

Parameter	Total (*N* = 251)	Multimorbidity		
		Physical-only (*n* = 193)	Mental-physical (*n* = 58)	*P*-value*
Sex, female, % (*n*)[a]	57.8 (145)	50.8 (98)	81.0 (47)	< 0.001
Age [years]:				
Mean[b] (SD; min.–max.)	70.6 (7.7; 60–93)	71.4 (7.8; 60–93)	67.8 (6.8; 60–83)	0.001
60–74 years, % (*n*)[a]	69.7 (175)	66.3 (128)	81.0 (47)	0.032
75+ years, % (*n*)	30.3 (76)	33.7 (65)	11.0 (19)	
Living arrangements, % (*n*)[a]:				
Alone	16.3 (41)	12.4 (24)	29.3 (17)	0.002
With someone	83.7 (210)	87.6 (169)	70.7 (41)	
Education level, % (*n*)[a]:				
Low education (6 or less years)	87.6 (220)	88.6 (171)	84.5 (49)	0.403
High education (more than 6 years)	12.4 (31)	11.4 (22)	15.5 (9)	
Income level, % (*n*)[a]:				
Low income	36.3 (91)	35.2 (68)	39.7 (23)	0.539
High income	63.7 (160)	64.8 (125)	60.3 (35)	
Chronic health problems:				0.006
Mean[b] (SD; min.–max.)	5.4 (2.3; 2–13)	5.2 (2.4; 2–13)	5.9 (1.8; 2–10)	
2–5 conditions[a]	56.6 (142)	61.7 (119)	39.7 (23)	0.003
6+ conditions	43.3 (109)	38.3 (74)	60.3 (35)	

[a]χ^2 test. [b]Mann-Whitney U-test. *P-value of comparison variabilities between physical multimorbidity vs. mental-physical multimorbidity groups.

Table II. SF-12 scores of individual scales by physical multimorbidity and mental-physical multimorbidity (2014–2015)

Scores	Total (N = 251)	Multimorbidity		P-value*
		Physical-only (n = 193)	Mental-physical (n = 58)	
SF-12 scale scores, mean (SD)[a]:				
Physical:				
Physical Functioning	41.2 (12.5)	42.0 (12.5)	38.7 (12.2)	0.076
Role-Physical	40.0 (13.5)	40.3 (13.9)	39.0 (12.2)	0.500
Bodily Pain	38.3 (12.0)	39.0 (11.8)	36.0 (12.5)	0.116
General Health	31.8 (9.6)	32.2 (9.6)	30.5 (9.8)	0.203
Mental:				
Vitality	46.7 (11.3)	47.4 (10.9)	44.6 (12.2)	0.117
Social Functioning	43.8 (14.2)	44.9 (13.8)	40.0 (14.7)	0.018
Role-Emotional	43.0 (13.1)	43.9 (12.5)	39.8 (14.5)	0.055
Mental Health	45.3 (13.1)	47.2 (12.6)	38.9 (12.8)	< 0.001
SF-12 component scores, mean (SD)[a]:				
Summary:				
Physical Component Summary (PCS)	36.8 (11.3)	37.0 (11.5)	36.4 (10.5)	0.666
Mental Component Summary (MCS)	46.9 (12.2)	48.4 (11.5)	41.9 (13.4)	0.001

[a]Mann-Whitney U-test. *P-value of comparison variabilities between physical multimorbidity vs. mental-physical multimorbidity groups.

Table III. Association between SF-12 scores and patients' characteristics (2014–2015)

Characteristic	SF-12 scores (P-values*)									
	Mental-physical multimorbidity									
	PF	RP	BP	GH	VT	SF	RE	MH	PCS	MCS
Sex	0.001	n.s.	0.033	0.035	n.s.	0.010	n.s.	0.019	0.012	0.031
Age group	0.016	n.s.	n.s.	0.031	n.s.	n.s.	n.s.	n.s.	0.006	n.s. .
Living arrangements	0.003	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.026	n.s.
Education level	n.s	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Income level	0.019	0.003	n.s.	0.020	0.040	n.s.	0.038	0.013	0.043	0.048
Chronic health problems group	n.s	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
	Physical-only multimorbidity									
	PF	RP	BP	GH	VT	SF	RE	MH	PCS	MCS
Sex	< 0.001	n.s.	0.001	n.s.	n.s.	0.024	n.s.	< 0.001	0.012	0.014
Age group	< 0.001	0.002	n.s.	n.s.	0.030	0.001	n.s.	n.s.	0.001	n.s.
Living arrangements	0.050	0.008	n.s.	n.s.	n.s.	0.002	0.038	0.026	n.s.	0.031
Education level	n.s	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Income level	0.031	0.032	0.002	0.005	0.028	0.003	< 0.001	0.007	0.033	< 0.001
Chronic health problems group	0.005	< 0.001	< 0.001	n.s.	0.041	0.029	0.020	n.s.	<0.001	n.s.

