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Antidepressants and age: A new form of evidence for U-shaped well-being through life

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ABSTRACT

A growing literature argues that mental well-being follows an approximate U-shape through life. Yet in the eyes of some scholars this evidence remains controversial. The reason is that it relies on people's answers to 'happiness' surveys. The present paper explores a different approach. It examines modern data on the use of antidepressant pills (as an implicit signal of mental distress) in 27 European nations. The regression-adjusted probability of using antidepressants reaches a peak in people's late 40s. This pattern – one that does not rely on well-being survey answers – is thus consistent with the claim that human beings experience a midlife low.

1. Introduction

For social scientists, antidepressants – medications to alleviate mood disorders – are an interesting modern commodity. First, citizens in western society are now able to use such pills to 'buy' happiness, or at least less unhappiness, in a way that was not possible half a century ago. Second, the taking of antidepressants is, by a kind of revealed preference, a potentially informative signal of mental distress, both about the person taking them and, more broadly, potentially about patterns in society at the aggregate level. For these reasons, information on antidepressant consumption is studied in the current paper.[1]

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[1] As in most work in social science, we will use data on reported actions (in this case the action will be the consumption of antidepressant pills) rather than literally observing those actions. We will thus not use data on reported feelings, which is what has been done in most of the literature on U-shaped wellbeing.

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The paper explores, in particular, a new empirical justification for the claim that human well-being has a tendency to follow an approximate U-shape through life.

In this study we provide evidence that:

(i) One in thirteen Europeans have taken an antidepressant in the previous twelve months.
(ii) The rates of antidepressant use are greatest in Portugal, Lithuania, France and the UK.
(iii) Adjusting for other characteristics, the probability of taking an antidepressant is greatest among those middle-aged, female, unemployed, poorly educated, and divorced or separated;
(iv) A strong hill-shaped age pattern is found – both for males and females and for the citizens of Western and Eastern Europe – that peaks in people's late 40s.
(v) We argue that this pattern is consistent with, and thus might be seen as powerful and independent corroboration of, the claim in the well-being literature that happiness and mental health follow an approximate U-shape through life.[2] The earlier, and more extreme, notion of a 'midlife crisis' goes back to Jaques (1965). There has been much discussion, and some controversy, about the claim that there is a U-shape in wellbeing (for example, Blanchflower and Oswald, 2008, 2009; Stone et al., 2010; Easterlin, 2006; Glenn, 2009; Frijters and Beatton, 2012; Kassenboehmer and Haisken-DeNew, 2012; Schwandt, 2015; Van Landeghem, 2008, 2012; Weiss et al., 2012; Cheng et al., 2016), and some social scientists continue to wonder whether 'happiness' answers should be treated as meaningful, although a formal test of validity, done in the economist's spirit, has been suggested in Oswald and Wu (2010).

One interpretation of the current paper is that the life cycle U-shape in human well-being – which emerges in a distinct and new way in data on antidepressant consumption – increasingly calls for explanation and further research. A smaller potential contribution of the paper is to provide statistically representative estimates for a large number of countries. Most previous work, such as Colman et al. (2006), Ohayon and Lader (2002) and Pagura et al. (2011), has had to rely on single or small numbers of nations, or, like Knapp et al. (2007), on data on actual sales numbers of antidepressants which, while valuable, do not allow researchers to learn about the micro patterns of consumption by different individuals.

This paper will not attempt to adjudicate in a fine-grained way between the concepts of unhappiness and depression. That issue is an important one but it cannot be tackled with the data set used in this paper. We will rely instead on the known fact that, as discussed in Blanchflower and Oswald (2008) and other sources, evidence for U-shaped well-being has been found by many research teams using both 'happiness' and 'mental health' data. The research question tackled here is then an admittedly narrow but, we hope, not uninteresting one. If data on antidepressant consumption are studied, is there any sign of empirical support for the idea of a midlife low (whether in happiness or in mental health)?

2. Background

The backdrop to this study is a burgeoning interest among quantitative social scientists in the study of human well-being. Today's inhabitants of the industrialized nations lead what are perhaps the richest, longest, and most comfortable lives in human history. As Offer (2007), Layard (2006, 2010) and others have argued, however, there are reasons to believe that not all is ideal in the industrialized countries. Some citizens display signs of mental turmoil amid the prosperity of modern living (the data in McManus et al., 2009 suggest that at any one time approximately 15% of people in the UK suffer from a mental disorder: their p.11) and Richard Easterlin's seminal doubts (Easterlin, 1974, 2003) remain pertinent. Such concerns are mirrored in recent work by the 2009 Stiglitz Commission on the Measurement of Economic Performance and Social Progress: the authors argue that traditional ways of measuring social and economic progress are out-of-date (www.stiglitz-sen-fitoussi.fr). In the mental-health literature, too, there have been long-standing worries about the rates of clinical depression in modern society (Paykel, 2006). A related literature, written partly by economists, has recently sprung up. It examines direct survey measures of well-being and mental health (and includes Theodossiou 1998; Frey and Stutzer, 2002; Easterlin, 2003; Blanchflower and Oswald, 2004; Van Praag and Ferrer-I-Carbonell, 2004; Graham, 2005, 2008; Helliwell and Huang, 2008; Clark et al., 2008; Deaton, 2008; Dolan et al., 2008; Dolan and Kahneman, 2008; Pacek and Radcliff, 2008; Biswas-Diener et al., 2010; Oswald and Wu, 2010; Powdthavee, 2010; Green, 2010).

The consumption of antidepressants has been little-studied in the economics literature. Two exceptions are interesting papers by Kuhn et al., 2009 and Ludwig et al., 2009. The first of these shows that job loss caused by plant closure leads to greater antidepressant consumption; the second argues that an increase in sales of one particular antidepressant – selective serotonin reuptake inhibitors (SSRIs) – by 1 pill per capita produces a large reduction (of 5%) in a country's suicide rate. A further exception in the wider literature is Askitas and Zimmermann (2011), which examines data on the timing of people's Google searches on antidepressants' side-effects. An important empirical source for health-economics researchers in Europe is Knapp et al. (2007). The authors document a near-doubling of antidepressant consumption (their Table 7.5 on p. 154) in the ten years from 1990 to 2000. Recent data from the OECD reveal a continuing upward trend: antidepressant consumption in daily-doses per thousand population rose from 32.4 in 2000 to 52.1 in 2007 (source: OECD, 2009).

[2] Many authors in the subjective well-being literature have replicated versions of the U-shape finding. Blanchflower and Oswald (2008) provide a historical list of such studies.

Table 1
The proportion of Europeans who took antidepressants over the previous 12 months (%).

	Not at all	Time to time	Regularly <4 weeks	Regularly >=4 weeks
Austria	91%	4%	1%	3%
Belgium	91	3	1	5
Bulgaria	96	3	0	1
Cyprus	96	2	1	2
Czech Republic	95	3	0	1
Denmark	93	1	1	5
Estonia	93	2	0	4
Finland	94	1	1	4
France	91	3	1	6
Germany	95	1	1	3
Greece	97	1	0	1
Hungary	93	3	1	3
Ireland	95	2	1	3
Italy	94	4	1	1
Latvia	92	6	1	2
Lithuania	89	6	1	3
Luxembourg	94	1	1	3
Malta	90	4	1	4
Netherlands	94	1	0	4
Poland	94	3	1	2
Portugal	84	5	2	9
Romania	93	5	1	1
Slovakia	91	6	1	2
Slovenia	92	5	0	2
Spain	92	2	1	5
Sweden	92	1	0	7
UK	91	1	1	7

Source: Own calculations using Eurobarometer #73.2, February–March 2010. Sample size: approximately 1000 randomly sampled citizens per nation. Question wording. Have you taken any antidepressants in the last 12 months? No, not at all; Yes, from time to time when you felt the need to; Yes, regularly for a period of less than four weeks; Yes, regularly for a period of at least four weeks?

