Trajectories of antidepressant use before and after union dissolution and re-partnering in later life: a prospective total population register-based cohort study

Yaoyue Hu ![ORCID] ,[1] Niina Metsä-Simola ![ORCID] ,[2] Satu Malmberg ![ORCID] ,[2] Pekka Martikainen ![ORCID] [2,3,4]

¹School of Public Health, Chongqing Medical University, Chongqing, China
²Population Research Unit, Faculty of Social Sciences, University of Helsinki, Helsinki, Finland
³Max Planck Institute for Demographic Research, Rostock, Mecklenburg-Vorpommern, Germany
⁴Max Planck – University of Helsinki Center for Social Inequalities in Population Health, Helsinki, Finland

Correspondence to
Professor Yaoyue Hu, School of Public Health, Chongqing Medical University, Chongqing, Chongqing, China; yaoyue.hu@cqmu.edu.cn

YH and NM-S are joint first authors.

![Check for updates]

ABSTRACT

Background Grey divorce and later remarriage have become increasingly common in high-income countries, but previous evidence on their impacts on mental health is scarce. Even less is known about the effects of non-marital separation and re-partnering in later life.

Methods Using Finnish registry data from 1996 to 2018 on 228 644 individuals aged 50–70 in 2000–2014, trajectories of antidepressant (AD) use 4 years before and 4 years after divorce, non-marital separation, bereavement and subsequent re-partnering were examined using individual fixed-effects (FE) linear probability models.

Results In adjusted FE models, for both genders AD use increased during the 4 years before divorce (men: 5.00 percentage points (95% CI 4.50 to 5.50); women: 6.96 (95% CI 6.34 to 7.59)), non-marital separation (men: 3.20 (95% CI 2.72 to 3.69); women: 5.98 (95% CI 5.30 to 6.66)) and bereavement (men: 4.53 (95% CI 3.97 to 5.09); women: 5.64 (95% CI 5.25 to 6.04)), with the increase accelerating immediately before the event. AD use gradually declined after union dissolution, after which it stabilised on a persistently higher level compared with pre-dissolution. Re-partnering was only associated with a small and transitory reduction in AD use (0.1–1.5 percentage points). The increases in AD use associated with union dissolution were larger in women than in men, whereas the small reductions in AD use associated with re-partnering were particularly short-lived among women.

Conclusions Our results suggest that union dissolution in later life is associated with large and persistent increases in AD use, whereas the reductions associated with re-partnering are limited both in magnitude and duration.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Population ageing has made re-partnering following union separation common in later life, but it remains unclear how antidepressant use changes among older adults who experience union dissolution and later re-partnering.

WHAT THIS STUDY ADDS

⇒ Individual fixed-effects regression results showed large increases in antidepressant use at the time of union dissolution and small or negligible declines at the time of re-partnering. The association between union dissolution and increases in antidepressant use was larger in women than in men, and the reductions in antidepressant use associated with re-partnering were particularly short-lived in women.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Our findings underscore the challenges of adapting to union dissolution in later life and the associated need for support.

INTRODUCTION

Due to population ageing, grey divorce (ie, divorce at age 50 and older) is on the rise in high-income countries.[1–4] Co-habitation in later life has also been increasing since baby boom cohorts—the first generation to co-habit in larger numbers—have entered late adulthood.[5] However, co-habitation at older ages is less stable than marriage,[6] leading to an increase in non-marital separations among older people. These changes have made re-partnering following union separation a commonplace event in the course of later life, yet the literature on re-partnering is limited and dated.[4]

Late-life depression is a common psychiatric disorder. It has been estimated that 10–15% of individuals aged >55 years have clinically significant depressive symptoms.[7] Although it is well known that divorce, separation from co-habitation, and bereavement are linked with poor mental health,[8–14] few studies have examined changes in depressive symptoms or depression before and after grey divorce. The small body of research, which is mainly cross-sectional, shows more depressive symptoms/depression among divorced older adults than their partnered counterparts.[2] A longitudinal study found that, compared with older Americans who remained married, those who experienced grey divorce already had higher levels of depressive symptoms before the divorce.[15] At the time of divorce they exhibited an immediate increase in depressive symptoms, followed by a gradual recovery to pre-divorce levels during the next 4 years.[15] Using couple fixed-effects (FE) models,

