



International Journal of Clinical and Health Psychology

www.elsevier.es/ijchp



ORIGINAL ARTICLE

Age of anxiety and depression revisited: A meta-analysis of two European community samples (1964-2015)



Jan Schürmann, Jürgen Margraf*

Mental Health Research and Treatment Center, Ruhr-Universität Bochum, Germany

Received 2 October 2017; accepted 7 February 2018

Available online 16 March 2018

KEYWORDS

Mental health;
Europe;
Temporal course;
Society;
Meta-analysis

Abstract *Background/Objective:* Based on studies using established psychometric scales, Twenge and coworkers have shown substantial increases in trait anxiety, depressive symptoms and neuroticism in North American population samples since the 1950s. Similar analyses for European samples have not yet been conducted. Our study therefore examined whether similar secular trends exist in German-speaking and British non-clinical samples together with possible connected societal factors. *Method:* A literature search identified 131 studies ($N = 63,269$) using the STAI, BDI or EPI in non-clinical samples between 1964 and 2015. Seven societal factors from national statistics were included. We conducted meta-analyses with displayed means and moderation analyses of publication year for all scales. *Results:* In contrast to North America results, anxiety, depression and neuroticism showed no increase in the two European populations. Publication year correlated negatively with and moderated trait anxiety (GER) and neuroticism (UK). Most societal factors were highly correlated with year of publication. Trait anxiety and neuroticism were significantly predicted by age at marriage and unemployment rate in German-speaking countries. *Conclusion:* The difference in secular trends between European and North American samples may indicate society specific developments connected to different societal factors.

© 2018 Asociación Española de Psicología Conductual. Published by Elsevier España, S.L.U. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

* Corresponding author: Mental Health Research and Treatment Center, Ruhr-Universität Bochum, Massenbergrasse 9-13, 44787 Bochum, Germany.

E-mail address: juergen.margraf@rub.de (J. Margraf).

PALABRAS CLAVE

Salud mental;
Europa;
curso temporal;
sociedad;
meta-análisis

Curso temporal de la ansiedad y la depresión: meta-análisis de dos muestras comunitarias europeas (1964-2015)

Resumen *Antecedentes/Objetivo:* En base a estudios que usan escalas psicométricas establecidas, Twenge y colegas han mostrado aumentos sustanciales en la ansiedad rasgo, los síntomas depresivos y el neuroticismo en muestras de población norteamericana desde los años 1950. Análisis similares no se han realizado para muestras europeas. Este estudio examina si tendencias seculares existen en muestras no clínicas de habla alemana y británica, junto con posibles factores sociales conexos. *Método:* Una búsqueda de literatura identificó 131 estudios (N = 63.269) utilizando el STAI, BDI o EPI en muestras no clínicas, 1964-2015. Se incluyeron siete factores sociales de las estadísticas nacionales. Realizamos meta-análisis con medias y análisis de moderación del año de publicación para las escalas. *Resultados:* En contraste con los resultados norteamericanos, ansiedad, depresión y neuroticismo no han mostrado un aumento en las dos poblaciones europeas. El año de publicación se correlacionó negativa y moderadamente con la ansiedad (GER) y neuroticismo (UK). Ansiedad y neuroticismo fueron predichas significativamente por la edad en el matrimonio y la tasa de desempleo en los países de habla alemana. *Conclusión:* La diferencia en las tendencias seculares entre las muestras europeas y norteamericanas puede indicar desarrollos específicos de la sociedad relacionados con diferentes factores sociales.

© 2018 Asociación Española de Psicología Conductual. Publicado por Elsevier España, S.L.U. Este es un artículo Open Access bajo la licencia CC BY-NC-ND (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Everything was better in the good old days – in the minds of many people the modern world is characterized by insecurity. General media as well as academic journals frequently raise the question whether people's feeling of insecurity has increased over the years. Several authors claim that worries about overall security, job safety, finances and other social aspects grew in the 20th century (e. g., Beck, 1992; Rosen, 1998; Sloan, 1996). Such temporal developments could influence general anxious, depressive and neurotic traits. The examination of these traits in the general public is highly relevant since several studies have identified high trait anxiety, depressive symptoms and neuroticism to be predictors for psychological disorders, most commonly anxiety disorders and Major Depression (Hofstede & McCrae, 2004; Jenny, Pachur, Williams, Becker, & Margraf, 2013; Kotov, Gamez, Schmidt, & Watson, 2010; Lukat, Becker, Lavallee, van der Veld, & Margraf, 2017; Ormel et al., 2013; Schneider, In-Albon, Nuendel, & Margraf, 2013; Woud, Zhang, Becker, McNally, & Margraf, 2014; Zinbarg et al., 2016).

An outstanding study by Twenge (2000) showed that anxiety and neuroticism in American students have constantly increased from 1952 to 1993, by evaluating publications that captured these constructs. Two other cohort studies by this author showed a significant increase in depressive symptoms and general psychopathology in the North American population over generations (Twenge, 2015; Twenge et al., 2010). Other authors also found evidence for an increase in various mental health issues in adults in the U.S. (Newsom, Archer, Trumbetta, & Gottesman, 2003; Swindle Jr, Heller, Pescosolido, & Kikuzawa, 2000) and children and adolescents internationally (Bor, Dean, Najman, & Hayatbakhsh, 2014). Furthermore, a current review demonstrated an increase of hopelessness in North American, Australian and European students (Lester, 2013). There is also evidence that societal

factors are associated with the increase in the considered traits. Thus, anxiety scores are significantly correlated with feelings of threat, economic conditions and low social connectedness in the North American population (Brand, 2015; Clark, Georgellis, & Sanfey, 2001; Cruwys, Haslam, Dingle, Haslam, & Jetten, 2014; Twenge, 2000). Furthermore, an increase in narcissism in the last decades was found which could be connected to the increase in anxiety and depression (Twenge, 2014; Twenge, Konrath, Foster, Campbell, & Bushman, 2008; Twenge, Konrath, Foster, Keith Campbell, & Bushman, 2008).

In contrast, several studies did not show such temporal developments of anxious and depressive traits across cohorts (Achenbach, Dumenci, & Rescorla, 2003; Costello, Erkanli, & Angold, 2006; McMartin, Kingsbury, Dykxhoorn, & Colman, 2014; Twenge & Nolen-Hoeksema, 2002). Furthermore, there are only few studies that examined the development of these traits in other Western countries. We found six studies that examined temporal changes in Europe. Four cohort studies showed an increase in depressive symptoms in Belgium, a rise in depressive and anxious symptoms in English adolescents, as well as increased anxiety in Slovenia and Finland over the last decades (Brault, Meuleman, & Bracke, 2012; Collishaw, Maughan, Natarajan, & Pickles, 2010; Kozina, 2014; Lindfors, Solantaus, & Rimpelä, 2012). In contrast to these findings, Meertens, Scheepers, and Tax (2003) showed no linear trend for depressive symptoms from 1975 to 1996 in the Netherlands. Furthermore, higher depression was only related to groups of people with low income, long-time unemployment or who were not married (Meertens et al., 2003). Evidence by Bremberg (2015) showed a country-specific increase of different mental health issues in Swedish adolescents, but not in the other Nordic countries or the Netherlands. Relating to pos-

sible societal factors underlying such linear trends, there are clear differences between European societies and the U.S., e. g. with respect to feeling of inequality, unemployment or criminality (Alesina, Di Tella, & MacCulloch, 2004; Blanchflower & Oswald, 2004; Tonry, 2014).

