Do Health Behaviors Explain the Association Between Personality and Mortality?

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Overview

- It's clear that personality influences illness, and ultimately, mortality. The evidence for the latter is impressive and growing.

- Yet what are the conduits or pathways through which personality influences mortality?

- One of the more popular theoretical positions is that personality traits work through health behaviors to influence mortality risk – essentially a mediator model.

- We tested this using 3 studies (two published, one under review)

Personality, Health and Mortality

- Do aspects of our personalities influence our health?

- Do our personalities influence how long we live? Do they plant the seeds of our death?

- There is a growing literature on the effect of personality traits on health and mortality.

What is Personality Science?

- It is the study of individuality – what makes each person unique.

- People are not interchangeable. The science of personality is about why and how we are not interchangeable.

- This area has made some important discoveries, including that personality traits are important factors in how healthy we are and how long we live, and also how wealthy we become.

Personality Traits: the Big Five

- Over 70 years of research has shown that most personality traits can be subsumed into 5 broad "meta-traits" known as the Big Five.

- These are:
  - Extraversion-Introversion
  - Emotional Stability-Neuroticism
  - Conscientiousness-Impulsivity
  - Agreeableness-Hostility
  - Openmindedness-Closedmindedness

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Sample Descriptors of the Big Five

- **Agreeableness vs. Hostility**: helpful, warm, caring, softhearted, sympathetic, hostile (-), unfriendly (-)
- **Conscientiousness vs. Impulsivity**: organized, responsible, hardworking, thorough, careless (-), unreliable (-), impulsive (-)
- **Emotional Stability vs. Neuroticism**: calm, cool, collected, moody (-), worrying (-), nervous (-),
- **Extraversion vs. Introversion**: outgoing, friendly, lively, active, talkative, shy (-), reserved (-)
- **Openness vs. Closedness**: creative, imaginative, intelligent, curious, broad-minded, sophisticated, adventurous, closed-minded (-), unintellectual (-)

Personality and Physical Health

- These Big 5 personality traits have emerged in recent years as predictors of a number of important physical health or health-related outcomes (Caspi, Roberts & Shiner, 2005; Hampson & Friedman, in press; Roberts & Bogg, 2004; Smith & Gallo, 2001; Smith, 2006).

- For example, high neuroticism and low conscientiousness are each associated with earlier mortality (Friedman, Tucker, Tomlinson-Keasy, Schwartz, Wingard & Criqui, 1993; Wilson, Mendes de Leon, Bienas, Evans & Bennett, 2004).

Which Personality Traits Should Predict Best?

- Most of the scientific evidence involves conscientiousness and neuroticism.

- Somewhat less evidence for agreeableness and openness.

- Very little evidence that extraversion is related to health or longevity.

Personality and Physical Health

Why would personality predict health?

1. Certain levels of particular traits (low conscientiousness, high neuroticism) directly or indirectly promote **biological mechanisms** or processes that foster disease or pathology (Roberts et al., 2007; Hampson & Friedman, 2010; Turiano, Chapman, Moynihan & Mroczek, 2012).

2. High or low levels of particular traits are associated with **health behaviors**, or the lack of such behavior (Smith, 2006; Chapman et al., in press): Smoking, drug use, exercise, risky sex, medication adherance…

3. Traits can either promote or inhibit **healthy reactions** to illnesses (e.g., resiliency vs. vulnerability).

Study 1: Neuroticism and Mortality

Mroczek, D.K., Spiro, A., & Turiano, N.A. (2009). Do health behaviors explain the effect of neuroticism on mortality? *Journal of Research in Personality, 43*, 653-659.

Higher levels of neuroticism are associated with higher mortality:

- Many studies have shown this (Wilson et al., 2003, 2004, 2005; Taylor et al., 2009).

- It is likely that neuroticism impacts physical health at least partly through health behaviors.

- It is well-documented that people high in Neuroticism engage in certain undesirable health behaviors.

Health Behaviors and Neuroticism

We considered 2 health behaviors:

- Smoking
- Drinking

Smoking

- Higher neuroticism is associated with cigarette smoking (Gilbert, 1995; Kirk et al., 2001; Lerman et al., 2000).