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another study of older Americans reported an increased probability of depression approaching divorce. Whereas among men gradual recovery associated with remarriage began already before divorce, among women the recovery started after it and was negligible.[16] However, a study from the UK showed that depressive symptoms in older divorcees increased during the year prior to their grey divorce and returned to the pre-separation level 1 year after the divorce,[2] a recovery rate that was much faster than in older Americans.[15] Nevertheless, none of these studies examined how depressive symptoms/depression or antidepressant (AD) use changed for older co-habitors who experienced a separation, as co-habitors were either excluded[2 15] or were few in number and thus combined with married couples.[16]

Furthermore, little is known as to whether and to what extent re-partnering after union dissolution at age ≥50 affects depressive symptoms/depression or AD use, as only a few studies have used longitudinal data to investigate these associations. Among older Americans who had divorced or became bereaved after the age of 50, their depressive symptoms were found to decrease abruptly following re-partnering, but this decrease dissipated during the next 6 years.[15] Nevertheless, using couple FE models, remarriage after divorce was found to be associated with a lower probability of depression only among older American men.[16] Although a few studies have examined re-partnering behaviours of separated co-habitors at older ages, none have assessed the association between re-partnering and depressive symptoms/depression or AD use.[4]

Time-invariant characteristics such as early-life experiences may relate to the formation and stability of unions—that is, individuals with such characteristics are more likely to be selected into a stable union and these characteristics may also be associated with one's mental health. Individual FE regression that uses within-individual variation in depression or AD use around the time of union dissolution and re-partnering provides a solution to control for these time-invariant confounders.[17 18]

In this study, using longitudinal Finnish registry data and individual FE regression, we investigated trajectories of AD use among Finnish adults aged 50–70 years who experienced divorce, separation from co-habitation or bereavement, as well as AD use trajectories before and after subsequent re-partnering. Uniquely, we compared the magnitude and timing of the changes in AD use associated with union dissolution and subsequent re-partnering, as we observed all the union transitions in the same population.

METHODS
Study population
We used total population register-based data on all permanent Finnish residents from 1996 to 2018. Statistics Finland provided information on their exact dates of entry into and exit out of marital and non-marital unions, as well as annual sociodemographic information. These data were linked to information on medication purchases from the National Prescription Register maintained by the Social Insurance Institution. We included all individuals who experienced union dissolution during 2000–2014 at the age of 50–70, a total of 228 644 from 2 364 310 men and women in the whole sample.

Union dissolution and re-partnering
Marital separation (ie, divorce) was defined to occur when a married partner moved out of the joint household or obtained a formal divorce, whichever came first. Non-marital separation refers to a co-habiting partner moving out of the joint

household. Spousal death was classified as bereavement only if the couple was still living together at the time of death. Re-partnering refers to an entry into a new marriage or co-habitation, which were recorded until the age of 70. Only persons living in private households were included, because entries to and exits out of unions cannot be reliably identified for those living in non-private households (eg, long-term care or prisons).

Antidepressant (AD) use
AD use in 1996–2018 was identified from information on AD purchases (Anatomical Therapeutic Chemical (ATC) Classification System Code N06A) recorded in the National Prescription Register. A prescription from a medical doctor is needed for purchasing AD medication in Finland, and all Finnish residents are entitled to reimbursement for medication expenses.

Sociodemographic characteristics
Annual information on sociodemographic characteristics in 1996–2018 included age, income (all individual-level taxable income), employment status (employed, unemployed, retired and other), housing tenure (owner vs renter or other), and having co-resident children (at least one vs none).

Statistical analyses
All individuals were followed for AD use 4 years before and 4 years after marital or non-marital separation, bereavement, or re-partnering. We chose the first separation/bereavement or first re-partnering as the reference event in case the individual experienced more than one event during the study period. The follow-up after separation/bereavement ended at the time of re-partnering, while the follow-up to re-partnering started at the time of separation/bereavement. The follow-up time was divided into 3-month quarters (January–March, April–June, July–September and October–December) as medication expenses can be reimbursed for a maximum of 3 months at a time.

We observed whether an individual had any AD use during each of the quarters and examined changes in AD use with linear probability models using the FE estimator. The individual FE model estimates the mean probability of AD use for each individual over the follow-up period and compares it to the probability of AD use in every quarter, and thus effectively uses each individual as their own control.[17] As a result, it controls for unobserved time-invariant confounders such as genetics and past life experiences. The coefficients of the individual FE models can be interpreted as the difference in the probability of AD use during each quarter compared with the quarter in which bereavement, marital or non-marital separation, or re-partnering occurred. The FE models were adjusted for time-varying age, age squared, year (1996–2001, 2002–2007, 2008–2013 and 2014–2018), season (summer vs winter), income, employment status, housing tenure and co-resident children.

