Journal of Research in Personality 70 (2017) 174–186

Contents lists available at ScienceDirect

Journal of Research in Personality

journal homepage: www.elsevier.com/locate/jrp

Full Length Article

Personality predicts mortality risk: An integrative data analysis of 15 international longitudinal studies

Eileen K. Graham [a], Joshua P. Rutsohn [a], Nicholas A. Turiano [b], Rebecca Bendayan [c], Philip J. Batterham [d], Denis Gerstorf [e], Mindy J. Katz [f], Chandra A. Reynolds [g], Emily S. Sharp [h], Tomiko B. Yoneda [i], Emily D. Bastarache [j], Lorien G. Elleman [j], Elizabeth M. Zelinski [k], Boo Johansson [l], Diana Kuh [c], Lisa L. Barnes [m], David A. Bennett [m], Dorly J.H. Deeg [n], Richard B. Lipton [f,o,p], Nancy L. Pedersen [q], Andrea M. Piccinin [i], Avron Spiro III [r,s,t], Graciela Muniz-Terrera [c], Sherry L. Willis [u], K. Warner Schaie [u], Carol Roan [v], Pamela Herd [v], Scott M. Hofer [i], Daniel K. Mroczek [a,j,*]

[a] Department of Medical Social Sciences, Feinberg School of Medicine, Northwestern University, Chicago, IL, United States
[b] Department of Psychology, Eberly College of Arts and Sciences, West Virginia University, Morgantown, WV, United States
[c] Unit for Lifelong Health and Ageing at University College London, London, United Kingdom
[d] National Institute for Mental Health Research, The Australian National University, Canberra, Australia
[e] Institute of Psychology, Humboldt University, Berlin, Germany
[f] The Saul R. Korey Department of Neurology, Albert Einstein College of Medicine, Bronx, NY, United States
[g] Department of Psychology, University of California, Riverside, CA, United States
[h] Department of Neurology, Yale School of Medicine, New Haven, CT, United States
[i] Department of Psychology, University of Victoria, Victoria, British Columbia, Canada
[j] Department of Psychology, Weinberg College of Arts & Sciences, Northwestern University, Evanston, IL, United States
[k] Leonard Davis School of Gerontology, University of Southern California, Los Angeles, CA, United States
[l] Department of Psychology & Centre for Aging and Health (AgeCap), University of Gothenburg, Sweden
[m] Rush Alzheimer's Disease Center, Rush University Medical Center, Chicago, IL, United States
[n] Department of Epidemiology and Biostatistics, VU University Medical Centre, Amsterdam, The Netherlands
[o] Department of Psychiatry and Behavioral Sciences, Albert Einstein College of Medicine, Bronx, NY, United States
[p] Department of Epidemiology & Population Health, Albert Einstein College of Medicine, Bronx, NY, United States
[q] Department of Medical Epidemiology and Biostatistics, Karolinska Institute, Stockholm, Sweden
[r] Massachusetts Veterans Epidemiology Research & Information Center, VA Boston Healthcare System, Boston, MA, United States
[s] Department of Epidemiology, Boston University School of Public Health, Boston, MA, United States
[t] Department of Psychiatry, Boston University School of Medicine, Boston, MA, United States
[u] Department of Psychiatry and Behavioral Sciences, University of Washington, Seattle, WA, United States
[v] Department of Sociology, University of Wisconsin, United States

ARTICLE INFO

Article history:
Received 27 March 2017
Revised 22 June 2017
Accepted 21 July 2017
Available online 22 July 2017

Keywords:
Personality
Mortality
Health behaviors
Replicability
Generalizability

ABSTRACT

This study examined the Big Five personality traits as predictors of mortality risk, and smoking as a mediator of that association. Replication was built into the fabric of our design: we used a Coordinated Analysis with 15 international datasets, representing 44,094 participants. We found that high neuroticism and low conscientiousness, extraversion, and agreeableness were consistent predictors of mortality across studies. Smoking had a small mediating effect for neuroticism. Country and baseline age explained variation in effects: studies with older baseline age showed a pattern of protective effects (HR < 1.00) for openness, and U.S. studies showed a pattern of protective effects for extraversion. This study demonstrated coordinated analysis as a powerful approach to enhance replicability and reproducibility, especially for aging-related longitudinal research.

1. Introduction

Personality traits are important predictors of health outcomes, including mortality risk (Friedman et al., 1995; Jokela et al., 2013), however, several questions remain with respect to this asso-

* Corresponding author at: Department of Psychology & Department of Medical Social Sciences, Northwestern University, Swift Hall, 2029 Sheridan Road, Evanston, IL 60208, United States.
E-mail address: daniel.mroczek@northwestern.edu (D.K. Mroczek).

http://dx.doi.org/10.1016/j.jrp.2017.07.005
0092-6566/

ciation. First, are all five of the Big Five traits related to mortality? Some recent studies have concluded that only conscientiousness predicts longevity (Jokela et al., 2013), although some have disagreed with this position (Chapman, Hampson, & Clarkin, 2014; Costa, Weiss, Duberstein, Friedman, & Siegler, 2014). Certainly, the effects of high conscientiousness and low neuroticism are well-established (Friedman, Kern, Hampson, & Duckworth, 2014) yet with the exception of Jokela et al. (2013) few large-scale investigations have examined the other traits. Second, to what extent do health-detrimental or health-promoting factors mediate the personality-mortality association? There has been some work on such mediation models (Mroczek, Spiro, & Turiano, 2009; Turiano, Chapman, Gruenewald, & Mroczek, 2015), but never in a large-scale, multiple-study context. This study addressed both of these questions, and did so using a novel methodological framework designed to enhance replicability: Coordinated Analysis. Rather than analyze different data sets one or two at a time, in what could be many separate papers, a Coordinated Analysis (a form of Integrative Data Analysis, or IDA; (Curran & Hussong, 2009; Hofer & Piccinin, 2009; Shrout, 2009)) seeks to harness many data sets at once, thereby leveraging power and sample diversity to create a more complete picture of an effect or set of effects than would otherwise be possible. In essence, we had two foci, one substantive and the methodological and replication-oriented.