An additional examination of the course of non-clinical anxious, depressive and neurotic traits is therefore necessary, especially for European populations. To our knowledge, no study has attempted to replicate the findings in German-speaking populations. This was the first aim of our study. In addition, we proceeded to analyze the temporal trend in the British population in order to compare effects between these different European countries. Therefore, this study analyzes publications using popular instruments to measure anxious, depressive and neurotic traits in German-speaking and British community samples over the period from 1964, when these instruments began to be used in Europe, until 2015. Another aim of this study was to explore possible societal factors that are connected to the course of the traits, especially in a comparison between European and North American societies. Based on evidence from North America, we expected to find a similar rising trend in anxious, depressive and neurotic traits in the two European samples. Finally, we hypothesized that societal factors influence the increase in these traits in the examined European populations in a similar manner as in North America.

Method

Literature search

We conducted a search for studies with commonly used instruments in German-speaking countries and the United Kingdom in the past decades. The most commonly used instruments are the State-Trait-Anxiety-Inventory (STAI), the Beck Depression Inventory (BDI) and the Eysenck Personality Inventory (EPI). Studies were identified through PsycInfo, PubPsych, Pubmed, Google Scholar and Web of Science using the following keywords:

STAI, State Trait Anxiety Inventory; BDI, Beck depression inventory; EPI, EPQ, Eysenck personality inventory, Eysenck personality questionnaire. Keywords were in German and English translations. We also used sample means displayed in the manual of the first version of each scale, if available. The search was done by two independent evaluators. Table 1 shows coefficients of interrater reliability.

Inclusion criteria

Studies that captured community samples from Germany, Austria, Switzerland and England were analyzed. We included studies if they fulfilled specific criteria. Studies must provide means in one of the used scales. Furthermore, standard deviations of respective means and sample sizes must be displayed. Probands needed to be at least 18 years of age. Some studies, which have also evaluated slightly younger probands, were included when the majority of the sample was adult. Persons with psychological disorders, severe physical illnesses, upcoming surgeries and pregnant women were excluded. Healthy control groups were included if the study showed separate means. Studies

Table 1 Kappa-coefficients of interrater reliability.

Variable	<i>n</i>	κ	SE	95% CI
Study selection	217	0.88	0.03	.81 - .95
Publication year	131	1.00	0.00	1.00
Country	131	1.00	0.00	1.00
Sample	131	0.89	0.02	.83 - .94
Age	106	0.97	0.01	.94 - 1.0
Gender distribution	116	0.91	0.02	.85 - .96
Means ^a	131	0.94	0.02	.90 - .98
SDs ^a	131	0.94	0.02	.90 - .98

Note. a = averaged across all scales; *n* = case size; κ = Cohen's kappa-coefficient; SE = asymptotic standard error; 95% CI = confidence interval of kappa-coefficient; study selection = inclusion/exclusion of studies.

were excluded if they only displayed means after manipulation such as stress induction. Separate baseline scores were included. If a study displayed means of more than one group, a weighted mean was calculated with the sample sizes of the respective groups. Studies were controlled for doubling and sample overlap. Studies that applied parts of a sample used in another study were excluded.

Data collection yielded 131 studies. Of those, 52 studies displayed means of the STAI (44 GER, eight UK), 46 displayed means of the BDI (24 GER, 22 UK) and 33 displayed means of the EPI (11 GER, 22 UK). A flow diagram of the selection process is shown in Figure 1.

Scales and transformation

State-Trait-Anxiety-Inventory. The STAI (German Version: Laux, Glanzmann, Schaffner, & Spielberger, 1981; English Version: Spielberger, Gorsuch, & Lushene, 1970) is an instrument with two separate versions to measure anxiety as a state and a trait construct. Each version contains 20 items and is rated on a 4-point Likert scale from one to four. The sum score for all items was determined. Only the trait version was used in this study.

Beck Depression Inventory. The first version of the BDI (German Version: Hautzinger, Bailer, Worall, & Keller, 1994; English Version: Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) is an instrument to measure depressive symptoms and their severity. It contains 21 items that are rated on a 4-point Likert scale from zero to three. The sum score for all items was determined. The included studies had used different versions of the BDI (like the BDI-I, BDI-II and short-forms). Excluding the varying versions of BDI would have led to a great loss of data, therefore, we decided to take the BDI-I as a reference and transform the other scales to its format because all scales used items based on the BDI-I. Therefore, all sum scores were transformed into a 4-point Likert scale and divided by the number of items. In the following, these scores are named BDI-total. The same transformation was executed for the standard deviation scores of all versions of the BDI.

Eysenck Personality Inventory. The first version of the EPI (German version: Eggert, 1974; English version: Eysenck & Eysenck, 1964) is an instrument based on two personality traits: extraversion and neuroticism. Each trait has a scale of 24 items that are answered with yes or no, where a positive