In addition to the main models, we performed sensitivity analyses using population-averaged (non-FE) logistic panel regression which estimates changes in the prevalence of AD use within the sample population. The logistic models adjusted for all covariates as in the individual FE models and relies on variation between individuals. All analyses were conducted using Stata 16 (StataCorp, 2019).

RESULTS
Of the total 228 644 individuals, 85 031 (37.2%) were bereaved, 75 009 (32.8%) were separated from marriage and 68 604 (30.0%) were separated from co-habitation at the age of 50–70

Table 1 Sociodemographic characteristics at the year of bereavement, separation and re-partnering

	Bereaved (n=85 031)	Separated from marriage (n=75 009)	Separated from co-habitation (n=68 604)	Re-partnered after bereavement (n=6264)	Re-partnered after marital separation (n=15 958)	Re-partnered after non-marital separation (n=31 238)
Age, years, mean±SD	62.2±5.7	56.7±5.5	54.9±4.9	60.6±5.1	58.9±5.1	56.4±4.6
Income quintile (%)						
(lowest)	32.9	26.9	24.4	6.0	7.8	6.7
2	22.6	16.9	16.4	13.1	13.1	11.3
3	18.5	18.7	19.4	20.6	18.3	17.3
4	15.2	18.2	19.9	27.8	23.8	27.5
(highest)	10.8	19.4	20.0	32.6	37.0	37.3
Employment status (%)						
Employed	30.8	58.7	64.5	41.9	51.1	64.8
Unemployed	5.9	8.8	10.9	8.3	8.3	10.0
Retired	60.8	28.9	20.6	46.7	37.3	22.1
Other or unknown	2.6	3.6	3.9	3.0	3.3	22.1
Housing tenure (%)						
Owner	77.0	63.3	55.4	76.9	79.6	68.8
Renter or other	23.0	36.8	44.6	23.1	20.4	31.2
Co-resident children (%)						
Yes	16.2	24.0	20.0	12.8	22.5	21.5
No	83.8	76.0	80.0	87.3	77.5	78.5

SD, standard deviation.

years (table 1). Separations occurred at a younger age than bereavements. Accordingly, separated individuals were more often employed, had a higher level of income and lived with co-resident children, whereas home ownership was more common among those who became bereaved. A higher proportion of individuals re-partnered after non-marital separation (45.5%) than after marital separation (21.3%) or bereavement (7.4%). Because younger widows were much more likely to re-partner than older widows, mean age at re-partnering following bereavement was lower than mean age at bereavement. Stratifying the sample by gender, a higher proportion of men than women re-partnered after bereavement and non-marital separation, whereas it was more similar for divorcees (table 2). The age at union dissolution and age at re-partnering were similar between men and women. In both genders, those who re-partnered had a higher income (online supplemental table 1).

Figure 1 shows the FE regression results on AD use trajectories 4 years before and after union dissolution, controlling for sociodemographic characteristics in 1996–2018 (see model coefficients in online supplemental table 2). Men and women who later became bereaved showed an increasing trend in AD use already 4 to 1 years before the event, and it was faster among women (figure 1A). Compared with the quarter in which bereavement occurred, men's probability of AD use was 0.0202 (95% CI 0.0173 to 0.0231) lower in the previous quarter and 0.0084 (95% CI 0.0052 to 0.0116) higher in the next quarter, suggesting a sharp increase in AD use from 3 months before to 3 months after bereavement in men. A similar increase was also observed in women (-0.0192 (95% CI -0.0212 to -0.0172) immediately before bereavement; 0.0104 (95% CI 0.0083 to 0.0126) immediately after bereavement). Afterwards, a much smaller decline occurred during the following year. Thereafter, AD use remained at a persistently higher level.

During the 4 years before divorce, AD use increased in both men and women (figure 1B). The increase was most pronounced from 6 months immediately before separation (men: -0.0197 (95% CI -0.0225 to -0.0170); women: -0.0246 (95% CI -0.0278 to -0.0214)) to the time of divorce. Immediately after divorce, AD use declined in both genders and after 1 year it remained relatively constant but still higher than pre-divorce.