- Persons high in neuroticism are more likely to smoke, tend to smoke more, and have greater difficulty quitting smoking (Almada et al., 1991; Raush et al., 1990).

- They also tend to use cigarettes and other tobacco products to self-medicate feelings of negative affect (Audrain et al., 1998; Lerman et al., 2000)

Drinking

- Several studies have documented that higher neuroticism is related to alcohol abuse and dependence (Almada et al., 1991; Grekin et al., 2006; Larkins & Sher, 2006; Read & O'Connor, 2006)

- Neuroticism is also associated with greater negative consequences from drinking (Fischer et al., 2007).

Testing the Hypothesis

- Hypothesis: Higher neuroticism will be associated with higher mortality risk, but health behaviors will *attenuate* the relationship.

- We test this hypothesis using survival analysis (Cox models), adjusting for age.

Sample and Measures

- 1,788 older men from the Boston VA Normative Aging Study

- Mean age 51 (SD=9) in 1975

- Neuroticism assessed via the EPI-Q (Floderus, 1974)

- Scores range 0 to 9, higher = more N

- Of the 1,788 men with data on personality and health behaviors in 1975, 665 died during follow-up

Neuroticism and Health Behaviors Predicting Mortality

Risk Factor	Model 1	Model 2	Model 3
Age	1.10***	1.11***	1.11***
Neurot.	1.05***	1.04***	1.03**
Smoking		2.13***	2.10***
Drinking			1.08

Study 1 Summary

- Neuroticism predicts mortality over 30 years.

- Smoking explains part of the Neuroticism-Mortality association, but not all.

- So there is room for other explanations, such a other health behaviors (e.g., exercise), but also physiological or immunological factors.

Study 2: Conscientiousness and Mortality

Turiano, N.A., Hill, P.L., Roberts, B.W., Spiro, A., & Mroczek, D.K. (2012). Smoking mediates the effect of conscientiousness on mortality: The Veterans Affairs Normative Aging Study. *Journal of Research in Personality, 46*, 719-724.

Higher levels of conscientiousness are associated with lower mortality:

- Many studies have shown this (Friedman et al., 1993): At least 20 replications.
- Like neuroticism, it is likely the effect of conscientiousness on mortality is at least partly through health behaviors.

Health Behaviors and Conscientiousness

We considered one health behavior in Study 2:

- Current Smoking Status

- Former Smoker Status

We used Goldberg (1992) adjectives to assess the Big 5, including conscientiousness, in mid-1991 (20 adjectives indexed conscientiousness)
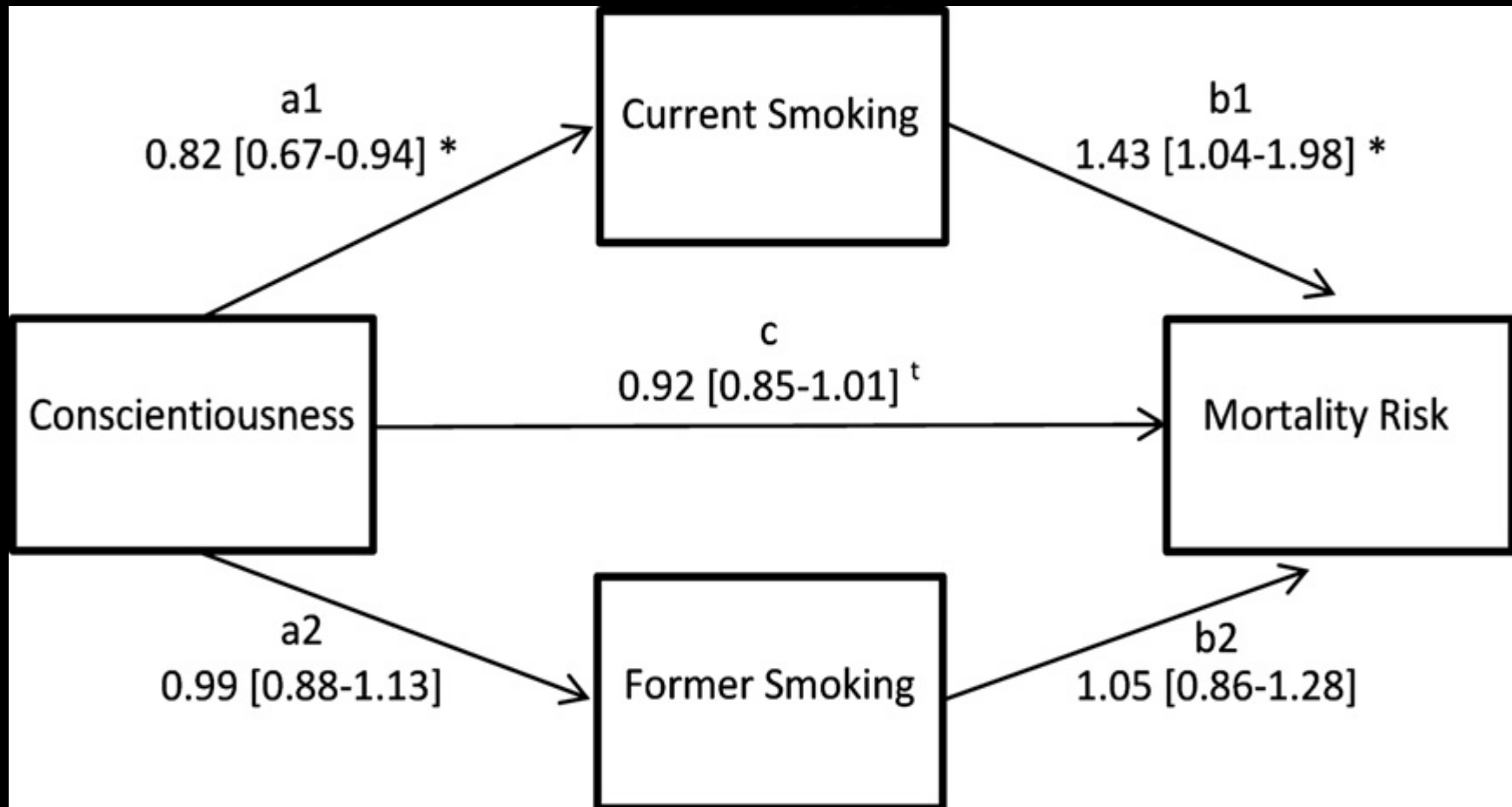
Sample

- 1,349 older men from the Boston VA Normative Aging Study.

- Of the 1,349 men with data on Goldberg adjectives and smoking in 1991, 547 died during the following 20 years.

Mediation

- In this study, we conducted formal tests of mediation. By 2010, SEM models for testing mediators had been developed for use with "censored" outcomes like mortality.

- We tested indirect effects pathways for two smoking statuses: "former" and "current" smokers

Testing Smoking as a Mediator of Conscientiousness & Mortality

Study 2 Summary

- Current smoking fully explained the Conscientiousness-Mortality association, although C was still protective (HR = .92) at p. < .10.