PF – physical functioning, RP – role physical, BP – bodily pain, GH – general health, VT – vitality, SF – social functioning, RE – role emotional, MH – mental health, PCS – physical component summary, MCS – mental component summary. *P-values of score comparison variabilities between categories of each patients' characteristic (n.s. – non-significant).

Filipe Prazeres, Luiz M. Santiago, José A. Simões

Table IV. Multiple linear regression for Physical Component Summary (PCS) and Mental Component Summary (MCS)

Variable	Mental-physical multimorbidity						Physical-only multimorbidity					
	PCS			MCS			PCS			MCS		
	B	SE_B	β	B	SE_B	β	B	SE_B	β	B	SE_B	β
Intercept	30.94	6.41	–	30.54	5.43	–	45.41	3.77	–	23.56	5.33	–
Sex	6.43	3.18	0.24*	9.51	4.33	0.28*	3.98	1.54	0.17*	3.34	1.57	0.15[*]
Age group	–8.96	3.11	–0.34[*]	–	–	–	–5.22	1.65	–0.22*	–	–	–
Living arrangements	–	–	–	–	–	–	–	–	–	5.17	2.38	0.15[*]
Income level	5.26	2.53	0.25*	–	–	–	–	–	–	6.18	1.64	0.26[*]
Chronic health problems group	–	–	–	–	–	–	–5.35	1.61	–0.23*	–	–	–

B – unstandardized regression coefficient, SE_B – standard error of the coefficient, β – standardized coefficient. *P < 0.05.

and low income were associated with statistically significantly lower MCS score.

Discussion

The present study will be useful for better understanding of the complex impact of MPM on health-related QoL of older people in primary care. To the best of the authors' knowledge, this is the first study of such nature in Portugal.

Even though the sample of patients with MPM in the present study was relatively small ($n = 58$), it made up a substantial proportion of all older people with 2+ chronic health problems (23.1%). This proportion is roughly in line with published prevalence rates amongst primary care patients [5]. Its epidemiologic characteristics (more common in women than men and in younger age groups) were like those encountered in other studies [5, 9], supporting the validity of the current study findings. This study also supports evidence from previous observations [27] where patients with mental conditions have more diseases, in a known bidirectional relationship [19, 28]. Nonetheless, because of the sample size, the results may not be generalisable. Further research is suggested on larger nationwide samples.

In general, MPM substantially and negatively affected health-related QoL of older people in primary care and was considerably worse compared with POM patients. These results match those observed in previous studies [29–31]. In reality, these findings of low health-related QoL can be even worse when we keep in mind that older people with health conditions often report QoL positively [12]. In a Canadian successful aging study, more than 80% of the 1821 participants of older age responded positively to the question "Do you think you have aged successfully?" [32]. Expectedly, in the current study, mental health (MCS score) was also significantly worse in the MPM group compared with the POM group. It can thus be suggested that older people with MPM suffer to a greater extent from maladaptive reaction to multimorbidity; the presence of some of the psychological problems may be a manifestation of the adjustment disorder [33], with a greater inability to feel calm and peaceful compared with POM patients. Older people with MPM also reported greater interference in their social activities (visiting friends, relatives, etc). Considering that a strong social network is associated with better QoL [34] and protects from multimorbidity [6], older people with MPM will probably need help for social support from the community, as seen in the present study; living with someone is a protective factor regarding mental health only for older people with POM.