Table 2 Bereavement, separation and re-partnering by gender

	Men			Women		
	Bereaved (n=22 678)	Separated from marriage (n=38 905)	Separated from co-habitation (n=38 107)	Bereaved (n=62 353)	Separated from marriage (n=36 104)	Separated from co-habitation (n=30 497)
Age at union dissolution, years, mean±SD	62.0±5.7	56.8±5.4	55.0±4.9	62.2±5.6	56.6±5.5	54.8±4.8
Re-partnered during follow-up, n (%)	3176 (14.0)	8928 (22.9)	19311 (50.7)	3088 (5.0)	7030 (19.5)	11 927 (39.1)
Average time until re-partnering, years, mean±SD	3.0±2.2	2.3±2.0	2.2±2.3	3.5±2.3	2.3±2.0	2.4±2.3
Age at re-partnering, years, mean±SD	60.9±5.1	58.9±5.1	56.6±4.7	60.3±5.1	58.8±5.1	56.1±4.5

SD, standard deviation.

(A) Bereavement

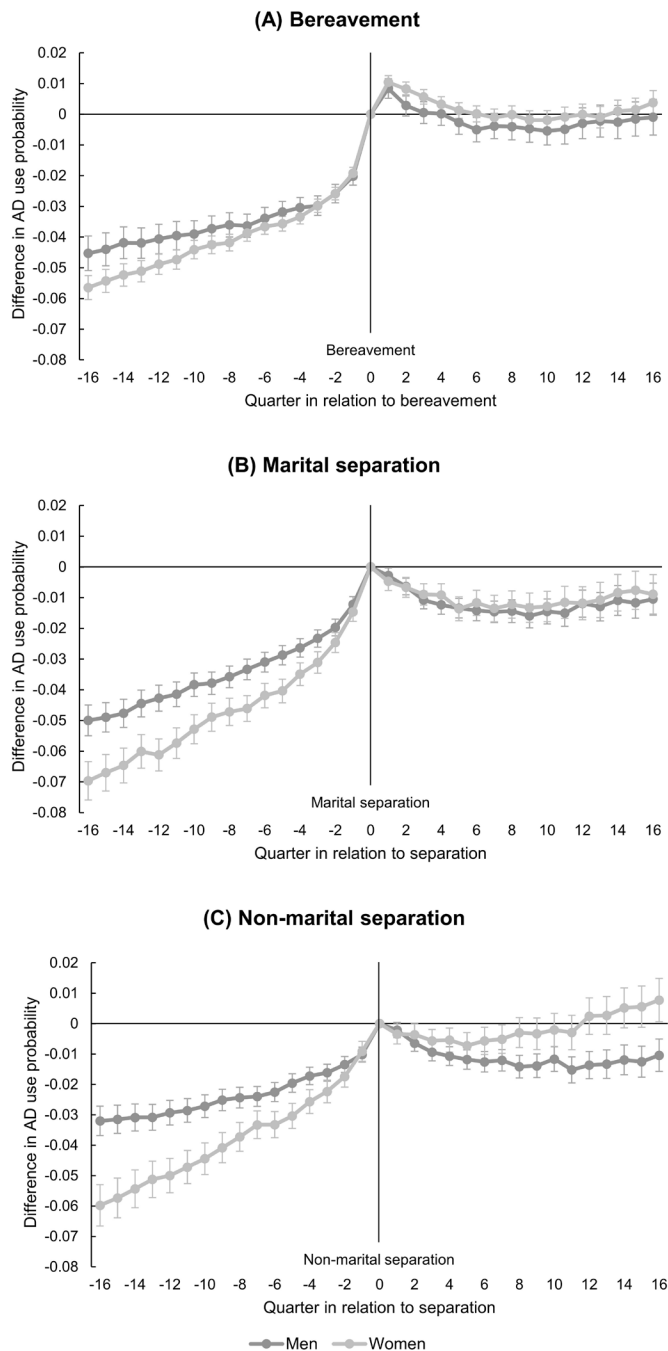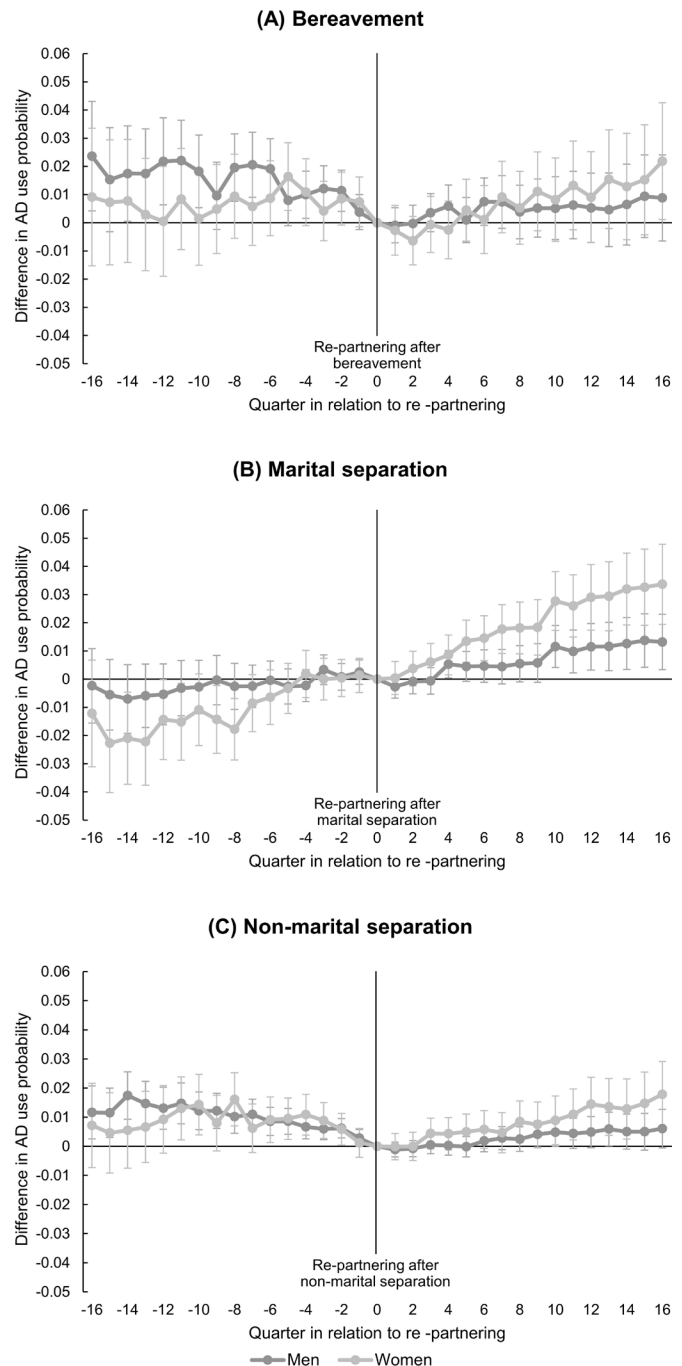## (B) Marital separation