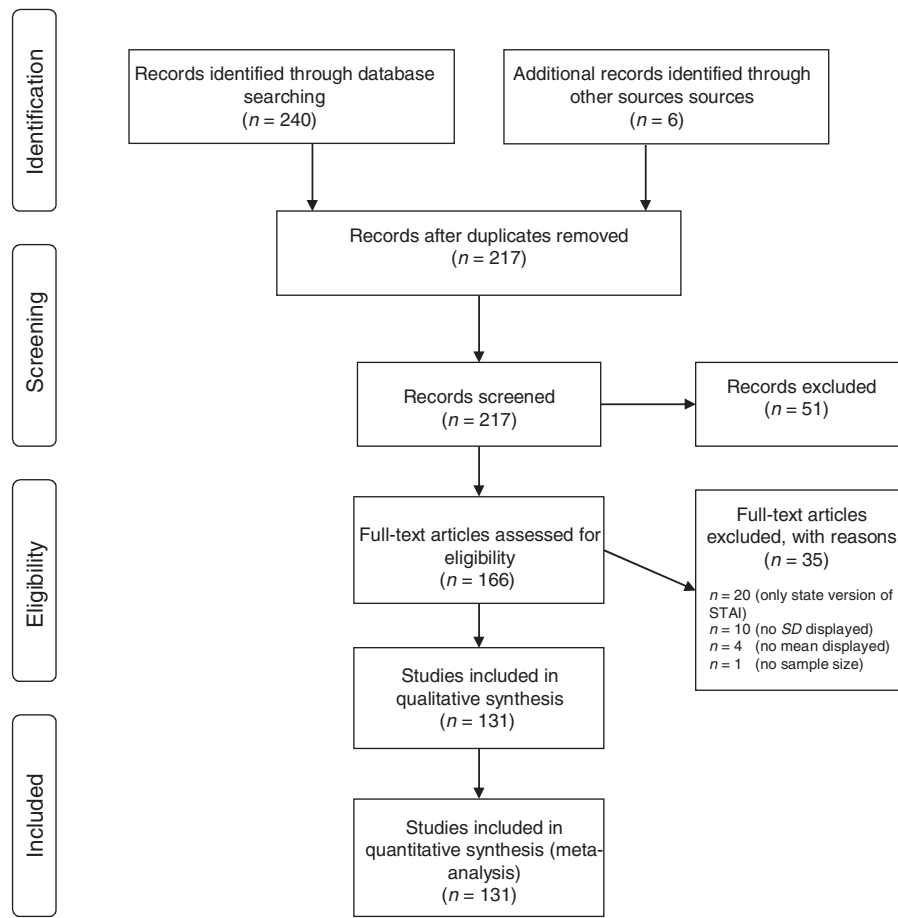


Figure 1 Flow diagram of included and excluded studies for the meta-analysis. Figure was adapted from Moher, Liberati, Tetzlaff, Altman, & PRISMA Group (2009).

answer signifies one point on the scale. Points are summed for each scale. In this study we only used the scale for neuroticism.

Societal factors

We searched for several official statistics in German-speaking countries and the UK that had shown an association with the temporal development in other studies (Gentile, Twenge, & Campbell, 2010; Twenge, 2000). Because this analysis contained only a few studies from Austria and Switzerland, we decided to use the statistics from Germany and the UK. German statistics are published by the following national institutions: Statistisches Bundesamt, Bundesagentur für Arbeit, Bundeskriminalamt (Federal Office of Statistics, Federal Office of Employment, Federal Office of Justice). Statistics for the UK are published by the following institutions: Office of National Statistics, International Monetary Fund, Eurostat, World Health Organization.

We found seven factors that are available in both countries for a period of at least 20 years. Selected factors were: rate of marriages, age at first marriage for females and males, rate of divorces, total rate of living births, unemployment rate, general criminality based on all registered offenses, rate of suicides. Each factor was based on a

one-year statistic. Time periods for each factor are displayed in Table 2.

Sample description

The included studies provided a sample of 63,269 persons ($n_{STAI-GER} = 6,490$; $n_{STAI-UK} = 724$; $n_{BDI-GER} = 18,452$; $n_{BDI-UK} = 6,467$; $n_{EPI-GER} = 1,505$; $n_{EPI-UK} = 29,631$). About 116 studies reported numbers of female/male participants. The proportion of sexes is balanced with 25,626 females and 28,043 males. 109 studies reported the age of probands ($M = 29.80$, $SD = 9.50$, Range 18–60).

Statistical analyses

All analyses were conducted using SPSS, version 23 (IBM Corporation, statistical package for social science) and R[®], version 3.3.2, package: metafor. Descriptive statistics of included studies and participants were calculated. Cohen's kappa-coefficients for overall study selection, as for various values (publication year, country, sample size, age, gender distribution, means and standard deviations of scales) were computed. To examine biases in the included studies, funnel plots (z-scores of means on the x-axis, standard error of means on the y-axis) were displayed. Egger's tests of

Table 2 Available time periods for scales and societal factors.

Variable	Period	
	GER	UK
STAI	1989-2014	1996-2014
BDI-total	1990-2014	1994-2015
EPI	1964-2012	1975-2012
Marriage rate	1950-2014	1955-2014
Age at marriage	1950-2014	1970-2014
Divorce rate	1960-2014	1955-2014
Birth rate	1950-2015	1950-2015
Unemployment rate	1980-2015	1955-2015
Criminality	1991-2015	1991-2014
Suicides	1980-2014	1981-2014

Note. GER = indices in German-speaking countries, UK = indices in the United Kingdom.

funnel plot asymmetry with standard error of each mean as predictor were conducted for each scale and tested to the significance level of $\alpha = .05$.

Mean scores of each scale were calculated for German-speaking countries and the UK. To compare scores between countries, we conducted meta-anovas with a random-effect model and restricted maximum-likelihood estimation and tested the nominal country variable as a moderator on mean scores in form of a Wald-type test with the significance level of $\alpha = .05$.

To examine trends of the existing traits over time, we conducted a meta-analytic random-effect model with restricted maximum-likelihood estimation for each scale respectively. Therefore, effect sizes were defined as means of each study. Then the variance of these effect sizes was defined as squared standard error of each mean. A variance test to examine the heterogeneity between effect sizes was conducted and tested to the significance level of $\alpha = .05$. Furthermore, a moderation analysis in form of an Omnibus-Test for the moderator publication year on the included effect sizes was conducted for all scales respectively and tested to the significance level of $\alpha = .05$. Further moderation analyses on the effect sizes were conducted for the variables mean age and gender distribution (percent females). For an analysis of residuals a case-by-case evaluation of outliers outside of two standard deviations and cook-distances were conducted for each effect size in the moderation analysis. For all scales except for the STAI_{UK}, one to two cases with outliers outside two standard deviations were found. Based on the averaged cook distance, we expected to find minimal influence of the outliers on the moderation, so that we decided to include all studies in the moderation analysis. Furthermore, bivariate correlations (Pearson) between scale means and publication year were calculated and tested to the significance level of $\alpha = .05$.

Finally, to examine the relation to the societal factors, scale means were summed by the publication year. First, bivariate correlations (Pearson) were calculated between publication year and each societal factor and tested to the significance level of $\alpha = .05$. Then we conducted multiple meta-regressions with random-effect model and restricted

maximum-likelihood estimation for all societal factors and scales and tested them to the significance level of $\alpha = .05$. The predictor variables were publication year and one societal factor each. In each case, the dependent variable was the year-averaged mean score. Adjusted R-squared values for each meta-regression based on both predictors were conducted.

Results

Publication years and bias analysis

The mean publication year for the 131 included studies was 2003 ($SD = 10.63$, Range 1964 – 2015). The variable showed a right-skewness for its distribution with a median at 2006. Egger's tests for funnel plot asymmetry showed significant results for means of the STAI_{UK}, $t(6) = 2.65$, $p = .038$, the BDI_{GER}, $t(22) = 3.558$, $p = .002$; the EPI_{GER}, $t(9) = 3.648$, $p = .005$; and the EPI_{UK}, $t(20) = 7.13$, $p = .000$. Therefore an asymmetry in the plots of these variables can be assumed. All other scales showed no significant results, $ps > .05$.