1.1. Personality, health behavior, and mortality risk

Our substantive research questions were guided by the health-behavior model of personality (Friedman et al., 1995), a theoretical framework positing that personality traits predispose individuals to engage in health-beneficial and refrain from health-detrimental behaviors, such as neglecting to visit a doctor regularly, smoking, or physical inactivity (Mroczek et al., 2009; Turiano et al., 2015). Behaviors such as smoking are one set of potential mechanisms, or mediators (MacKinnon, 2008), that connect personality traits to long-term downstream outcomes of disease and mortality. Newer formulations of this model (Friedman et al., 2014) have emphasized dynamic, changing aspects of both personality and health behaviors over the lifespan (Chapman et al., 2014; Shanahan, Hill, Roberts, Eccles, & Friedman, 2014). This is a development we endorse, however the logistical constraints of a large scale (15-study) Coordinated Analysis limited us to basic tests of the personality-health behavior model. The current study sought to provide a set of (up to) 15 tests of the association between the full Big 5 personality traits and mortality, with data sets from around the world, as well as a set of mediation tests using the key health-detrimental behavior of smoking. Over the 15 studies, we had a wider range of follow up times (42.75 years) than has been used in most prior investigations. This is important because, despite a well-articulated theoretical model of personality and health behaviors (Friedman et al., 1995, 2014), there has been very little longitudinal work that connects traits to mediating mechanisms (such as health behaviors) and then, within the same sample, link even further downstream to long-term outcomes such as mortality. Part of the reason for this paucity has to do with the demands of obtaining such long-term data, and when a qualifying extant study is identified, it is often the case the full desired set of mediators are unmeasured.

This work also has practical or applied significance in that it could demonstrate the role of personality traits as psychosocial or behavioral "vital signs" that predict long-term health risks for individuals. Traits may be useful to health care professionals to identify those who are at greater risk for early health problems and earlier mortality, even without knowing what future health-detrimental behaviors they may be likely to engage in. Using discrete-time longitudinal mixture analysis under a structural equation modeling (SEM) framework (Muthen & Masyn, 2005), we simultaneously tested both direct effects of traits on mortality risk, and indirect effects of traits (mediation) through smoking on mortality risk (CDC, 2008).

1.2. Coordinated analysis: a technique to enhance replication

Complementing the above substantive goal, we had an additional methodological goal of this study that was focused on enhancing replication of results. There is great concern at present with replicability of findings in psychological science (Open Science Collaboration, 2015). Much of this concern has focused on research that uses experimental design. However, areas that use other techniques, such as longitudinal designs, have unique replication challenges that have largely gone unaddressed in the more experimentally-oriented debates about replication in psychology. It is not easy to replicate a long-term longitudinal finding, especially one that uses a large N. An experiment that deploys a relatively small N, a cross-sectional design, and a convenience sample can be run again on a new sample quickly. Replications cannot be done quickly with mortality follow-ups or other long-term longitudinal investigations, which can span years or decades. In addition, groupings of longitudinal studies tend to be different enough from one another (different measures of the same constructs, samples of different ages or from different countries) that exact replications are often impossible, although these study-level differences can often greatly enhance generalizability and external validity. In addition, many recent replication efforts are comprised of a single attempt to replicate a given result. However, two studies do not necessarily make – or break – a replicable result. Hofer and Piccinin (2009) proposed Coordinated Analysis as a possible solution to this problem of robustness and replication in hard-to-obtain longitudinal studies.

Coordinated Analysis is a form of Integrative Data Analysis (IDA; (Curran & Hussong, 2009; Hofer & Piccinin, 2009) has two main forms, Coordinated Analysis and Pooled Analysis. Coordinated analysis marshals multiple datasets, estimates identical data-analytic models (using the same code) to answer a given research question, and then summarizes effect sizes using tools borrowed from meta-analysis such as forest plots of effects sizes and weighted summary effects. In contrast, pooled analysis, another form of IDA merges data sets to obtain a single effect size. Coordinated Analysis approach promotes and accelerates the process of obtaining the multiple replications required to have confidence in a finding. In lieu of waiting for the investigators of longitudinal studies to test and publish results on a given research question, then waiting further still for someone to meta-analyze that literature, Coordinated Analysis can expedite the process. With coordinated analysis, it is also possible to maximize the comparability of the models, including operationalizing of measurement and conditioning on a similar set of covariates.

In the area of personality and mortality, Pooled Analysis investigations have been successfully carried out using 2 or 3 merged data sets (Jokela, Pulkki-Raback, Elovainio, & Kivimaki, 2014; Jokela et al., 2010, 2013). However, Pooled Analysis requires the same measures of constructs and ultimately obtains a single effect size (per research question). Coordinated Analysis preserves the heterogeneity of effect sizes across studies, and because it doesn't pool data, can accommodate studies that do not have the same measures of constructs, or other key differences. This permits a larger total number of studies to be included. Despite these advantages, most Coordinated Analyses are based on 3–6 studies. In the current investigation, we opted for a much larger-scale attempt, and included 15 studies from 5 different countries, representing up to 44,094 participants depending on the construct. This is perhaps the largest Coordinated Analysis attempted to date. It