(C) Non-marital separation

Figure 1 Changes in antidepressant (AD) use before and after bereavement (A), marital separation (B) and non-marital separation (C). Results based on fixed-effects models. Note: Annual information on age, age squared, period (1996–2001, 2002–2007, 2008–2013 and 2014–2018), season, income quintile, employment status, housing tenure and having co-resident children in 1996–2018 were adjusted for.

(A) Bereavement

(B) Marital separation

(C) Non-marital separation

Figure 2 Changes in antidepressant (AD) use before and after re-partnering following bereavement (A), marital separation (B) and non-marital separation (C). Results based on fixed-effects models. Note: Annual information on age, age squared, period (1996–2001, 2002–2007, 2008–2013 and 2014–2018), season, income quintile, employment status, housing tenure and having co-resident children in 1996–2018 were adjusted for.

Women separating from co-habitation also experienced a large increase in AD use during the four pre-separation years, whereas among men the increase was more modest (figure 1C). Within a year after non-marital separation, AD use declined to the level observed 1 year before separation among men without any changes observed thereafter. In contrast, among women only a very small decline in AD use occurred immediately after separation. From the first year after separation onwards, their AD use started to slowly increase again.

Figure 2 shows AD use trajectories 4 years before and after re-partnering, based on the FE regression results adjusted for sociodemographic characteristics in 1996–2018 (see model coefficients in online supplemental table 3). From 4 years to 6 months before re-partnering, AD use fluctuated among men and women who had previously become bereaved (Figure 2A), whereas a decline in AD use was observed from 6 months before (men: 0.0114 (95% CI 0.0041 to 0.0187); women: 0.0086

(95% CI −0.0008 to 0.0180)) to 6 months after re-partnering (men: −0.0003 (95% CI −0.0067 to 0.0062); women: −0.0064 (95% CI −0.0149 to 0.0022)). Thereafter, AD use started to increase among women but not among men.