Scale means

Means of each scale for the two countries are displayed in Table 3. To compare mean scores between countries meta-anovas were conducted. All examined comparisons showed significant heterogeneity of effect sizes, $ps < .001$, $I^2 = 95\%$. Meta-anovas showed no significant difference of means between countries for the STAI, $z = 0.19$, $QM(1) = 0.038$, $p = .846$; and the BDI-total, $z = -0.035$, $QM(1) = 0.001$, $p = .972$. Means of the EPI differed significantly, $z = 2.27$, $QM(1) = 5.169$, $p = .023$. The UK showed significantly higher means of neuroticism than the German-speaking countries.

Trends across time

Indices for the meta- and moderation analyses are shown in Table 4. All examined scales showed significant heterogeneity of effect sizes, $ps < .001$, $I^2 = 95\%$.

In terms of the evaluation of possible trends across time, two scales showed a significant moderation of the variable publication year on the respective effect sizes: the STAI in the German-speaking countries, $d = 566.28$ [202.65, 929.91], $z = 3.05$; $QM(1) = 8.107$, $p = .004$; and the neuroticism scores in the UK, $d = 429.30$ [142.01, 716.59], $z = 2.92$; $QM(1) = 8.156$, $p = .004$. We did not find a significant moderation of the variable publication year on the effect sizes of all other scales, $ps > .05$. Age of probands and gender distribution significantly moderated effect sizes of the STAI in the UK, $QM(1) = 5.248$, $p = .022$. We did not find significant moderations of these variables for any other scale, all $ps > .05$.

Correlations between scale means and publication year were determined. We conducted area-separated analyses. For the German-speaking countries, a significant negative correlation was found between STAI means and publication year, $r_{STAI}(44) = -.40$, $p = .007$. We did not find significant correlations of publication year with the BDI-total $r_{BDI-total}(24) = -.21$, $p = .305$, and the EPI, $r_{EPI}(11) = -.33$, $p = .31$; in the German-speaking countries. In the UK, a significant negative

Table 3 Indices of scales for German-speaking countries and the UK.

Variable	Countries	<i>n</i>	<i>M</i> (<i>SD</i>)	<i>SE</i>	Range	<i>k</i>	<i>QM</i> ^a	<i>p</i>
STAI	GER	44	38.07 (5.03)	0.75	31.3–56	52	0.038	.846
	UK	8	38.37 (2.84)	1.004	34.17–41.82			
BDI-total	GER	24	0.30 (0.19)	0.03	0.06–0.80	46	0.001	.972
	UK	22	0.30 (0.20)	0.043	0.1–1.07			
EPI	GER	11	7.87 (2.54)	0.76	2.8–11.8	33	5.169	.023
	UK	22	10.75 (3.74)	0.798	5.47–23.88			

Note. *n* = sample sizes; *M* = mean; *SD* = standard deviation; *SE* = standard error of mean; *k* = case sizes of the meta-anova; *QM* = test-statistic of the meta-anova; *a* = degrees of freedom for all Wald-tests = 1; *p* = *p*-value of test statistic.

Table 4 Indices of the meta- and moderation analyses for scale means.

Variable	Countries	<i>k</i>	<i>d</i>	τ^2	<i>df</i>	<i>QE</i>	<i>pQE</i>	<i>QM</i> ^a	<i>pQM</i>
STAI	GER	44	566.28	20.36	42	1334.81	.000	8.107	.004
	UK	8	506.85	5.66	6	31.91	.000	2.290	.130
BDI-total	GER	24	13.56	0.04	22	6667.82	.000	1.102	.293
	UK	22	-3.67	0.03	20	3290.33	.000	0.064	.800
EPI	GER	11	119.91	6.47	9	494.98	.000	1.204	.273
	UK	22	429.30	9.82	20	3013.99	.000	8.156	.004

Note. *k* = case size; *d* = estimated coefficient of the model; τ^2 = estimated amount of residual heterogeneity; *df* = degrees of freedom of test for heterogeneity; *QE* = *Q*-value of test for heterogeneity; *pQE* = *p*-value for heterogeneity; *QM* = test statistic of Omnibus-test for moderator publication year; *a* = degrees of freedom for all Omnibus-tests = 1; *pQM* = *p*-value for moderation.

correlation between publication year and the neuroticism scores of the EPI was found, $r(22) = -.54$, $p = .009$. We did not find significant correlations of the publication year to the STAI, $r(8) = -.47$, $p = .237$; and the BDI-total, $r(22) = .03$, $p = .880$; in the UK. Scales *z*-scores over the examined time period are shown in Figure 2.

Relation to societal factors

For the German-speaking countries, marriage rate, age at marriage, divorce rate, birth rate and rate of suicides were highly associated with year of publication, $ps < .001$. On the other hand, criminality, $r(25) = -.31$, $p = .123$, and unemployment rate, $r(31) = .06$, $p = .727$, were not correlated to time. For the UK, all societal factors were highly correlated with the publication year, $ps < .001$. Marriage rate, birth rate, criminality, and rate of suicides showed negative relations, while all other factors were positively associated with time.

Multiple meta-regressions were calculated to predict year-averaged scale means based on publication year and the respective societal factors. Table 5 shows coefficients of the meta-regression for societal factors in comparison between countries. For the STAI (GER) significant predictors were age at marriage of females, $z = -2.16$, $p = .030$, $R^2 = .391$ and unemployment rate, $z = -2.70$, $p = .007$, $R^2 = .46$. Mean scores of the EPI (GER) were significantly predicted by age at marriage of males, $z = -4.673$, $p = .000$, $R^2 = .83$; and females, $z = -2.1473$, $p = .032$, $R^2 = .465$; as by unemployment rate, $z = -2.54$, $p = .011$, $R^2 = .56$. We found no societal factor to be a significant predictor for any scale mean scores in the UK, all $ps > .05$.

Discussion

The main aim of our study was to examine whether the secular trend of increasing levels of anxiety, depression and neuroticism found in North America would also exist in samples from two European major language areas. In addition, we also wanted to explore societal factors that might possibly be connected to the course of the examined traits. In contrast to the North American reports, however, we found no increase in anxious, depressive and neurotic traits for the examined European countries in an analysis that included the complete time-span since the introduction of the most popular psychometric scales for these traits. Samples of German-speaking countries and the UK showed similar means of the STAI and the BDI-total, but overall neuroticism mean scores were significantly higher in the UK. In terms of the examination of possible trends in the temporal development, our results showed a significant moderation effect of the moderator publication year for the STAI in the German-speaking countries and in the neuroticism scores in the UK. We did not find a significant moderation effect of the publication year for any other scale. Furthermore, significant negative correlations of the publication year were found for the STAI scores in German-speaking countries and for neuroticism scores in the UK. Therefore, a decrease of trait anxiety in German-speaking countries and neuroticism in the UK can be assumed. For all other scales, no linear change over the years can be assumed in both countries.