- An indirect mediator effect was found: C reduces the likelihood of being a current smoker, which in turn reduces the likelihood of dying.
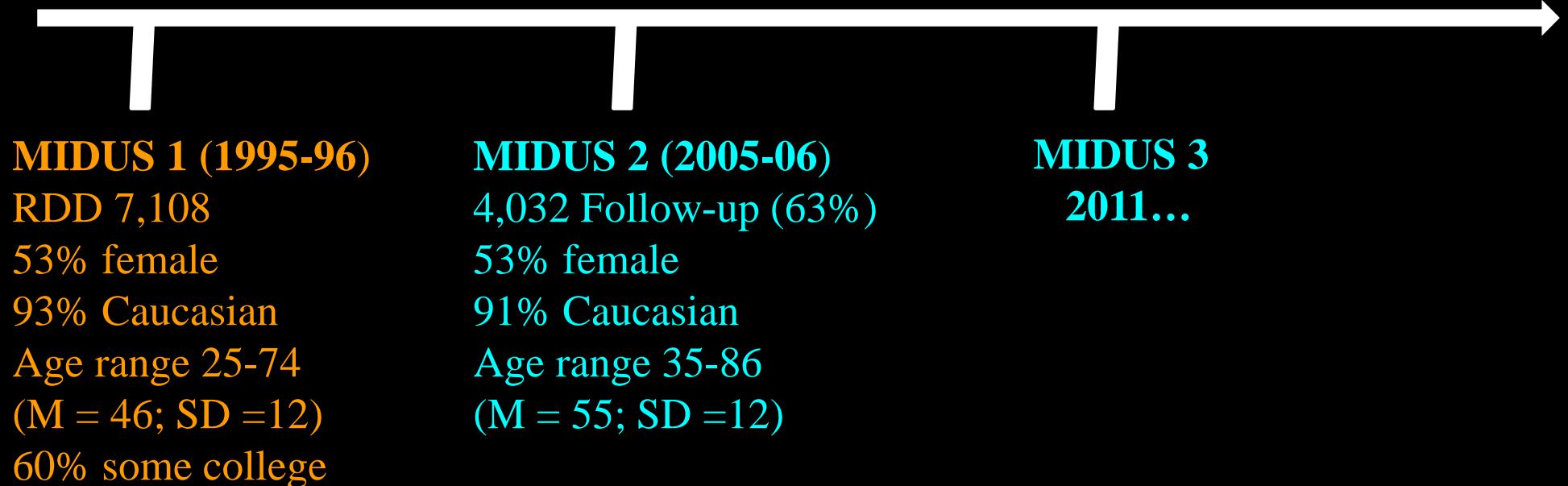
Study 3: Extraversion, Conscientiousness and Mortality

Turiano, N.A., Chapman, B.P., Gruenewald, T.L., & Mroczek, D.K. (under review; 2nd revise and resubmit phase). Personality and the Leading Behavioral Contributors of Mortality, *Almost Accepted for Publication*.

In this 3rd study, we considered the full Big 5, using the MIDUS, a large national U.S. sample with 15 year mortality data.

Again, in this larger and more representative sample, we considered the mediating role of smoking, heavy drinking and waist circumference of personality traits on mortality (controlling for gender, education, age, and marital status)

National Survey of Midlife Development in the US (MIDUS)

MIDUS 1 (1995-96)
RDD 7,108
53% female
93% Caucasian
Age range 25-74
(M = 46; SD =12)
60% some college

MIDUS 2 (2005-06)
4,032 Follow-up (63%)
53% female
91% Caucasian
Age range 35-86
(M = 55; SD =12)

MIDUS 3
2011…

The Health Behavior Model We Tested

Personality → [Alcohol, Tobacco, Drug, Adiposity] → Mortality

Turiano, Chapman, Grunewald, & Mroczek, under review (Health Psychology)

Study Variables

- **Big 5**: Midlife Development Inventory (MIDI; Lachman & Weaver, 1998)

Trait	Mean (SD)	Alpha	Adjectives
Conscientiousness	3.42 (0.44)	.58	organized, responsible, hardworking, careless
Neuroticism	2.24 (0.66)	.74	moody, worrying, nervous, calm
Extraversion	3.20 (0.56)	.76	outgoing, friendly, lively, active, talkative
Agreeableness	3.50 (0.49)	.80	helpful, warm, caring, softhearted, sympathetic
Openness	3.02 (0.53)	.77	creative, imaginative, intelligent, curious, broad-minded, sophisticated, adventurous

- **Drug Use**: Use of any of 10 substances in past 12 months (12% yes)

- **Adiposity**: waist circumference in inches (*Med* = 35; *IQR* 31-39)