Antidepressants are typically prescribed by physicians. Hence it seems natural to begin by thinking of the probability, P, of taking an antidepressant as given by the joint probability of going to a doctor or psychiatric professional for help with a mental health problem, p, and being in a nation with a rate-of-prescribing probability, r. Assume that p is a function of personal characteristics, denoted by a vector x, and of national characteristics, denoted by a vector n. Assume that the rate-of-prescribing is a national characteristic that for our purposes can be viewed as exogenously given (perhaps by cultural and historical norms). Then we might write:

$$P = p(x,n) \times r(n) = P(\text{personalcharacteristics, countrycharacteristics}).$$

We concentrate here on estimation of the reduced-form probability of antidepressant use, which is the function $P(..)$. As a referee has correctly pointed out, we are not able in the later analysis to observe completely objectively who took antidepressant pills and how many they took. However, we are able to draw on cross-country survey information where individuals report this information.

The main data set used in the analysis is the Eurobarometer survey #73.2, February–March 2010. The data cover the 27 countries listed in Table 1. Unusually, this social-science data set includes questions on the use of antidepressant pills. The exact question (numbered QD5 on page 52 of the Eurobarometer questionnaire codebook) to which people responded was:

> "Have you taken any antidepressants in the last 12 months? Yes, regularly for a period of at least 4 weeks. Yes, regularly for a period of less than 4 weeks. Yes, from time to time when I felt the need. No, not at all."

Table 1 provides a description of the raw patterns in the data set. It gives the mean figure for each European country's use of antidepressants. For Europe as a whole, approximately 8% of people use antidepressants (within a single year).

In Austria, as one example, Table 1 shows that 91% of individuals said they had not taken any antidepressant in the previous twelve months; 4% answered "from time to time"; 1% said "regularly, for less than 4 weeks; 3% said 'regularly, for more than 4 weeks'. Portugal stands out in the data as the nation with the highest rate of antidepressant consumption (in the sense of the proportion of people reporting such medication). Approximately 16% of Portugese citizens took antidepressants in the previous year, and 9% did so for a long period (that is, more than 4 weeks). Other countries with relatively high consumption, according to Table 1's data, are France (9%, with 6% having done so for a long period), Lithuania (11%, with 3% having done so for a long period), Malta (10%, and 4%), and the UK (9%, and 7%). Data on the total prescriptions within some of these nations are given for the year of 2002 in Rose (2007), within Knapp et al. (2007), as Table 7.14 on their page 163. Although many of the patterns are consistent with our Table 1, Belgium tops the Rose (2007) table.

The numbers here in Table 1 are raw means of antidepressant use. Later tables give regression-equation-adjusted rates. At a referee's suggestion, we also examined the country-level correlation between the happiness of nations and the use of

antidepressants. Adjusting for country GDP-per-capita, that correlation is negative but not statistically significant; with just 27 country-level observations this is perhaps to be expected.

It could be argued that people's memories – particularly in answering questions of this kind about lengths of time – are likely to be imperfect. The cell sizes here, for some categories of answer, are also small. For these reasons, the paper's later analysis chooses not to put a heavy weight on the exact number of weeks the individuals say that they consumed antidepressants. Instead, its later focus is on the simpler distinction between taking any antidepressants and taking none. This is adopted because it seems likely that individuals will have an accurate appreciation for whether they were taking any pills at all. There is, necessarily, some loss of efficiency from this approach. As a check, therefore, ordered logit equations have also been estimated.

Bauer et al. (2008) and Sleath and Shih (2003) argue that prescribing norms vary by country – for what appear to be cultural or sociological reasons – so that it will be necessary in the later analysis to adjust for this fact by using country dummy variables. Consistent with such a view, Pagura et al. (2011) conclude that in the US almost one quarter of antidepressant prescriptions are to people without serious psychiatric conditions.

The characteristics of those citizens in Europe who are most likely to use antidepressant medication can be seen in Table 2. The table presents three regression equations, which are to be read vertically. In each case, the dependent variable can be thought of as a measure of the probability of antidepressant use. The sample size is 26,611 individuals. Although it is possible to include independent variables for many demographic and personal characteristics, a notable one is absent. The data set does not contain an income variable. Fortunately, a variable for age-left-school, denoted ALS in the tables, which is a strong correlate with earnings because it is a measure of the length of a person's formal education, is available in the data set.

The first column of Table 2 reports the estimates from an ordinary least squares (OLS) linear probability model in which the dependent variable uses data that are coded 1 for any positive level of antidepressant use and 0 otherwise. Column 2 of Table 2 estimates an otherwise equivalent Probit equation. Column 3 is an Ordered Logit in which the dependent variable can take one of four values (No, Not at all,... Yes, regularly for a period of at least four weeks). The structure of the three equations, however, is in each case similar.

Because of the cardinal nature of the estimator, column 1 of Table 2 is particularly straightforward to interpret. First, a hump-shaped age profile in people's use of antidepressants can be seen in the coefficients on the dummy variables from 'Age 25–34' up to 'Age greater than or equal to 65'. The base category in the regression equation is those people in the survey aged 15–24 years old. In Table 2's column 1, the largest coefficient on age is that for age band 45–54, at 0.0652. Column 1 thus reveals that the probability of taking antidepressants rises gradually to reach a high point in the mid-life age band of 45–54. It then falls back, by age 65 and above, to approximately the same probability that is implicitly found among the youngest group, age 15–24. Experiments done with various functional forms – available upon request – suggest that the data are fairly well approximated by a simple quadratic equation.[3]

It might be wondered if the mid-life peak in antidepressant consumption found in Table 2 is merely a result of people in middle age tending disproportionately to have young children. However, such an explanation is not supported empirically. When a variable for the number of young children is included in the regression equation, it enters with a very small negative coefficient (the opposite of the sign that might perhaps have been expected) that is not statistically significantly different from zero. Those specifications are available on request. The size of the hump-shaped age pattern is not a negligible one. At its peak, in mid-life, the hump-shape accounts in this specification for an extra approximately 6.5% points in the probability of using antidepressants. In other words, it nearly doubles the risk. The age 45–54 coefficient of 0.0652 in column 1 of Table 2 is also slightly larger here than that on known stressful life events such as being unemployed or being divorced/separated.

One way to depict the hump-shaped age profile is to do so graphically, as in Charts 1 and 2. To construct these graphs, we use a different and less parametrically restrictive estimation method than in the equations of the Tables. Instead of six age-band variables, a separate dummy variable for (almost) every year of age from 15 up to 90 is now entered in the antidepressant-use regression equation. There is one caveat; because sample sizes become small at higher ages, the exact approach was the following. Above age 80, we grouped together the people aged 82 and 83 and plotted them on the chart as 81.5 years; similarly, we grouped those aged 84 and 85 and plotted them as 84.5; we grouped all individuals from 86 to 97 and plotted them as a weighted average assigned on the chart axis to age 88. While simple, this method ensures that sample sizes for dots situated along the sparse part of the age range in the graphs are always based on at least a cell-size of 0.5% or $N = 200$. The same independent variables as before, with the exception of the banded age variables, are also included in the regression specifications in the two charts.