The number of chronic conditions was related to SF-12 scores in POM patients, but not in MPM patients. More than the number of chronic health problems, the most probable explanation for this might be that the disease severity would be responsible for the decline in QoL, through the increase of psychological distress in older people with MPM [35]. Another explanation might be related to the presence of mental conditions which are known to have a larger effect on QoL than the severity of the physical illness [19]. Nonetheless, future research regarding MPM multimorbidity should consider the use of disease severity measures.

Some sociodemographic characteristics, commonly associated with worse health-related QoL in the context of multimorbidity [6, 23, 36], were also found in geriatric MPM patients: female sex, old age and low income (after the model was adjusted). These data suggest that MPM patients will most likely need care through medical and social services, as well as financial support [6, 23].

Limitations to the present study include the risks of secondary data analysis. Nonetheless, the authors were the ones who collected the orig-

inal data, and as such, know perfectly the constructs measured and by what means they were measured, which was certainly an advantage [37]. Another advantage was that in the original sample, the 4 diseases collected are not only known to be associated with lower QoL but also with mental conditions.

In the future it would be beneficial to study whether, when the diagnosis of a mental health condition precedes the appearance of the physical health condition, that would affect the older persons' quality of life. It would also be of interest to apply differential loads to medical conditions in future studies.

In conclusion, the present study contributes to the global knowledge of MPM in older people, illuminates health-related QoL differences among MPM patients and POM patients, and highlights the importance of non-modifiable characteristics associated with worse health-related QoL. Team collaboration between primary care physicians, psychiatrists (and other mental health providers), and social workers may be necessary to assess psychiatric and physical symptoms and provide for the care needs of older people with MPM.

Acknowledgments

Conflict of interest

The authors declare no conflict of interest.

References

1. Prazeres F, Santiago L. Prevalence of multimorbidity in the adult population attending primary care in Portugal: a cross-sectional study. BMJ Open 2015; 5: e009287.
2. Boyd CM, Fortin M. Future of multimorbidity research: how should understanding of multimorbidity inform health system design? Public Health Rev 2012; 32: 451-74.
3. Norquist GS, Regier DA. The epidemiology of psychiatric disorders and the de facto mental health care system. Ann Rev Med 1996; 47: 473-9.
4. Fortin M, Bravo G, Hudon C, Vanasse A, Lapointe L. Prevalence of multimorbidity among adults seen in family practice. Ann Fam Med 2005; 3: 223-8.
5. Cassell A, Edwards D, Harshfield A, et al. The epidemiology of multimorbidity in primary care: a retrospective cohort study. Br J Gen Pract 2018; 68: e245-51.
6. Marengoni A, Angleman S, Melis R, et al. Aging with multimorbidity: a systematic review of the literature. Ageing Res Rev 2011; 10: 430-9.
7. Marengoni A, Nobili A, Pirali C, et al. Comparison of disease clusters in two elderly populations hospitalized in 2008 and 2010. Gerontology 2013; 59: 307-15.
8. United Nations Department of Economic and Social Affairs Population Division. World population prospects: The 2017 revision, key findings and advancetables. Working. Paper No. ESA/P/WP/248, 2017.
9. Barnett K, Mercer SW, Norbury M, Watt G, Wyke S, Guthrie B. Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. Lancet 2012; 380: 37-43.
10. van den Brink AM, Gerritsen DL, Oude Voshaar RC, Koopmans RT. Patients with mental-physical multimorbidity: do not let them fall by the wayside. Int Psychogeriatr 2014; 26: 1585-9.
11. Naylor C, Parsonage M, McDaid D, Knapp M, Fossey M, Galea A. Long-term conditions and mental health: The cost of co-morbidities. http://www.kingsfund.org.uk/publications/mental_health_ltcs.html (Accessed: 5.08.2018).
12. Tripathi RK. Quality of life: an important issue in geriatric research. J Gerontol Geriatr Res 2012; 1: 5.
13. Theofilou P. Quality of life: definition and measurement. Eur J Psychol 2013; 9: 150-62.
14. Palomo-Lopez P, Calvo-Lobo C, Becerro-de-Bengoa-Vallejo R, et al. Quality of life related to foot health status in women with fibromyalgia: a case-control study. Arch Med Sci 2019; 15: 694-9.
15. Chmaj-Wierzchowska K, Rzymski P, Wojciechowska M, Parda I, Wilczak M. Health-related quality of life (Nottingham Health Profile) in patients with endometriomas: correlation with clinical variables and self-reported limitations. Arch Med Sci 2020; 16: 584-91.
16. Baczyk G, Kozlowska K. The role of demographic and clinical variables in assessing the quality of life of outpatients with rheumatoid arthritis. Arch Med Sci 2018; 14: 1070-9.
17. Depta A, Jewczak M, Skura-Madziala A. Quality of life of patients from rural and urban areas in poland with head and neck cancer treated with radiotherapy. A study of the influence of selected socio-demographic factors. Arch Med Sci 2017; 13: 1474-82.
18. Coventry PA, Dickens C, Todd C. How does mental-physical multimorbidity express itself in lived time and space? A phenomenological analysis of encounters with depression and chronic physical illness. Soc Sci Med 2014; 118: 108-18.
19. Naylor C. Sp0115 the link between long-term conditions and mental health. Ann Rheuma Dis 2013; 71: 28-9.
20. Kwak Y, Kim Y. Health-related quality of life and mental health of elderly by occupational status. Iranian J Public Health 2017; 46: 1028-37.
21. Fortin M, Lapointe L, Hudon C, Vanasse A, Ntetu AL, Maltais D. Multimorbidity and quality of life in primary care: a systematic review. Health Qual Life Outcomes 2004; 2: 51.
22. Prazeres F, Santiago L. Multimorbidity in primary care in Portugal (MM-PT): a cross-sectional three-phase observational study protocol. BMJ Open 2014; 4: e004113.
23. Prazeres F, Santiago L. Relationship between health-related quality of life, perceived family support and unmet health needs in adult patients with multimorbidity attending primary care in portugal: a multicentre cross-sectional study. Health Qual Life Outcomes 2016; 14: 156.
24. O'Halloran J, Miller GC, Britt H. Defining chronic conditions for primary care with icpc-2. Fam Pract 2004; 21: 381-6.
25. Pais-Ribeiro J. O importante é a saúde: Estudo de adaptação de um instrumento para avaliar o estado de saúde. Lisboa: Fundação Merck Sharp & Dohme; 2005.