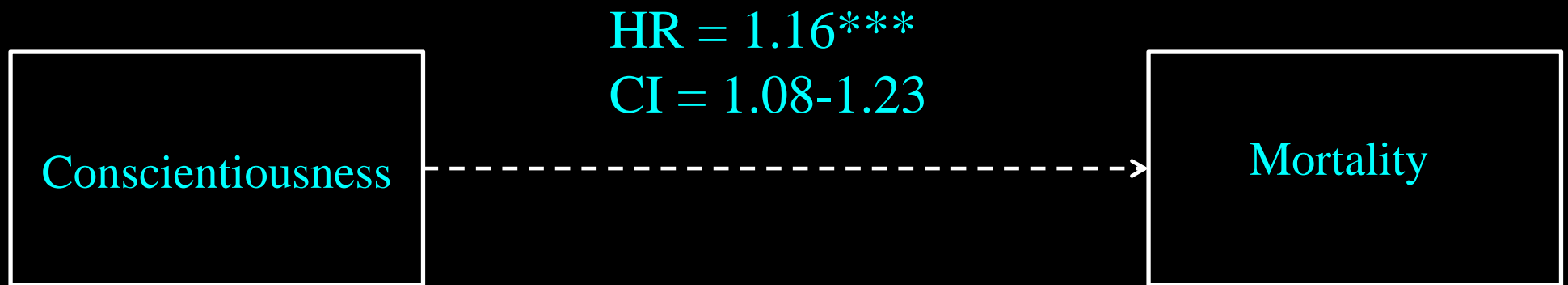- **Mortality:** National Death Index updates as of 2010 (*N* = 580)

Analytic Strategy

- Proportional Hazards Modeling (Cox Models) conducted in Mplus statistical software
  - Accounts for occurrence of a <u>discrete outcome event</u> (dead/alive) and <u>continuous survival time</u>

- Proportional Hazards extended for use in SEM
  - Product by Coefficients approach to calculate total, direct, and indirect effects for mediation (e.g., Ploubidis & Grundy, 2009; Turiano, Spiro & Mroczek, 2012)
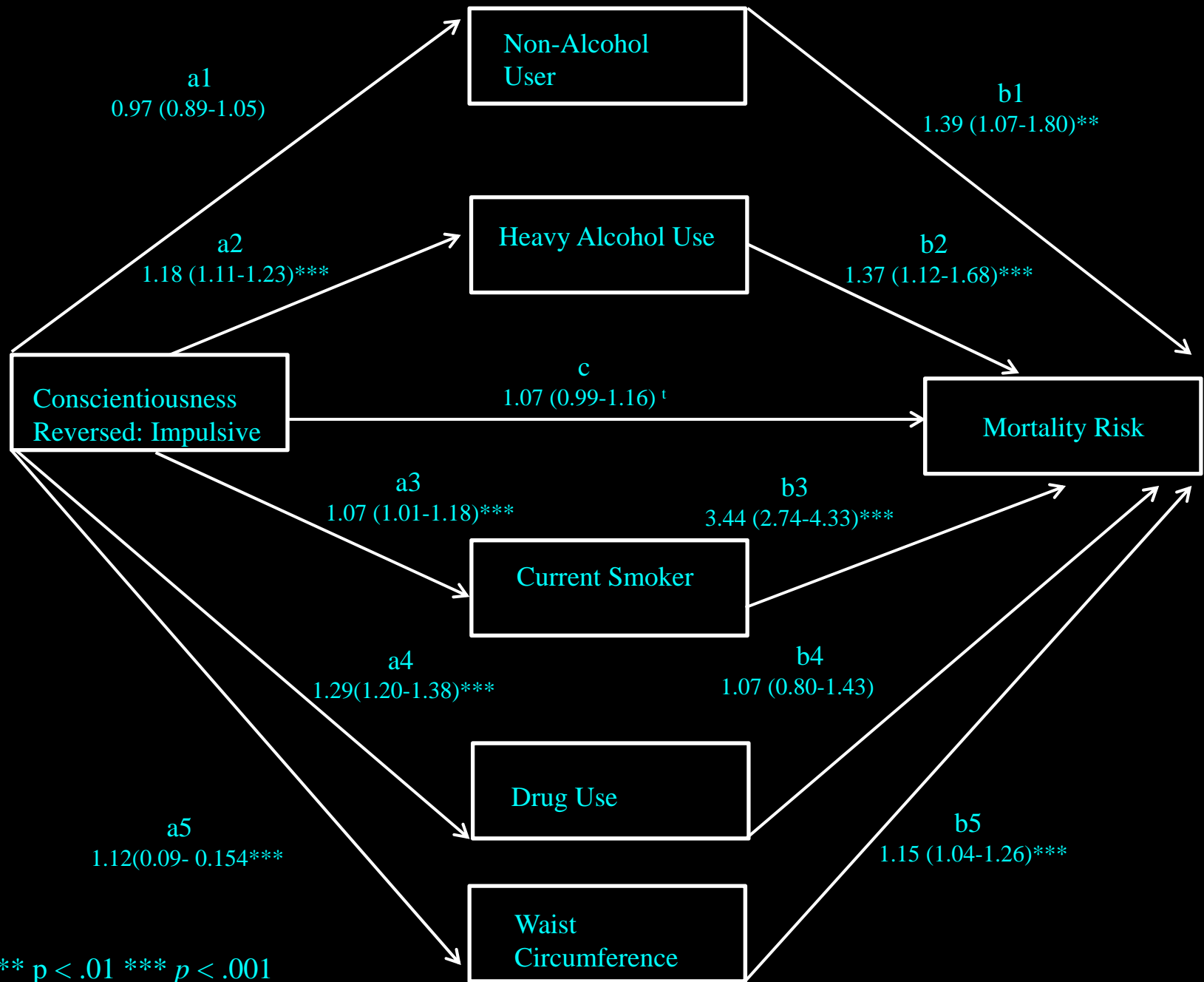
Results