Chart 1 gives a plot of the raw data; it is an unadjusted correlation (apart from country dummies). By contrast, Chart 2's scatter is derived from a full regression equation, where each of the dots in the chart corresponds to the probability at that particular age. This has the advantage that it produces in an approximately non-parametric way the same form of age profile as in Table 2's columns. There is strong evidence in Chart 2 of a peak in antidepressant use in mid-life.[4] As previously

[3] This hill-shaped result appears to be a new one. The closest we have been able to find in the existing literature is in the third column of Table 1 of Olfson and Marcus (2009) on US data. The authors do not discuss the age profile. However, the Olfson–Marcus estimation results are not exactly comparable to ours, because their regression equations hold constant the state of a person's measured mental health.

[4] The intercept on the *y*-axis in the charts has been normalized by expressing all the plotted probabilities relative to an age-15 probability set to zero. In the raw data, the mean in the probability of antidepressant use in Europe is approximately 0.08.

Table 2
Regression equations for the probability of taking anti-depressants in data on 27 nations.

	OLS	Probit	Ordered logit
Age 25–34	0.0289 (3.68)	0.0374 (3.81)	0.5751 (3.76)
Age 35–44	0.0501 (6.06)	0.0666 (6.14)	0.9361 (6.04)
Age 45–54	0.0652 (7.81)	0.0858 (7.56)	1.1396 (7.42)
Age 55–64	0.0450 (5.08)	0.0618 (5.51)	0.8507 (5.27)
Age ≥65	0.0037 (0.37)	0.0222 (2.10)	0.3881 (2.27)
Male	−0.0372 (11.12)	−0.0363 (11.63)	−0.6099 (11.42)
Home	0.0438 (6.71)	0.0468 (6.89)	0.6558 (7.28)
Student	−0.0645 (2.53)	−0.0325 (2.05)	−0.5851 (1.91)
Unemployed	0.0520 (8.52)	0.0587 (8.95)	0.7834 (9.40)
Retired	0.0733 (12.18)	0.0695 (11.73)	0.9900 (11.86)
Married	−0.0254 (4.99)	−0.0228 (4.83)	−0.3932 (5.10)
Living together	−0.0068 (1.05)	−0.0047 (0.78)	−0.1204 (1.14)
Divorced/separated	0.0347 (4.66)	0.0231 (3.40)	0.3092 (3.22)
Widowed	0.0101 (1.32)	0.0025 (0.39)	0.0051 (0.05)
ALS <16	−0.0611 (2.53)	−0.0285 (1.87)	−0.4615 (1.84)
ALS 16–19	−0.0706 (2.93)	−0.0381 (2.27)	−0.5647 (2.25)
ALS >=20	−0.0781 (3.23)	−0.0408 (2.67)	−0.6908 (2.74)
Austria	0.0012 (0.11)	0.0021 (0.22)	0.0184 (0.11)
Cyprus	−0.0352 (2.49)	−0.0302 (2.65)	−0.6592 (2.60)
Denmark	−0.0126 (1.09)	−0.0108 (1.12)	−0.1385 (0.81)
Finland	−0.0310 (2.69)	−0.0242 (2.70)	−0.4604 (2.56)
France	0.0057 (0.50)	0.0039 (0.39)	0.0997 (0.64)
Germany	−0.0422 (4.04)	−0.0331 (4.26)	−0.6945 (4.15)
Greece	−0.0522 (4.51)	−0.0441 (5.23)	−1.0909 (4.97)
Ireland	−0.0280 (2.42)	−0.0232 (2.53)	−0.4438 (2.45)
Italy	−0.0161 (1.40)	−0.0134 (1.40)	−0.2608 (1.50)
Luxembourg	−0.0265 (1.88)	−0.0194 (1.70)	−0.3783 (1.70)
Malta	0.0267 (1.87)	0.0187 (1.43)	0.2891 (1.56)
Netherlands	−0.0166 (1.45)	−0.0154 (1.61)	−0.2367 (1.34)
Portugal	0.0767 (6.56)	0.0625 (5.10)	0.7622 (5.19)
Spain	−0.0045 (0.39)	−0.0040 (0.41)	−0.0213 (0.13)
Sweden	−0.0100 (0.87)	−0.0060 (0.62)	−0.0920 (0.54)
UK	0.0035 (0.32)	0.0013 (0.15)	0.0836 (0.56)
Bulgaria	−0.0443 (3.83)	−0.0348 (4.03)	−0.7839 (4.01)
Czech Republic	−0.0318 (2.77)	−0.0257 (2.84)	−0.5482 (2.98)
Estonia	−0.0196 (1.70)	−0.0160 (1.73)	−0.2768 (1.63)
Hungary	−0.0225 (1.96)	−0.0192 (2.13)	−0.3504 (2.10)
Latvia	0.0027 (0.24)	0.0016 (0.16)	−0.0099 (0.06)
Lithuania	0.0180 (1.56)	0.0120 (1.16)	0.1670 (1.08)
Poland	−0.0251 (2.18)	−0.0202 (2.24)	−0.3772 (2.21)
Romania	−0.0141 (1.23)	−0.0112 (1.16)	−0.2356 (1.38)
Slovakia	0.0081 (0.71)	0.0060 (0.59)	0.0712 (0.44)
Slovenia	−0.0010 (0.09)	−0.0019 (0.20)	−0.0544 (0.34)
Constant/cut1	0.1218		2.5652
Cut2			3.1669
Cut3			3.3706
Adjusted R^2/pseudo R^2	0.0369	0.0712	0.0568
N	26,611	26,611	26,611

Source: Eurobarometer #73.2, February–March 2010.
t-Statistics are given in parentheses.
Notes. Base (i.e. reference) categories: age 15–24; Belgium; employed; no fulltime education; and single. ALS is age left schooling. Column 1 is estimated as a linear probability ordinary-least-squares model where the dependent variable is 1 for having taken any level of antidepressants and zero otherwise. Column 2 is estimated as a dprobit using Stata. Column 3 is estimated as an ordered logit using all four possible survey answers.
If a variable for the number of young children is included in these regression equations, its coefficient is small and statistically insignificantly different from zero.
Question wording. Have you taken any antidepressants in the last 12 months? No, not at all; Yes, from time to time when you felt the need to; Yes, regularly for a period of less than four weeks; Yes, regularly for a period of at least four weeks? In columns 1 and 2 the dependent variable is set to zero if 'no, not at all", zero if otherwise. In column 3 'no, not at all = 1; from time to time = 2 and so on.

in Table 2, the calculation holds constant other factors, so once again is to be viewed as a ceteris–paribus relationship. In the raw unadjusted picture of Chart 1, the turn-down in antidepressant-use probability at higher ages exists, but is less clear in a simple scatter; the standard error bands – not shown – are large at higher ages.