26. Ware J Jr, Kosinski M, Keller SD. A 12-item short-form health survey: construction of scales and preliminary tests of reliability and validity. Medical Care 1996; 34: 220-33.

27. Goodwin RD, Davidson KW, Keyes K. Mental disorders and cardiovascular disease among adults in the United States. J Psychiatr Res 2009; 43: 239-46.

28. Mercer SW, Gunn J, Bower P, Wyke S, Guthrie B. Managing patients with mental and physical multimorbidity. BMJ 2012; 345: e5559.

29. Moussavi S, Chatterji S, Verdes E, Tandon A, Patel V, Ustun B. Depression, chronic diseases, and decrements in health: results from the world health surveys. Lancet 2007; 370: 851-8.

30. Yohannes AM, Willgoss TG, Baldwin RC, Connolly J. Depression and anxiety in chronic heart failure and chronic obstructive pulmonary disease: prevalence, relevance, clinical implications and management principles. Int J Geriatr Psychiatry 2010; 25: 1209-21.

31. Mujica-Mota RE, Roberts M, Abel G, et al. Common patterns of morbidity and multi-morbidity and their impact on health-related quality of life: evidence from a national survey. Qual Res 2015; 24: 909-18.

32. Tate RB, Lah L, Cuddy TE. Definition of successful aging by elderly Canadian males: the manitoba follow-up study. Gerontologist 2003; 43: 735-44.

33. Schulze T, Maercker A, Horn AB. Mental health and multimorbidity: psychosocial adjustment as an important process for quality of life. Gerontology 2014; 60: 249-54.

34. Cohen S, Wills TA. Stress, social support, and the buffering hypothesis. Psychol Bull 1985; 98: 310-57.

35. Fortin M, Bravo G, Hudon C, Lapointe L, Dubois MF, Almirall J. Psychological distress and multimorbidity in primary care. Ann Fam Med 2006; 4: 417-22.

36. Uijen AA, van de Lisdonk EH. Multimorbidity in primary care: prevalence and trend over the last 20 years. Eur J General Pract 2008; 14 Suppl 1: 28-32.

37. Greenhoot AF, Dowsett CJ. Secondary data analysis: an important tool for addressing developmental questions. J Cogn Develop 2012; 13: 2-18.