Men and women who re-partnered following divorce showed a significant increasing trend in AD use from 4 years before (men: −0.0024 (95% CI −0.0156 to 0.0108); women: −0.0122 (95% CI −0.0311 to 0.0067)) to 4 years after re-partnering (men: 0.0132 (95% CI 0.0034 to 0.0230); women: 0.0337 (95% CI 0.0195 to 0.0478)). However, the increase in AD use paused during the year immediately before re-partnering among women, as well as from 1 year before to 1 year after re-partnering among men (figure 2B).

Among men and women who re-partnered following non-marital separation, AD use decreased slightly from 4 years before re-partnering (men: 0.0116 (95% CI 0.0025 to 0.0207); women: 0.0072 (95% CI −0.0073 to 0.0216)) to the time of re-partnering (figure 2C). However, AD use started to increase again 6 months after re-partnering among women and 1 year after re-partnering among men.

In the population-averaged (non-FE) logistic models, although women always had a higher likelihood of AD use than men, the trajectories of AD use were similar to those found in the individual FE models (see online supplemental figures 1 and 2).

DISCUSSION
Summary of findings
In this cohort study using total population data from Finland we found that, after accounting for time-invariant individual confounding and adjusting for observed time-varying sociodemographic characteristics, AD use increased during the 4 years before union dissolution in both genders, with the increase accelerating immediately before the event. Afterwards, AD use decreased gradually but never returned to the pre-dissolution level. Only small or negligible declines in AD use were observed at the time of re-partnering, and the declines lasted no more than 1 year. The increases in AD use associated with union dissolution were larger in women than in men, whereas reductions in AD use associated with re-partnering were particularly short-lived in women.

AD use before and after union dissolution
It is well documented that union dissolution has detrimental effects on mental health.[2 12 15 19–22] The sharp increase in AD use before and 3 months after bereavement (men: 5.4 percentage points (pp), women: 6.7 pp) followed by a partial recovery (men: 0.9 pp, women: 0.7 pp) was consistent with previous studies.[23 24] Compared with the increase in AD use related to bereavement, the increase at the time of divorce (men: 5.0 pp, women: 7.0 pp) was of similar magnitude, whereas among men the increase related to non-marital separation (men: 3.2 pp, women: 6.0 pp) was clearly smaller. The accelerated increase in AD use that we observed 6 months before divorce (men: 2.0 pp, women: 2.5 pp) supports the findings from British adults aged ≥50 years,[2] but contradicts those from older Americans among whom an increase in depressive symptoms immediately after divorce was found.[15] Some of these differences may reflect differences in the measures and methodology used across studies.

Although we observed a decline in AD use shortly after union dissolution, in contrast to previous longitudinal studies,[2 15 16] neither our individual FE models nor population-averaged models showed a full recovery of AD use to the pre-dissolution level. Moreover, AD use increased again after the

short-lived post-dissolution reduction among women separated from co-habitation. The trajectories we observed partly support the crisis model,[21] which suggests that the adverse effects of union dissolution on AD use are largest at the time of dissolution when individuals experience the greatest number of upheavals. Consistent with the model, we also showed that these increases in AD use gradually diminish during the 2 years following dissolution as individuals adapt to the loss and changes related to it.[20–22 25 26] However, the partial recovery and the continuous increase in AD use appear to support the marital resource model which instead suggests that losing the partner may bring stressful changes in life circumstances (eg, decreased household income, loss of social support) that persist or accumulate over time. Even though the impacts of financial challenges were accounted for as we controlled for time-varying income and home ownership, the resource model still seems to apply more to women who separated from co-habitation than to their male counterparts.[20 25 26]

AD use before and after re-partnering
Although previous literature on the mental health effects of re-partnering in later life is limited, few studies have investigated how remarriage influences depressive symptoms/depression. Older American widows who remarried in the 3-year study period were found to experience small reductions in depressive symptoms relative to those who remained married,[12] whereas using couple FE models, remarriage was shown to be associated with a lower probability of depression only among older American men.[16] Another study showed that, among the currently married older Americans, those who had experienced previous divorce had more depressive symptoms,[27] indicating that the benefits of remarriage are smaller than the detrimental consequences of divorce. In contrast, among Australians aged 55–74, symptoms of poor mental health related to divorce were largely limited to those who did not remarry,[28] indicating that remarriage either completely offsets the negative effects of divorce or that the negative effects are limited to those who do not remarry. Our sensitivity analysis showed that the pre-divorce increase in AD use was smaller among those who later re-partnered (online supplemental figure 3) compared with the full sample, suggesting that the association between grey divorce and AD use was indeed weaker among those who later re-partnered than among those who remained divorced. However, this was not found for bereavement or non-marital separation.