Other systematic influences are visible in the data. Men, in Table 2, are less likely than women to take antidepressants. The coefficient on Male in column 1 is −0.0372 with a *t*-statistic over 11. Antidepressant use is highest among those living in the parental home (coefficient 0.0438), the unemployed (0.0520), the retired (0.0733), and those who are divorced or separated (0.0347). Antidepressant use is low among students (−0.0645) and those married (−0.0254). In column 1 of Table 2 there is a discernible monotonic gradient associated with years of education; ALS is the age at which a person left their formal

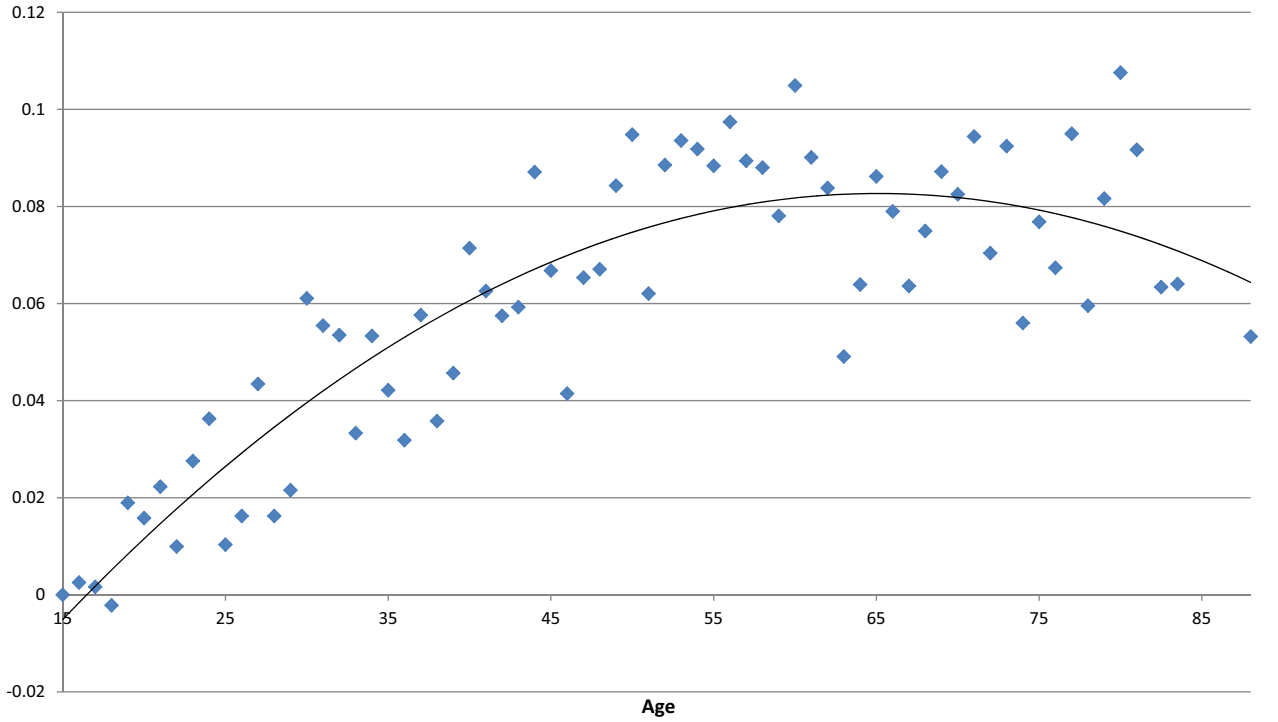

Chart 1. The Unadjusted relationship between the probability of antidepressant use and age (only country dummies).

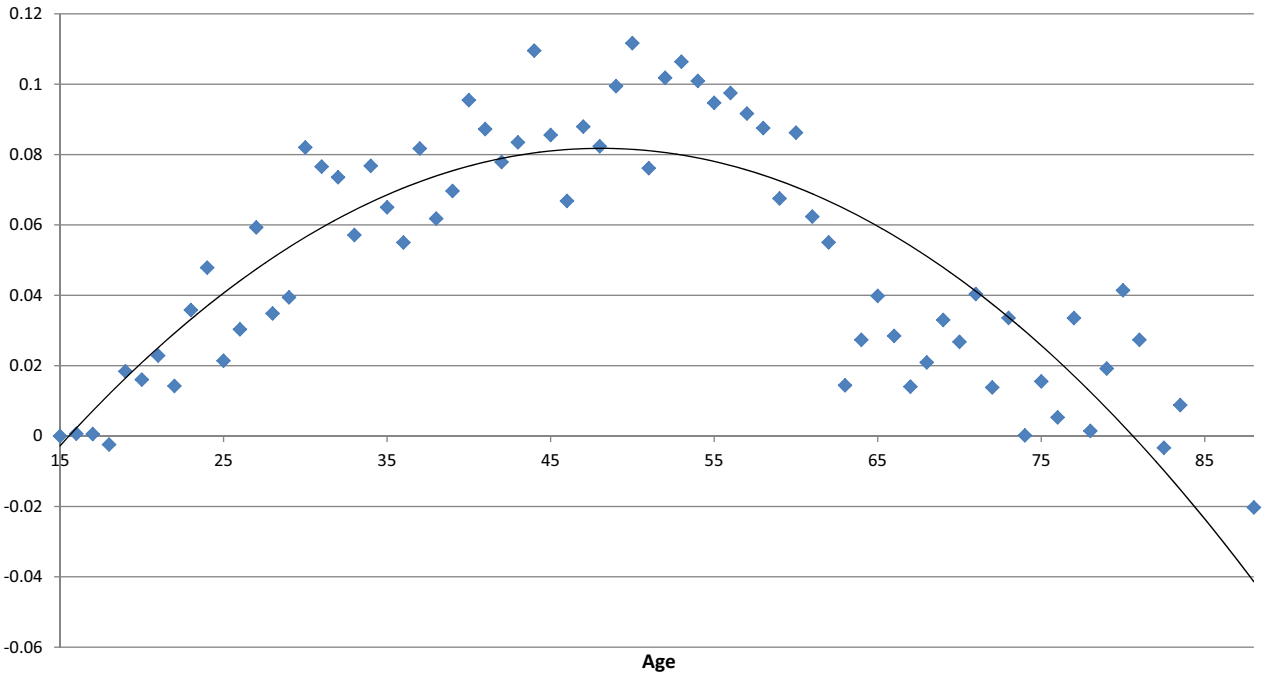

Chart 2. The regression-adjusted relationship between the probability of antidepressant use and age (full set of controls, as in Column 1 of Table 2).

education. Those people who left school at greater than or equal to age 20 are almost 8% points less likely to be taking an antidepressant (the coefficient on ALS >= 20 is −0.0781). There are no statistically significant effects associated with being in the living-together category of marital status or being widowed.

The coefficients on the country dummy variables are listed at the foot of Table 2. The base country, against which others are measured, is Belgium. The positive coefficients are Austria, France, Malta, Portugal, the UK, Latvia, Lithuania, and Slovakia.

Table 3
Regression equations for the probability of taking anti-depressants in Western Europe (Estimated with a linear probability OLS model).