- Four of the Big 5 predicted mortality: Conscientiousness, Neuroticism, Extraversion and Agreeableness.

- However, when adding controls (gender, age, education and marital status), only the Conscientiousness effect remained.

- Although, Extraversion still had HR of .90, but was p , .08.

Results: Predictor of Mortality

HR = 1.16***
CI = 1.08-1.23

Conscientiousness - - - - - - - - - - - - - - - -> Mortality

*** *p* < .001
* Model adjusted for age, sex, and education

a1
0.97 (0.89-1.05)

Non-Alcohol
User

b1
1.39 (1.07-1.80)**

a2
1.18 (1.11-1.23)***

Heavy Alcohol Use

b2
1.37 (1.12-1.68)***

c
1.07 (0.99-1.16) ^{t}

Conscientiousness
Reversed: Impulsive

Mortality Risk

a3
1.07 (1.01-1.18)***

b3
3.44 (2.74-4.33)***

Current Smoker

a4
1.29(1.20-1.38)***

b4
1.07 (0.80-1.43)

a5
1.12(0.09- 0.154***

Drug Use

b5
1.15 (1.04-1.26)***

Waist
Circumference

$t = p < .10$ ** $p < .01$ *** $p < .001$
* Model adjusted for age, sex, and education

Summary of Indirect Effects

Effect	HR (95% CI)
Alcohol	0.04 (-0.01 - 0.08)[t]
Tobacco	0.02 (0.01-0.03)***
Drug	0.02 (-0.06 - 0.09)
Adiposity	0.02 (0.01-0.03)***
Indirect	0.09 (0.01-1.18)***
Total	0.16 (0.05-0.27)**

*** *p < .001*

Study 3: Summary

1. Did health behaviors <u>mediate</u> the relationship between the Big 5 personality traits and 15 year all-cause mortality risk?

   a) YES. 46% of variance explained

   b) Overall, provides support for the Health Behavior Model of personality

General Discussion

- These findings have public health applications:

  1. Personality traits can identify those "at risk" for closer monitoring

  2. <u>Tailor interventions</u> based on traits

  3. Personality as a <u>target</u> of intervention

     - idea of addressing "root causes"

Crossing Disciplinary Boundaries

- These findings demonstrate how behavioral and psychological variables play a role in important biomedical outcomes.

- This work also shows one way in which the boundaries between psychosocial and biomedical disciplines can be crossed profitably.

- Provides an example of integration between *health and human sciences*.

Personality & Personalized Medicine

- This is in line with the new emphasis on Personalized Medicine.

- Personalized Medicine tailors treatments and preventions based on personal characteristics, especially genetic factors.

- Personality traits are a another personal characteristics that may prove very useful to the emerging area of Personalized Medicine.

Discovery with Delivery

- Potential for application: We may be able to use personality trait measurements, in concert with other predictors, to more precisely identify who is most at risk for certain detrimental health behaviors, and ultimately, illness and mortality.

- Personality traits may potentially be part of a prevention toolkit that organizations (businesses, universities) can use to improve health and lower health care costs.

Thank you for your attention!

Don't worry; live longer!