The analysis of the societal factors showed high and significant associations of publication year to all factors in the UK and most factors in the German-speaking countries. Unemployment rate and general criminality were not significantly correlated to publication year in the

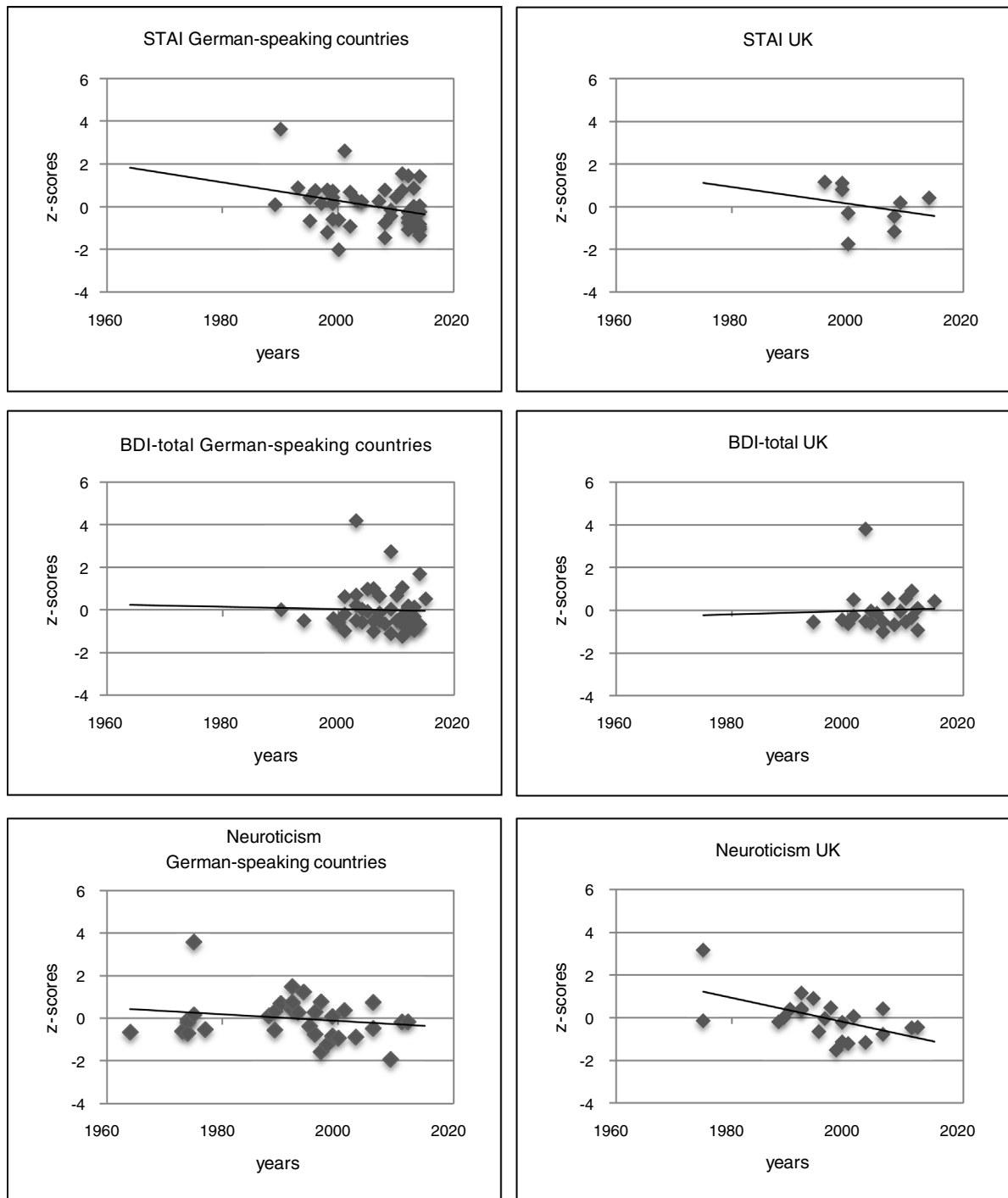


Figure 2 Scatter charts of z-scores for the STAI, the BDI-total and neuroticism over the examined time period. The values of the German-speaking countries are shown on the left, those from the UK on the right. For each chart a linear trend line is displayed.

German-speaking countries. Furthermore, trait anxiety and neuroticism were significantly predicted by the factors age at marriage and unemployment rate in the German-speaking countries whereas no such associations were found for the UK.

Our findings in two European populations are in direct contrast to the evidence for North America: Rather than an increase in anxious, depressive and neurotic traits in the last decades, our results even suggest a decrease in trait

anxiety in the German-speaking countries and in neuroticism in the UK for the examined period. Unlike our second hypothesis, most included societal factors showed no association with the scores of the questionnaires. However, our findings do not contradict the results of Twenge and colleagues as they were gained in different societies. Their evidence clearly showed that in certain social structures anxious and depressive symptoms are increasing and that specific societal factors have an influence on the social structure. In

Table 5 Coefficients of multiple meta-regressions.

	Countries	Coefficients	Marriage rate	Age at marriage (m)	Age at marriage (w)	Divorce rate	Birth rate	Unemployment rate	Criminality	Suicides
STAI-T ^a	GER	β	0.000	-3.313	-7.816*	-0.000	0.000	-1.778**	-0.000	-0.000
		QM^b	4.067	7.654*	12.920*	4.370	4.299	16.611***	2.127	4.111
		k	19	18	18	19	19	18	17	19
	UK	β	0.000	-9.129	-14.234	0.000	0.000	1.915	-0.000	-0.000
		QM^b	0.139	2.118	1.537	0.792	1.241	1.573	0.918	0.123
		k	6	6	6	6	6	6	6	6
BDI-total ^a	GER	β	-0.000	0.007	0.043	-0.000	0.000	0.036	0.000	-0.000
		QM^b	0.058	0.052	0.121	0.050	0.135	2.119	2.916	0.068
		k	13	13	13	13	13	13	12	13
	UK	β	0.000	0.272	0.340	0.000	-0.000	-0.035	0.000	-0.000
		QM^b	0.106	1.127	1.226	4.957	3.474	2.263	5.274	1.420
		k	14	14	14	14	15	15	14	14
EPI ^a	GER	β	-0.000	-21.401***	-18.574*	-0.000	-0.000	-1.838*	-0.000	0.002
		QM^b	0.467	27.500***	6.345*	3.076	0.6125	8.607*	1.151	1.114
		k	11	6	6	8	11	6	6	7
	UK	β	0.000	-0.872	-1.076	-0.000	0.000	-0.007	-0.000	-0.002
		QM^b	8.228*	7.471*	7.660*	12.759**	8.905*	6.748*	0.091	1.641
		k	17	17	17	17	17	17	13	16

Note. a = Means of scales averaged by year of publication; b = degrees of freedom for all Omnibus-tests = 2; β = estimated model-coefficient of meta-regression; QM = test statistic of Omnibus-test of moderation based on publication year and one societal factor; k = case size.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

line with this argumentation, our results show that in the examined European societies other influencing factors may play a role in the course of anxiety, depressive symptoms and neuroticism. For instance, higher age at first marriage is significantly related to lower scores of trait anxiety and neuroticism in the German-speaking countries. This may point to a contrary impact of this factor in different societies. A possible explanation of this effect could be that older age at marriage is connected to a higher marital stability (Rotz, 2016).