	Full sample	Male	Female
Age 25–34	0.0333 (3.34)	0.0336 (2.72)	0.0344 (2.25)
Age 35–44	0.0583 (5.56)	0.0600 (4.59)	0.0561 (3.50)
Age 45–54	0.0692 (6.54)	0.0522 (3.98)	0.0819 (5.04)
Age 55–64	0.0461 (4.14)	0.0173 (1.23)	0.0656 (3.87)
Age ≥65	−0.0009 (0.08)	−0.0235 (1.47)	0.0080 (0.43)
Male	−0.0293 (6.83)		
Home	0.0581 (7.46)	0.1308 (4.45)	0.0513 (5.34)
Student	−0.0763 (2.52)	−0.1603 (3.76)	−0.0238 (0.56)
Unemployed	0.0713 (8.48)	0.0828 (8.09)	0.0587 (4.46)
Retired	0.0655 (8.65)	0.0817 (8.52)	0.0586 (5.03)
Married	−0.0237 (3.80)	−0.0213 (2.81)	−0.0246 (2.49)
Living together	−0.0108 (1.31)	0.0000 (0.01)	−0.0214 (1.64)
Divorced/separated	0.0481 (5.16)	0.0320 (2.62)	0.0589 (4.27)
Widowed	0.0141 (1.45)	0.0022 (0.16)	0.0188 (1.36)
ALS <16	−0.0754 (2.66)	−0.1499 (3.70)	−0.0316 (0.81)
ALS 16–19	−0.0878 (3.09)	−0.1614 (3.98)	−0.0436 (1.11)
ALS >=20	−0.0980 (3.45)	−0.1605 (3.96)	−0.0653 (1.65)
Austria	0.0018 (0.16)	0.0232 (1.61)	−0.0171 (0.97)
Cyprus	−0.0377 (2.65)	0.0016 (0.10)	−0.0769 (3.48)
Denmark	−0.0092 (0.79)	−0.0066 (0.46)	−0.0117 (0.65)
Finland	−0.0263 (2.27)	−0.0211 (1.49)	−0.0312 (1.73)
France	0.0076 (0.67)	0.0075 (0.53)	0.0074 (0.43)
Germany	−0.0417 (3.97)	−0.0237 (1.85)	−0.0599 (3.67)
Greece	−0.0540 (4.62)	−0.0346 (2.42)	−0.0739 (4.07)
Ireland	−0.0311 (2.66)	−0.0200 (1.37)	−0.0410 (2.31)
Italy	−0.0165 (1.43)	−0.0145 (1.01)	−0.0191 (1.08)
Luxembourg	−0.0254 (1.80)	0.0042 (0.24)	−0.0508 (2.35)
Malta	0.0236 (1.64)	0.0242 (1.28)	0.0211 (0.99)
Netherlands	−0.0145 (1.26)	−0.0092 (0.66)	−0.0217 (1.21)
Portugal	0.0757 (6.39)	0.0387 (2.64)	0.1054 (5.80)
Spain	−0.0087 (0.74)	−0.0179 (1.23)	−0.0019 (0.11)
Sweden	−0.0047 (0.41)	0.0033 (0.23)	−0.0114 (0.63)
UK	0.0054 (0.50)	0.0068 (0.51)	0.0033 (0.20)
Constant	0.0864	0.1711	0.092
Adjusted R^2/pseudo R^2	0.0399	0.0343	0.0392
N	16,512	7713	8799

Source: Eurobarometer #73.2, February–March 2010. *t*-Statistics are given in parentheses.
Notes: see Table 2.

Of these, however, the only one in column 1 of Table 2 with a coefficient that is significantly different from zero at the 95% confidence level is Portugal. These country-dummy coefficients are not small. They vary, in column 1 of Table 2, from 0.0767 for Portugal to −0.0522 in Greece. This implies a spread of 13% points in the likelihood of antidepressant use.

Columns 2 and 3 of Table 2 reinforce the conclusions from the simple OLS linear-probability estimator. There are only marginal differences, when compared to column 1, in variables' qualitative influence or levels of statistical significance.

One interesting and potentially important distinction is that between Western Europe and Eastern Europe. The transition countries have lower levels of Gross Domestic Product and, especially when compared to the western countries, may have rather different medical-prescribing practices. Table 3 therefore calculates results separately for the set of nations from Western Europe (including East Germany, within the nation Germany). The econometric results – from now on, for simplicity, only OLS linear probability models are presented – are similar to those in the full sample. However, the coefficient on being unemployed is now slightly larger (at 0.0713 in column 1 of Table 3) and the education gradient becomes steeper (the coefficient on ALS over 20 is now −0.0980).

Table 3 continues to find a well-defined hump shape in the effect of age on the probability of consuming antidepressants. Compared to the young and the old, people in midlife in Western Europe have an approximately doubled probability of antidepressant use.

The main findings are broadly robust across the genders. Columns 2 and 3 of Table 3 compare the male sub-sample to the female sub-sample. Perhaps the most interesting difference in the size of coefficients is for the ALS age-left-school variable. Men in Western Europe have a more pronounced education gradient in the risk of antidepressant medication. At a low, in column 2, the coefficient is −0.1605 for males compared to −0.0653 among females. In this correlational sense, it could be said that low qualifications appear to be particularly a danger for the mental health of men. It is also noticeable that the coefficient on the Portugal dummy variable is considerably greater for women.

Eastern Europe is examined on its own in Table 4. There are separate regression equations for the full sample, the males, and the females.

Table 4
Regression equations for the probability of taking anti-depressants in Eastern Europe (Estimated with a linear probability OLS model).

	Full sample	Males	Females
Age 25–34	0.0234 (1.83)	0.0335 (2.39)	0.0122 (0.58)
Age 35–44	0.0352 (2.60)	0.0391 (2.60)	0.0286 (1.31)
Age 45–54	0.0552 (4.02)	0.0597 (3.90)	0.0470 (2.11)
Age 55–64	0.0340 (2.28)	0.0281 (1.68)	0.0391 (1.62)
Age ≥65	0.0095 (0.56)	−0.0208 (1.05)	0.0303 (1.13)
Male	−0.0472 (8.80)		
Home	0.0061 (0.49)	0.0836 (2.78)	−0.0025 (0.16)
Student	−0.0394 (0.83)	−0.1750 (1.73)	−0.0192 (0.32)
Unemployed	0.0333 (3.75)	0.0225 (2.26)	0.0484 (3.38)
Retired	0.0871 (8.56)	0.1146 (9.67)	0.0653 (4.12)
Married	−0.0263 (2.98)	−0.0305 (3.04)	−0.0155 (1.10)
Living together	0.0010 (0.10)	0.0009 (0.09)	0.0038 (0.21)
Divorced/separated	0.0138 (1.11)	0.0015 (0.10)	0.0267 (1.46)
Widowed	0.0000 (0.01)	−0.0184 (1.00)	0.0088 (0.50)
ALS <16	−0.0317 (0.68)	−0.1970 (1.95)	0.0078 (0.14)
ALS 16–19	−0.0347 (0.76)	−0.1798 (1.79)	−0.0059 (0.11)
ALS >=20	−0.0386 (0.84)	−0.1829 (1.82)	−0.0118 (0.21)
Bulgaria	−0.0496 (4.24)	−0.0230 (1.65)	−0.0692 (3.87)
Czech Republic	−0.0365 (3.12)	−0.0050 (0.37)	−0.0620 (3.41)
Estonia	−0.0257 (2.20)	0.0051 (0.37)	−0.0485 (2.75)
Hungary	−0.0286 (2.45)	−0.0164 (1.21)	−0.0394 (2.18)
Lithuania	0.0166 (1.43)	0.0053 (0.40)	0.0285 (1.57)
Poland	−0.0298 (2.53)	−0.0087 (0.63)	−0.0449 (2.49)
Romania	−0.0170 (1.46)	−0.0063 (0.48)	−0.0264 (1.41)
Slovakia	0.0040 (0.35)	0.0056 (0.42)	0.0040 (0.23)
Slovenia	−0.0100 (0.86)	0.0061 (0.45)	−0.0237 (1.33)
Constant/cut1	0.1038	0.1878	0.0831
Adjusted R^2/Pseudo R^2	0.0372	0.0352	0.0269
N	10,099	4478	5621

Source: Eurobarometer #73.2, February–March 2010. *t*-Statistics are given in parentheses.
Notes: see Table 2. Excluded category—Latvia.