In many high-income countries remarriage is not very common as non-marital co-habitation increasingly provides a long-term alternative that allows older couples to preserve their financial autonomy and to ensure wealth transfers to their offspring rather than to their new partner.[29] We observed small declines in AD use associated with re-partnering, but they were short-lived as AD use returned to the level observed before re-partnering or remained even higher 2 years after re-partnering, supporting the honeymoon effect documented in prior research,[30] particularly among bereaved individuals. Our results, which have taken financial gains related to re-partnering into account by adjusting for time-varying income and home ownership, suggest that among divorcees other mechanisms such as gains in social support and regulation of health behaviours at re-partnering are of small or negligible importance.[16 25] The larger reduction in AD use following re-partnering after bereavement compared with re-partnering after divorce may also be explained by the irreversible loss of the spouse at the time of bereavement whereas divorce may be more voluntary, perhaps even due to having a new partner in sight. Non-marital separation, in contrast, may

be considered to have fewer social consequences than marital divorce, so there are fewer adverse circumstances to overcome at the time of later re-partnering. Nevertheless, further research is needed to document why re-partnering benefits AD use of widow(er)s and those separating from non-marital unions, but not divorcees.

Gender differences in AD use around partnership changes

Gender differences in family roles, responsibilities and economic status are often the explanations for the greater detrimental impacts of union dissolution on mental health observed in women than in men.[16 25] Nevertheless, the more extensive social network, greater social support and better health behaviours of women could enable them to cope with union dissolution better than men, and thus make them less vulnerable mentally during the transition.[16 25] The greater increases in AD use associated with union dissolution among women in our study may indeed relate to the fact that the costs of union dissolution on mental health fall more heavily on women than men.[23]

The smaller declines in AD use associated with re-partnering in women than in men may be related to the explanations that marriage benefits men's mental health to a greater extent than women's,[31] and older men are more likely than women to seek emotional support from re-partnering.[32] In addition, women may take greater responsibilities to manage interpersonal relationsips between the blended families, such as those with the partner's children,[31] which could undermine their mental health. Finally, in our study both men and women who re-partnered after the union dissolution had a higher income than those who did not, suggesting that economic resources play a similar role in later life re-partnering for both genders.

Strengths and limitations

To our knowledge, this is the first large population-based cohort study to investigate the AD use trajectories of older adults who experienced divorce, non-marital separation, bereavement or later re-partnering. Unlike previous studies, we examined separately the changes in AD use associated with divorce and separation from co-habitation. The similarity of results from the individual FE models accounting for unobserved time-invariant confounding and the population-averaged models emphasises the credibility of our findings. However, in our study we did not take into account how the history of marriage and co-habitation—for example, the number and duration of unions—may influence the AD use trajectories. The associations between union dissolution, re-partnering and AD use could also be modified by family support networks and living arrangements, which was not fully examined as we controlled for co-resident children only. Although the peak in AD use observed around the time of union dissolution as well as the short-term declines at the time of re-partnering lend support to the idea that transitions in and out of marriage/co-habitation influence mental health in later life, future research is still needed to identify and quantify the potential mechanisms such as relationship quality,[31 33] social networks and support, and social control of behaviours that drive these associations. In addition, while our study centred on adults aged ≥50 years, further studies are needed on how the relationships between union dissolution, re-partnering and depression or AD use vary between younger and older adults.

CONCLUSION

Divorce, non-marital separation and bereavement after the age of 50 were associated with a 3–7% increase in AD use. The observation that AD use never returned to the pre-dissolution level underscores the challenges of adapting when the union dissolves in later life. Although AD use declined at the time of re-partnering, this reduction was small and short-lived, and was not observed in female divorcees.

ORCID iDs
Yaoyue Hu http://orcid.org/0000-0001-6517-1503
Niina Metsä-Simola http://orcid.org/0000-0001-8813-3980
Satu Malmberg http://orcid.org/0009-0008-9538-5383
Pekka Martikainen http://orcid.org/0000-0001-9374-1438

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