Furthermore, it is important to consider the differences in secular trends of the societal factors between Germany, the UK and North American societies. Three of the examined factors showed, beside natural fluctuations, a different linear course in the European countries: unemployment rate, criminality and suicide rate. In comparison, our results displayed that unemployment rate showed no change in the German-speaking countries whereas it slightly increased over the years in the United States. Overall criminality is decreasing in the German-speaking countries and England, whereas it is relatively stable in North America. Finally, the suicide rate is significantly decreasing in the European countries, whereas this factor showed no linear change in the U.S. in the past decades. The different temporal courses of these factors could reflect differences in social structures and their influences on mental health in different countries. Thus, unemployment rate showed a significant prediction of trait anxiety and neuroticism in the German-speaking countries. Some authors emphasize the role of unemployment on general mental health (Kessler & Bromet, 2013; Meertens et al., 2003; Wanberg, 2012). Other relevant influences on anxiety and depression that differ between cultures might include personal value orientations (Maercker et al., 2015), currently discussed social values like consumerism and individualism (Joshanloo & Jarden, 2016; Mikucka, 2014; Passini, 2013), positive mental health (Lukat et al., 2017; Lukat, Margraf, Lutz, van der Veld, & Becker, 2016; Schönfeld, Brailovskaia, & Margraf, 2017), avoidance behaviour (Rudaz, Ledermann, Margraf, Becker, & Craske, 2017) as well as macro-social factors such as wealth, justice and freedom (Scholten, Velten, Neher, & Margraf, 2017; Steel, Taras, Uggerley, & Bosco, 2017).

This study has several limitations. First, for some scales we found only a few studies with a healthy community sample. This led to low power in the meta-analytic and correlative operations. This also resulted in a great restriction of the examined time period for some scales. Furthermore, it is a structural problem that many versions of the BDI were used. The transformation we conducted could have led to a distortion of the results, however, a separate analysis of the data only with the BDI-I and BDI-II revealed no differences to the results found, which included all versions. Another limitation is based on the general publication process. Most studies found were published in the past ten to fifteen years, which led to an overrepresentation of this time period in the data. Our statistical analyses also may indicate publication biases in a number of included scales. Moreover, studies that use different methodological strategies have been included in our analysis, which may cause heterogeneity in the average estimations. Finally, the cross-cultural measurement invariance of the investigated scales has hardly ever been tested although the principal feasibility of these tests has

been established (e. g., for depression, anxiety and stress scales: Scholten, Velten, Bieda, Zhang, & Margraf, 2017; for positive mental health scale: Bieda, Hirschfeld, Schönfeld, Brailovskaia, Zhang, & Margraf, 2017).

A central question raised by our study is the nature of the course of anxiety, depressive symptoms and neuroticism as well as possible relationships with societal factors in different societies. As a first step we examined two populations from Europe. A further examination of other European countries as well as other countries, e.g., Asia and Latin America, in comparison with North America is needed. In respect to the results of our paper an important point of further research should be to find out why anxious and neurotic traits are decreasing in (at least) some European countries in contrast to the increase found in North America. Especially societal factors such as the age at getting married that may have a contrary association to the development of the traits over time should be examined. On the other hand, factors such as employment rate, criminality and suicides that have a different course in different countries could be a key for a better understanding of these questions. Therefore, further cohort or longitudinal studies should examine which societal factors in different societies influence mental health. We also recommend simultaneous analyses in Europe and North America for future research. Another important aspect should be to examine how historical events affect the overall feeling of security or insecurity in the population. Finally, in the light of new data showing a possible unexpected protective effect of neuroticism on mortality (Gale, Cukic, Batty, McIntosh, Weiss, & Deary, 2017), the relationships with somatic health and mortality data should be taken into account.

Conclusion

In the present study we examined the temporal course of anxious, depressive and neurotic traits in the German-speaking and British populations over the past decades. In contrast to evidence from North America, we did not find an increase, instead a decrease for some of the constructs. Most included societal factors showed no association with the course of these traits. Our results are significant in showing that North American findings cannot simply be generalized to other regions of the world and that different societal structures may be related to different courses in mental health issues.

Funding

This study was funded by the Alexander von Humboldt professorship awarded to Jürgen Margraf. The authors like to thank Olga Remeniuk, Ksenia Kortikova, Gerrit Hirschfeld and Helen Copeland-Vollrath for their special support.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at [doi:10.1016/j.ijchp.2018.02.002](https://doi.org/10.1016/j.ijchp.2018.02.002).