A hump-shaped age pattern is again visible. Both for females and males, antidepressant use is at its greatest in people's midlife. The size of the effect at age 45–54 is similar (0.0597 for men and 0.0470 for women); the null of equality of these coefficients in Table 4 cannot be rejected. In Table 4, however, there is little sign of an education gradient.

In most countries, part of the process of taking antidepressants is first to visit a doctor or health professional. That information is available in the data set. Therefore Table 5 estimates a different form of equation (the p(.) functional form discussed earlier). Here the dependent variable is no longer antidepressant consumption but rather a variable for consulting a mental-health specialist. The exact survey question is:

> "In the last 12 months, did you seek help from a professional because of a psychological or emotional problem. Yes or no."

The mean of this in the data is 11%, so in 2010 approximately one in nine Europeans consulted a professional about mental health problems.

Table 5 reports zero-one OLS equations for the probability of consulting a mental-health professional. To allow for consistency of interpretation with earlier regressions, the set of independent variables is the same as in Tables 2–4. For the full sample of column 1 of Table 5 there continues to be evidence of a well-determined age pattern. The probability of seeking help for a psychological or emotional problem reaches its turning point – adjusting for other factors – in the 45–54 age band. Males, students, the married, and those with high levels of education are less likely to see a mental-health professional. Those living at home, the unemployed, the retired, and the divorced or separated are more likely to do so. The *t*-statistics on the relevant coefficients are typically large in column 1 of Table 5.

Results for the West and East are given separately in columns 2 and 3 of Table 5. Particularly for Eastern Europe, many of the coefficients now become fairly poorly defined. For example, an age pattern is now barely discernible, with large standard errors. The only variables in the Eastern Europe equations with coefficients that are statistically significantly different from zero are Male, Student, and Retired. For Western Europe, nevertheless, the existence of a hump-shaped age profile is still clear in the data. The largest coefficient is 0.0321 (*t*-statistic 3.46) on age-group 45–54. However, for Western Europe there is little sign of an age-left-school effect on the probability of consulting a mental-health professional.

Despite the different dependent variable, the country dummies in Table 5 therefore produce a similar life-cycle pattern to that found in the earlier antidepressant-use equations. The largest positive coefficient in the full sample of column 1 is for Romania at 0.1395 with a *t*-statistic of 10.08. Slovakia and Portugal also have large coefficients. The smallest coefficients in Table 5 are found for Bulgaria, Cyprus and Greece.

Table 5
Regression equations for the probability of seeing a mental-health professional (Estimated with a linear probability OLS model).

	Full sample	Western Europe	Eastern Europe
Age 25–34	0.0084 (0.88)	0.0179 (2.05)	−0.0130 (0.82)
Age 35–44	0.0153 (1.53)	0.0285 (3.11)	−0.0098 (0.58)
Age 45–54	0.0310 (3.07)	0.0321 (3.46)	0.0035 (0.21)
Age 55–64	0.0259 (2.41)	0.0024 (0.25)	0.0103 (0.56)
Age ≥65	0.0192 (1.59)	−0.0310 (2.83)	0.0395 (1.87)
Male	−0.0304 (7.49)	−0.0198 (5.28)	−0.0303 (4.53)
Home	0.0296 (3.74)	0.0303 (4.45)	−0.0023 (0.15)
Student	−0.1699 (5.50)	−0.0320 (1.21)	−0.1218 (2.04)
Unemployed	0.0290 (3.93)	0.0506 (6.87)	0.0122 (1.11)
Retired	0.0438 (6.00)	0.0437 (6.57)	0.0496(3.91)
Married	−0.0170 (2.75)	−0.0328 (6.00)	0.0021 (0.19)
Living together	−0.0109 (1.37)	−0.0127 (1.76)	−0.0015 (0.11)
Divorced/separated	0.0293 (3.24)	0.0263 (3.22)	0.0222 (1.43)
Widowed	0.0056 (0.60)	−0.0109 (1.29)	0.0102 (0.65)
ALS <16	−0.1278 (4.36)	−0.0433 (1.75)	−0.0732 (1.26)
ALS 16–19	−0.1535 (5.25)	−0.0457 (1.84)	−0.1025 (1.78)
ALS >=20	−0.1622 (5.54)	−0.0293 (1.18)	−0.1071 (1.86)
Austria	−0.0037 (0.27)	−0.0290 (2.86)	
Cyprus	−0.0757 (4.40)	0.0087 (0.70)	
Denmark	−0.0090 (0.64)	−0.0082 (0.80)	
Finland	−0.0515 (3.68)	−0.0308 (3.03)	
France	−0.0068 (0.49)	0.0018 (0.18)	
Germany	−0.0473 (3.75)	−0.0237 (2.59)	
Greece	−0.0863 (6.13)	−0.0302 (2.95)	
Ireland	−0.0168 (1.20)	−0.0297 (2.92)	
Italy	−0.0249 (1.79)	0.0087 (0.86)	
Luxembourg	−0.0503 (2.94)	−0.0069 (0.56)	
Malta	−0.0166 (0.96)	−0.0242 (1.92)	
Netherlands	−0.0225 (1.61)	0.0271 (2.68)	
Portugal	0.0323 (2.28)	−0.0125 (1.21)	
Spain	−0.0230 (1.63)	−0.0081 (0.79)	
Sweden	−0.0336 (2.40)	−0.0205 (2.01)	
UK	−0.0242 (1.85)	−0.0469 (0.70)	
Bulgaria	−0.0872 (6.24)		−0.0894 (6.13)
Czech Republic	−0.0209 (1.50)		−0.0206 (1.41)
Estonia	−0.0132 (0.95)		−0.0128 (0.88)
Hungary	−0.0445 (3.20)		−0.0457 (3.13)
Latvia	−0.0040 (0.29)		
Lithuania	0.0036 (0.26)		0.0077 (0.53)
Poland	−0.0676 (4.82)		−0.0681 (4.64)
Romania	0.1395 (10.08)		0.1390 (9.58)
Slovakia	0.0513 (3.68)		0.0534 (3.67)
Slovenia	0.0421 (3.01)		−0.0463 (3.19)
Constant	0.2717	0.1118	0.2208
Adjusted R^2/Pseudo R^2	0.0326	0.0220	0.0515
N	26,800	16,618	10,182

Source: Eurobarometer #73.2, February–March 2010. *t*-Statistics are given in parentheses.
Notes: Base (i.e. reference) categories: Belgium in columns 1 and 2, and Latvia in column 3.
Question wording: In the last 12 months, did you seek help from a professional because of a psychological or emotional problem?

As a final formal check, Table 6 re-estimates the model using a probit equation, and Table 7 gives equivalent results for a variant question (with details explained at the foot of Table 7). The same hump-shaped pattern tends to emerge once again.

3. Potential issues

On the hill-shaped distribution with respect to age, it is possible to think of various potential objections (we thank, in particular, Dr Ian Colman for discussions on these). Here we list some, with possible responses.

(i) Prescribing patterns may differ by country and by age: one possibility is that people who are employed may be more likely to be treated (presumably because physicians want to help people get back to work). In principle, that could create a hill-shaped distribution.

Our econometric estimates do control for country dummies, and also for whether the person is employed. Thus the hill-shape cannot be being generated merely by intercept differences in national medical practices. If it were true that physicians felt they should encourage workers back into the workplace, it is difficult to see why the hill-shape would be so noticeably

Table 6
Regression equations for the probability of seeing a mental-health professional (dprobit).

	Psychiatrist	Psychologist	Other psych. professionals
Age 25–34	0.0112 (2.69)	0.0015 (0.57)	0.0102 (2.00)
Age 35–44	0.0187 (3.93)	0.0059 (1.92)	0.0247 (4.18)
Age 45–54	0.0173 (3.62)	0.0026 (0.90)	0.0204 (3.45)
Age 55–64	0.0043 (1.03)	−0.0055 (2.10)	−0.0005 (0.10)
Age ≥65	−0.0097 (2.82)	−0.0129 (5.13)	−0.0240 (4.97)
Male	−0.0034 (2.48)	−0.0049 (4.05)	−0.0100 (4.91)
Home	0.0102 (3.43)	0.0026 (1.16)	0.0097 (2.42)
Student	−0.0011 (0.21)	−0.0010 (0.26)	0.0027 (0.36)
Unemployed	0.0109 (3.43)	0.0122 (4.42)	0.0218 (4.74)
Retired	0.0322 (10.56)	0.0149 (5.90)	0.0458 (10.82)
Married	−0.0081 (3.35)	−0.0051 (2.45)	−0.0138 (3.81)
Remarried	−0.0068 (1.61)	−0.0017 (0.39)	−0.0072 (1.03)
Living together	−0.0048 (1.69)	−0.0004 (0.18)	0.0016 (0.38)
Previously lived together	0.0071 (1.73)	0.0087 (2.46)	0.0197 (3.18)
Divorced	0.0012 (0.40)	0.0091 (2.75)	0.0125 (2.39)
Separated	0.0149 (2.49)	0.0203 (3.48)	0.0373 (4.01)
Widowed	−0.0043 (1.54)	−0.0007 (0.27)	−0.0055 (1.22)
Mar-09	0.0041 (0.55)	−0.0039 (0.72)	−0.0100 (1.02)
Mar-10	−0.0054 (0.45)	0.0049 (0.38)	0.0132 (0.64)
ALS <16	0.0000 (0.00)	−0.0005 (0.18)	−0.0005 (0.09)
ALS 16–19	−0.0009 (0.26)	−0.0041 (1.25)	−0.0038 (0.65)
ALS >=20	−0.0021 (0.55)	−0.0023 (0.71)	0.0009 (0.16)
Austria	−0.0090 (2.60)	−0.0006 (0.14)	−0.0138 (2.38)
Cyprus	−0.0086 (1.85)	0.0071 (1.11)	−0.0087 (1.09)
Denmark	−0.0092 (2.62)	0.0190 (3.09)	−0.0022 (0.35)
Finland	−0.0026 (0.67)	0.0064 (1.25)	−0.0021 (0.33)
France	0.0003 (0.08)	0.0040 (0.84)	0.0063 (0.93)
Germany	−0.0081 (2.55)	0.0064 (1.37)	−0.0049 (0.86)
Greece	−0.0018 (0.44)	0.0039 (0.80)	−0.0018 (0.27)
Ireland	−0.0127 (3.77)	−0.0054 (1.33)	−0.0182 (3.18)
Italy	−0.0120 (3.65)	−0.0003 (0.08)	−0.0162 (2.86)
Luxembourg	−0.0005 (0.11)	−0.0013 (0.23)	−0.0019 (0.24)
Malta	−0.0067 (1.45)	−0.0026 (0.48)	−0.0140 (1.82)
Netherlands	−0.0014 (0.37)	0.0280 (4.15)	0.0210 (2.81)
Portugal	0.0062 (1.31)	0.0103 (1.86)	0.0120 (1.61)
Spain	−0.0034 (0.85)	0.0234 (3.53)	0.0063 (0.88)
Sweden	−0.0058 (1.53)	0.0159 (2.66)	0.0021 (0.32)
UK	−0.0109 (3.58)	−0.0052 (1.40)	−0.0211 (4.21)
Bulgaria	−0.0105 (3.10)	−0.0090 (2.37)	−0.0243 (4.52)
Czech Republic	−0.0023 (0.59)	−0.0010 (0.24)	−0.0068 (1.09)
Estonia	−0.0021 (0.52)	−0.0039 (0.95)	−0.0095 (1.57)
Hungary	−0.0006 (0.16)	−0.0022 (0.52)	−0.0057 (0.92)
Latvia	−0.0117 (3.64)	−0.0025 (0.62)	−0.0173 (3.17)
Lithuania	−0.0015 (0.37)	−0.0007 (0.16)	−0.0040 (0.64)
Poland	−0.0052 (1.44)	0.0020 (0.43)	−0.0087 (1.45)
Romania	−0.0124 (3.86)	−0.0090 (2.38)	−0.0245 (4.63)
Slovakia	−0.0068 (1.86)	−0.0066 (1.66)	−0.0152 (2.61)
Slovenia	−0.0061 (1.65)	−0.0031 (0.74)	−0.0127 (2.15)
Turkey	−0.0053 (1.35)	0.0067 (1.27)	−0.0026 (0.39)
Croatia	0.0015 (0.36)	−0.0041 (1.03)	−0.0078 (1.27)
Turkish Cyprus	0.0008 (0.16)	0.0289 (3.57)	0.0112 (1.24)
Pseudo R^2	0.0687	0.0816	0.0613
N	29,248	29,248	29,248

Source: Eurobarometer #64.4 December 2005–January 2006. *t*-Statistics are given in parentheses. Base categories: employed; Belgium; and age <25. Column 3 includes psychoanalysts and psychotherapists.
Question wording: In the last 12 months, did you seek help from a professional in respect of a psychological or emotional health problem? (IF YES), Indicate who in the following list. . .

peaked in midlife. It might be expected, instead, that the probability would run fairly flat from people's early 20s to their mid-60s (the usual working-career length).

(ii) This study is unable to follow the same individuals longitudinally through time (as Colman et al., 2006 can), which means that the age variable may be correlated with some form of birth-cohort effect.

This is a justifiable concern and one common to all studies of our type. Nevertheless, in this case, a multi-country cross-sectional design has one advantage. Through the decades, it may indeed be that antidepressant-prescribing norms by Europe's physicians have changed (in a way that affects the link between underlying mental distress and observed

Table 7
Regression Equations for the probability of having mental-health problems (dprobit).