References

- Achenbach, T. M., Dumenci, L., & Rescorla, L. A. (2003). Are American children's problems still getting worse? A 23-year comparison. *Journal of Abnormal Child Psychology*, *31*, 1–11. <http://dx.doi.org/10.1023/A:1021700430364>
- Alesina, A., Di Tella, R., & MacCulloch, R. (2004). Inequality and happiness: Are Europeans and Americans different? *Journal of Public Economics*, *88*, 2009–2042. <http://dx.doi.org/10.1016/j.jpubeco.2003.07.006>
- Beck, A. T., Ward, C. H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry*, *4*, 561–571.
- Beck, U. (1992). *Risk Society: Towards a New Modernity*. London: Sage Publications Ltd.
- Bieda, A., Hirschfeld, G., Schönfeld, P., Brailovskaia, J., Zhang, X. C., & Margraf, J. (2017). Universal Happiness? Cross-Cultural Measurement Invariance of Scales Assessing Positive Mental Health. *Psychological Assessment*, *29*, 408–421. <http://dx.doi.org/10.1037/pas0000353>
- Blanchflower, D. G., & Oswald, A. J. (2004). Well-being over time in Britain and the USA. *Journal of Public Economics*, *88*, 1359–1386. [http://dx.doi.org/10.1016/S0047-2727\(02\)00168-8](http://dx.doi.org/10.1016/S0047-2727(02)00168-8)
- Bor, W., Dean, A. J., Najman, J., & Hayatbakhsh, R. (2014). Are child and adolescent mental health problems increasing in the 21st century? A systematic review. *Australian & New Zealand Journal of Psychiatry*, *48*, 606–616. <http://dx.doi.org/10.1177/0004867414533834>
- Brand, J. E. (2015). The Far-Reaching Impact of Job Loss and Unemployment. *Annual Review of Sociology*, *41*, 359–375. <http://dx.doi.org/10.1146/annurev-soc-071913-043237>
- Brault, M.-C., Meuleman, B., & Bracke, P. (2012). Depressive symptoms in the Belgian population: Disentangling age and cohort effects. *Social Psychiatry and Psychiatric Epidemiology*, *47*, 903–915. <http://dx.doi.org/10.1007/s00127-011-0398-0>
- Bremberg, S. (2015). Mental health problems are rising more in Swedish adolescents than in other Nordic countries and the Netherlands. *Acta Paediatrica*, *104*, 997–1004. <http://dx.doi.org/10.1111/apa.13075>
- Clark, A., Georgellis, Y., & Sanfey, P. (2001). Scarring: The Psychological Impact of Past Unemployment. *Economica*, *68*, 221–241. <http://dx.doi.org/10.1111/1468-0335.00243>
- Collishaw, S., Maughan, B., Natarajan, L., & Pickles, A. (2010). Trends in adolescent emotional problems in England: A comparison of two national cohorts twenty years apart. *Journal of Child Psychology and Psychiatry*, *51*, 885–894. <http://dx.doi.org/10.1111/j.1469-7610.2010.02252.x>
- Costello, E. J., Erkanli, A., & Angold, A. (2006). Is there an epidemic of child or adolescent depression? *Journal of Child Psychology and Psychiatry*, *47*, 1263–1271. <http://dx.doi.org/10.1111/j.1469-7610.2006.01682.x>
- Cruwys, T., Haslam, S. A., Dingle, G. A., Haslam, C., & Jetten, J. (2014). Depression and Social Identity. *Personality and Social Psychology Review*, *18*, 215–238. <http://dx.doi.org/10.1177/1088868314523839>
- Eggert, O. (1974). *Eysenck-Persönlichkeits-Inventar EPI 1. Auflage*. Göttingen: Hogrefe.
- Eysenck, S. B. G., & Eysenck, H. J. (1964). An improved short questionnaire for the measurement of extraversion and neuroticism. *Life Sciences*, *305*, 1103–1109.
- Gale, C. R., Čukić, I., Batty, G. D., McIntosh, A. M., Weiss, A., & Deary, I. J. (2017). When Is Higher Neuroticism Protective Against Death? Findings From UK Biobank. *Psychological Science*, *28*, 1345–1357. <http://dx.doi.org/10.1177/0956797617709813>
- Gentile, B., Twenge, J. M., & Campbell, W. K. (2010). Birth cohort differences in self-esteem, 1988–2008: A cross-temporal meta-analysis. *Review of General Psychology*, *14*, 261. <http://dx.doi.org/10.1037/a0019919>
- Hautzinger, M., Bailer, M., Worall, H., & Keller, F. (1994). *Beck-Depressions-Inventar (BDI)*. In *Testhandbuch. 1. Auflage*. Bern, Göttingen, Toronto, Seattle: Huber.
- Hofstede, G., & McCrae, R. R. (2004). Personality and Culture Revisited: Linking Traits and Dimensions of Culture. *Cross-Cultural Research*, *38*, 52–88. <http://dx.doi.org/10.1177/1069397103259443>
- Jenny, M., Pachur, T., Williams, S. L., Becker, E., & Margraf, J. (2013). Simple Rules for Detecting Depression. *Journal of Applied Research in Memory and Cognition*, *2*, 149–157. <http://dx.doi.org/10.1016/j.jarmac.2013.06.001>
- Joshanloo, M., & Jarden, A. (2016). Individualism as the moderator of the relationship between hedonism and happiness: A study in 19 nations. *Personality and Individual Differences*, *94*(Supplement C), 149–152. <http://dx.doi.org/10.1016/j.paid.2016.01.025>
- Kessler, R. C., & Bromet, E. J. (2013). The Epidemiology of Depression Across Cultures. *Annual Review of Public Health*, *34*, 119–138. <http://dx.doi.org/10.1146/annurev-publhealth-031912-114409>
- Kotov, R., Gamez, W., Schmidt, F., & Watson, D. (2010). Linking “big” personality traits to anxiety, depressive, and substance use disorders: A meta-analysis. *Psychological Bulletin*, *136*, 768–821. <http://dx.doi.org/10.1037/a0020327>
- Kozina, A. (2014). Developmental and time-related trends of anxiety from childhood to early adolescence: Two-wave cohort study. *European Journal of Developmental Psychology*, *11*, 546–559. <http://dx.doi.org/10.1080/17405629.2014.881284>
- Laux, L., Glanzmann, P., Schaffner, P., & Spielberger, C. D. (1981). *Das State-Trait-Angstinventar. Theoretische Grundlagen und Handanweisung*. Weinheim: Beltz Test.
- Lester, D. (2013). Hopelessness in undergraduate students around the world: A review. *Journal of Affective Disorders*, *150*, 1204–1208. <http://dx.doi.org/10.1016/j.jad.2013.04.055>
- Lindfors, P., Solantaus, T., & Rimpelä, A. (2012). Fears for the future among Finnish adolescents in 1983–2007: From global concerns to ill health and loneliness. *Journal of Adolescence*, *35*, 991–999. <http://dx.doi.org/10.1016/j.adolescence.2012.02.003>
- Lukat, J., Becker, E. S., Lavallee, K. L., van der Veld, W. M., & Margraf, J. (2017). Predictors of Incidence, Remission and Relapse of Axis I Mental Disorders in Young Women: A Transdiagnostic Approach. *Clinical Psychology & Psychotherapy*, *24*, 322–331. <http://dx.doi.org/10.1002/cpp.2026>
- Lukat, J., Margraf, J., Lutz, R., van der Veld, W. M., & Becker, E. S. (2016). Psychometric properties of the Positive Mental Health Scale (PMH-scale). *BMC Psychology*, *4*, 8. <http://dx.doi.org/10.1186/s40359-016-0111-x>
- Maercker, A., Chi Zhang, X., Gao, Z., Kochetkov, Y., Lu, S., Sang, Z., Yang, S., Schneider, S., & Margraf, J. (2015). Personal value orientations as mediated predictors of mental health: A three-culture study of Chinese, Russian, and German university students. *International Journal of Clinical and Health Psychology*, *15*, 8–17. <http://dx.doi.org/10.1016/j.ijchp.2014.06.001>
- McMartin, S. E., Kingsbury, M., Dykxhoorn, J., & Colman, I. (2014). Time trends in symptoms of mental illness in children and adolescents in Canada. *Canadian Medical Association Journal*, *186*, E672–E678. <http://dx.doi.org/10.1503/cmaj.140064>
- Meertens, V., Scheepers, P., & Tax, B. (2003). Depressive symptoms in the Netherlands 1975–1996: A theoretical framework and an empirical analysis of socio-demographic characteristics, gender differences and changes over time. *Sociology of Health & Illness*, *25*, 208–231. <http://dx.doi.org/10.1111/1467-9566.00332>
- Mikucka, M. (2014). Does Individualistic Culture Lower the Well-Being of the Unemployed? Evidence from Europe. *Journal of Happiness Studies*, *15*, 673–691. <http://dx.doi.org/10.1007/s10902-013-9445-8>
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group. (2009). Preferred reporting items for systematic reviews

- and meta-analyses: The PRISMA statement. *PLoS Medicine*, 6, e1000097. <http://dx.doi.org/10.1371/journal.pmed.1000097>
- Newsom, C. R., Archer, R. P., Trumbetta, S., & Gottesman, I. I. (2003). Changes in adolescent response patterns on the MMPI/MMPI-a across four decades. *Journal of Personality Assessment*, 81, 74–84. http://dx.doi.org/10.1207/S15327752JPA8101_07
- Ormel, J., Jeronimus, B. F., Kotov, R., Riese, H., Bos, E. H., Hankin, B., Rosmalen, J. G. M., & Oldehinkel, A. J. (2013). Neuroticism and common mental disorders: Meaning and utility of a complex relationship. *Clinical Psychology Review*, 33, 686–697. <http://dx.doi.org/10.1016/j.cpr.2013.04.003>
- Passini, S. (2013). A binge-consuming culture: The effect of consumerism on social interactions in western societies. *Culture & Psychology*, 19, 369–390. <http://dx.doi.org/10.1177/1354067X13489317>
- Rosen, B. C. (1998). *Winners and losers of the information revolution: Psychosocial change and its discontents*. Westport, CT: Greenwood Publishing Group.
- Rotz, D. (2016). Why Have Divorce Rates Fallen?: The Role of Women's Age at Marriage. *Journal of Human Resources*, 51, 961–1002. <http://dx.doi.org/10.3368/jhr.51.4.0214-6224R>
- Rudaz, M., Ledermann, T., Margraf, J., Becker, E. S., & Craske, M. G. (2017). The moderating role of avoidance behavior on anxiety over time: Is there a difference between social anxiety disorder and specific phobia? *PLoS ONE*, 12, e0180298.
- Scholten, S., Velten, J., Bieda, A., Zhang, X. C., & Margraf, J. (2017). Testing measurement invariance of the Depression Anxiety, and Stress Scales (DASS-21) across four countries. *Psychological Assessment*. *Advance online publication.*, <http://dx.doi.org/10.1037/pas0000440>
- Scholten, S., Velten, J., Neher, T., & Margraf, J. (2017). Wealth, justice and freedom: Objective and subjective measures predicting poor mental health in a study across eight countries. *SSM - Population Health*, 3, 639–648. <http://dx.doi.org/10.1016/j.ssmph.2017.07.010>
- Schneider, S., In-Albon, T., Nuendel, B., & Margraf, J. (2013). Parental Panic Treatment Reduces Children's Long-Term Psychopathology: A Prospective Longitudinal Study. *Psychotherapy and Psychosomatics*, 82, 346–348. <http://dx.doi.org/10.1159/000350448>
- Schönfeld, P., Brailovskaia, J., & Margraf, J. (2017). Positive and negative mental health across the lifespan: A cross-cultural comparison. *International Journal of Clinical and Health Psychology*, 17, 197–206. <http://dx.doi.org/10.1016/j.ijchp.2017.06.003>
- Sloan, T. S. (1996). *Damaged life: The crisis of the modern psyche*. London: Psychology Press.
- Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). *Manual for the State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press.
- Steel, P., Taras, V., Uggerslev, K., & Bosco, F. (2017). The happy culture: A theoretical, meta-Analytic, and empirical review of the relationship between culture and wealth and subjective well-being. *Personality and Social Psychology Review*. *Advance online publication.*, <http://dx.doi.org/10.1177/1088868317721372>
- Swindle, R., Jr., Heller, K., Pescosolido, B., & Kikuzawa, S. (2000). Responses to nervous breakdowns in America over a 40-year period: Mental health policy implications. *American Psychologist*, 55, 740. <http://dx.doi.org/10.1037//0003-066X.55.7.740>
- Tonry, M. (2014). Why Crime Rates Are Falling throughout the Western World. *Crime and Justice*, 43, 1–63. <http://dx.doi.org/10.1086/678181>
- Twenge, J. M. (2000). The age of anxiety? Birth cohort change in anxiety and neuroticism, 1952-1993. *Journal of Personality and Social Psychology*, 79, 1007–1021. <http://dx.doi.org/10.1037//0022-3514.79.6.100>
- Twenge, J. M. (2014). *Generation Me - Revised and Updated: Why Today's Young Americans Are More Confident, Assertive. In Entitled-and More Miserable Than Ever Before*. New York: Simon and Schuster.
- Twenge, J. M. (2015). Time Period and Birth Cohort Differences in Depressive Symptoms in the U.S., 1982-2013. *Social Indicators Research*, 121, 437–454. <http://dx.doi.org/10.1007/s11205-014-0647-1>
- Twenge, J. M., Gentile, B., DeWall, C. N., Ma, D., Lacefield, K., & Schurtz, D. R. (2010). Birth cohort increases in psychopathology among young Americans, 1938-2007: A cross-temporal meta-analysis of the MMPI. *Clinical Psychology Review*, 30, 145–154. <http://dx.doi.org/10.1016/j.cpr.2009.10.005>
- Twenge, J. M., Konrath, S., Foster, J. D., Campbell, W. K., & Bushman, B. J. (2008). Further evidence of an increase in narcissism among college students. *Journal of Personality*, 76, 919–928. <http://dx.doi.org/10.1111/j.1467-6494.2008.00509.x>
- Twenge, J. M., Konrath, S., Foster, J. D., Keith Campbell, W., & Bushman, B. J. (2008). Egos inflating over time: A cross-temporal meta-analysis of the Narcissistic Personality Inventory. *Journal of Personality*, 76, 875–902. <http://dx.doi.org/10.1111/j.1467-6494.2008.00507.x>
- Twenge, J. M., & Nolen-Hoeksema, S. (2002). Age, gender, race, socioeconomic status, and birth cohort differences on the children's depression inventory: A meta-analysis. *Journal of Abnormal Psychology*, 111, 578–588. <http://dx.doi.org/10.1037//0021-843X.111.4.578>
- Wanberg, C. R. (2012). The Individual Experience of Unemployment. *Annual Review of Psychology*, 63, 369–396. <http://dx.doi.org/10.1146/annurev-psych-120710-100500>
- Woud, M. L., Zhang, X. C., Becker, E., McNally, R. J., & Margraf, J. (2014). Don't panic: Interpretation bias is predictive of new onsets of panic disorder. *Journal of Anxiety Disorders*, 28, 83–87. <http://dx.doi.org/10.1016/j.janxdis.2013.11.008>
- Zinbarg, R. E., Mineka, S., Bobova, L., Craske, M. G., Vrshek-Schallhorn, S., Griffith, J. W., Wolitzky-Taylor, K., Waters, A. M., Summer, J. A., & Anand, D. (2016). Testing a Hierarchical Model of Neuroticism and Its Cognitive Facets. *Clinical Psychological Science*, 4, 805–824. <http://dx.doi.org/10.1177/2167702615618162>