	Psychotherapy	Taken drugs	Admitted to hospital
Age 25–34	0.0095 (1.76)	0.0222 (2.49)	−0.0009 (0.35)
Age 35–44	0.0237 (3.83)	0.0562 (5.59)	0.0003 (0.11)
Age 45–54	0.0242 (3.82)	0.0766 (7.17)	0.0007 (0.25)
Age 55–64	0.0030 (0.53)	0.0594 (5.55)	−0.0040 (1.48)
Age ≥65	−0.0196 (3.78)	0.0187 (1.85)	−0.0087 (3.29)
Male	−0.0084 (3.99)	−0.0320 (9.99)	0.0026 (2.11)
Home	0.0145 (3.45)	0.0421 (6.64)	0.0132 (4.66)
Student	−0.0065 (0.95)	−0.0144 (1.26)	−0.0080 (2.77)
Unemployed	0.0352 (6.94)	0.0533 (7.20)	0.0119 (3.91)
Retired	0.0509 (11.74)	0.0782 (13.55)	0.0244 (9.05)
Married	−0.0068 (1.80)	−0.0164 (2.73)	−0.0011 (0.50)
Remarried	0.0077 (0.92)	0.0052 (0.44)	0.0096 (1.71)
Living together	0.0019 (0.39)	−0.0031 (0.41)	−0.0004 (0.15)
Previously lived together	0.0291 (4.16)	0.0451 (4.31)	0.0121 (2.77)
Divorced	0.0162 (2.82)	0.0311 (3.61)	0.0094 (2.55)
Separated	0.0421 (4.20)	0.0599 (4.21)	0.0191 (3.08)
Widowed	0.0013 (0.27)	0.0070 (0.95)	0.0043 (1.38)
Mar-09	0.0105 (0.91)	−0.0028 (0.15)	0.0144 (1.91)
Mar-10	0.0384 (1.68)	0.0238 (0.79)	0.0129 (1.02)
ALS <16	−0.0062 (1.21)	0.0017 (0.22)	−0.0039 (1.60)
ALS 16–19	−0.0119 (2.24)	−0.0097 (1.19)	−0.0074 (2.84)
ALS >=20	−0.0076 (1.44)	−0.0083 (1.00)	−0.0064 (2.62)
Austria	−0.0036 (0.52)	0.0121 (1.08)	−0.0073 (3.56)
Cyprus	−0.0081 (0.93)	−0.0534 (4.53)	−0.0090 (3.38)
Denmark	−0.0001 (0.02)	−0.0135 (1.31)	−0.0096 (4.96)
Finland	0.0113 (1.47)	−0.0137 (1.34)	−0.0096 (4.92)
France	0.0054 (0.74)	0.0049 (0.45)	−0.0084 (4.27)
Germany	−0.0096 (1.61)	−0.0149 (1.61)	−0.0098 (5.74)
Greece	−0.0087 (1.29)	−0.0328 (3.40)	−0.0101 (5.14)
Ireland	0.0016 (0.22)	−0.0085 (0.79)	−0.0083 (3.94)
Italy	−0.0111 (1.70)	−0.0263 (2.63)	−0.0083 (4.03)
Luxembourg	−0.0063 (0.74)	0.0048 (0.37)	−0.0073 (2.79)
Malta	0.0014 (0.16)	−0.0234 (1.91)	−0.0080 (3.04)
Netherlands	0.0191 (2.41)	−.0028 (0.28)	−0.0091 (4.80)
Portugal	0.0096 (1.24)	0.0194 (1.68)	−0.0094 (5.05)
Spain	0.0139 (1.71)	−0.0089 (0.84)	−0.0079 (3.80)
Sweden	0.0089 (1.17)	−0.0065 (0.61)	−0.0105 (5.22)
UK	−0.0107 (1.76)	−0.0060 (0.61)	−0.0088 (4.87)
Bulgaria	−0.0177 (2.88)	−0.0228 (2.28)	−0.0104 (5.50)
Czech Republic	−0.0125 (1.94)	−0.0140 (1.36)	−0.0100 (5.16)
Estonia	−0.0148 (2.37)	0.0129 (1.16)	−0.0105 (5.51)
Hungary	0.0012 (0.18)	−0.0046 (0.45)	−0.0088 (4.68)
Latvia	−0.0077 (1.17)	0.0094 (0.86)	−0.0086 (4.39)
Lithuania	−0.0045 (0.67)	0.0246 (2.14)	−0.0067 (3.19)
Poland	−0.0072 (1.10)	−0.0064 (0.62)	−0.0099 (5.40)
Romania	−0.0261 (4.56)	−0.0308 (3.20)	−0.0102 (5.54)
Slovakia	−0.0098 (1.48)	−0.0126 (1.22)	−0.0085 (4.22)
Slovenia	−0.0044 (0.64)	−0.0209 (2.06)	−0.0108 (5.39)
Turkey	0.0166 (1.98)	0.0176 (1.46)	−0.0060 (2.68)
Croatia	−0.0013 (0.19)	−0.0006 (0.06)	−0.0081 (4.08)
Turkish Cyprus	0.0180 (1.77)	−0.0005 (0.04)	−0.0072 (2.58)
Pseudo R^2	0.0554	0.0667	0.0703
N	28,958	28,985	28,984

Source: Eurobarometer #64.4 December 2005–January 2006. Base categories: employed; Belgium; and age <25.
Question wording: please indicate which ones of the following statements possibly apply to your situation. In the last 12 months. . .
You have received psychotherapy due to psychological or emotional health problems.
You have taken drugs due to psychological or emotional health problem.
You have been admitted to hospital due to psychological or emotional health problems.

antidepressant consumption). Yet that kind of potential bias is not present in the present study; our data come from the same year and the equations allow for different intercept shifters in each nation. Moreover, it is known that the U-shape in wellbeing through the life course is not itself because of cohort effects (as shown in a specific test in Blanchflower and Oswald, 2008).

(iii) As people age, the presentation of depression might change, such that older individuals become more likely to present with somatic complaints rather than mood complaints. Physicians may be more likely to treat the somatic symptoms without recognizing an episode of depression.

This is a possible interpretation. However, it is a particular theory, it might be said, of the hill-shape, rather than a criticism of the results themselves.

(iv) Treatment-seeking may differ by age. It could be that younger adults are less likely to seek treatment than middle-aged adults.

This is possible, and unfortunately is not easily tested. It cannot, however, account for the drop-off in antidepressant use in older age groups (who presumably are well-informed, when compared to the young, about the concept of antidepressant treatment).

(v) The hump-shape in antidepressant consumption may somehow be reflecting not ageing per se, but instead a midlife threat of, or insecurity from, unemployment.

We checked this by including an extra set of interaction dummies between being unemployed and a series of age bands. The coefficients were statistically insignificantly different from zero, and the hill-shape in age was unaffected.

(vi) There could be a form of 'survivor' effect—severe depression is associated with suicide and other chronic diseases that lead to death. The remaining population is therefore healthier and less likely to need antidepressants.

Such an argument is qualitatively a good one; presumably the mechanism must play some role. However, the annual risk of suicide per-person in an industrialized country is approximately 1 in 10,000, so quantitatively it is difficult to see how a compositional suicide-survivor theory could explain a large proportion of the observed hill-shape in antidepressant use. The turning point in the hill-shape occurs long before many deaths have occurred.

when compared to the young, about the concept of antidepressant treatment).

4. Conclusions

This paper studies the patterns of antidepressant use in Europe. It draws three main conclusions.

First, a hill-shaped age pattern is found in these modern European data (after adjustment for a standard set of covariates). The concave shape is illustrated in Chart 2. People in mid-life are approximately twice as likely to be taking antidepressants as individuals with the same characteristics who are under the age of 25 or over the age of 65. As statistical checks in the paper reveal, this finding seems to be robust to a large number of sub-sample re-estimations, including a division into males and females or into West and East. Rather robustly, the regression-adjusted probability of using an antidepressant attains a maximum in approximately people's late 40s. This seems to suggest that mental distress occurs particularly strongly in midlife. Such a pattern is consistent with recent claims in the well-being literature that happiness and mental health follow a U-shape through life. If this paper's evidence is viewed as a valuable corroboration of the U-shape, it suggests that the need for a conceptual explanation of that quadratic lifetime path of human well-being remains a pressing one.

Second, the probability of taking antidepressants is also greater among those who are female, unemployed, poorly educated, and divorced or separated. These patterns may repay further study by social scientists.

Third, despite the security and wealth of modern living, 1 in 13 European citizens used antidepressants in the year 2010, and rates of consumption are notably high in Portugal, Lithuania, France and the UK. One interpretation of such findings is that they support the broader societal concerns of the Stiglitz Commission.

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