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Concept Paper Form

Provisional Paper Title: The p factor: An empirical evaluation of methods and concepts
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P.I. Sponsor: Click or tap here to enter text. (if the proposing author is a student or colleague of an original PI)
Today's Date: 10/5/2020

Please describe your proposal in 2-3 pages with sufficient detail for helpful review.

Objective of the study:

The first part of this article outlines the history behind the idea of a general factor of psychopathology, the 'p' factor. This historical treatment is informative because it explains how the idea originated in order to account for emerging discoveries in developmental and psychiatric epidemiology (e.g., about comorbidity; about ubiquitous risk factors shared between disorders vs. scarce risk factors that are disorder-specific; about shifting disorders; about the perils of statistical controls for comorbidity). The historical treatment also reveals how small, almost incidental decisions can generate unnecessary debate (e.g., about the use of the bifactor model).

The second part of this article addresses the debate about how to derive a general factor of psychopathology. Here we will compare a 1-factor model, a correlated-factor model, a higher-order model, a bi-factor model, and variations on the bifactor model (called S-1 models). We will evaluate and compare model-fit statistics and factor loadings, and correlations between the different factors. Our question is: Does it matter how the general factor is derived?

The third part of the article tests the correlates of the general factor of psychopathology. Here we tackle a fundamental confusion about 'p' factor's raison d'etre. Some researchers argue that a risky test of the validity of the 'p' factor is that "including a general factor should improve the correlated factor model's external validity." Other researchers claim that the p factor can recapitulate much of the same information that can be gleaned from multivariable representations of the structure of psychopathology. In this section, we will evaluate well-established correlates of psychopathology, including: family history of disorder, exposure to adversity and victimization, emotional and behavioral dysregulation, low IQ, and inflammation.

The final part of the article articulates futures directions and testable hypotheses. We will discuss the following items.

The value of standard reporting strategies.

On the 'dangers' of statistically controlling comorbidity.

What is the meaning of the general factor?

Data analysis methods:

We will use data from the E-Risk study. We will use the same mental health data that we have used in previous research:

Statistical analysis:
We will compare/contrast various methods of parsing the structure of psychopathology using confirmatory factor analysis (CFA) models:

- One-factor model
- Correlated-factors model
- Higher-order factor model
- 2 Bifactor models (w/ and w/o correlated specific factors)
- 3 Bifactor S-1 models (i.e., bifactor model omitting EXT, INT, THD specific factors one at a time)

NOTE: The models reported here will differ somewhat from those reported in Schaefer, et al. (2017). In order to fit the wide array of models, we will need to treat the indicators of psychopathology as skewed continuous variables rather than as ordinal variables as was done in Schaefer, et al (2017). To account for the skewed nature of the symptom criteria scales, we will use the MLR (robust maximum likelihood) estimator, which "introduces data-based corrections to the test statistic and standard errors to offset the bias introduced by the non-normal distribution." (https://curranbauer.org/can-i-estimate-an-sem-if-the-sample-data-are-not-normally-distributed/). This change will also allow us to report traditions SEM model fit indices that were unavailable in the ordinal specification.

The models will be assessed using the following criteria:

- Traditional SEM model fit indices (e.g., chi-square, RMSEA, CFI/TLI, SRMR, AIC, BIC, Sample-size adjusted BIC)
- It is becoming well-known that traditional model fit indices tend to favor the bifactor model even when it is not the 'true' underlying model; given this, we will also examine various ancillary model fit indices [e.g., omega H, omega S, H, explained common variance, item explained common variance, relative parameter bias, tau equivalence (relative strength of loadings on the general vs specific factors)]
- Examine correlations between extracted factor scores across the models (including measures of factor determinacy)

- Examine similarities/differences in heritability of the extracted factors
- Compare the magnitude of correlations of the various factor scores with external correlates (e.g., family history of mental health problems, IQ, ACEs, poly-victimization, low self-control, suPAR)
    - We will attempt to run these within the SEM framework (given the complexity of the models, this may or may not work)
    - We will examine sex adjusted partial correlations between the extracted factors scores and the external correlates
- Do measures of p predict external correlates above and beyond measures of externalizing, internalizing, and thought disorder factors obtained from the correlated-factors model? (i.e., is there added value to estimating p?)
    - We will examine partial correlations between the extracted factor scores and the external correlates; variables partialled will include sex, externalizing, internalizing and thought disorder factors from the correlated factor model
- What do the specific factors in the bifactor model represent? Do correlations between the specific factors from the bifactor model and external correlates "match" partialled correlations from the correlated factors model (e.g., effect of INT after partialling EXT & THD correlated factors)?
- All statistical models will account for the nesting of twins within families.

Variables needed at which ages:

See attached table

Significance of the Study (for theory, research methods or clinical practice):

The purpose of this article is to shed light on the history of research about the 'p' factor, clarify ideas, end unproductive debates, generate testable hypotheses, and present guiding ideas for future research.

References cited:

Data Security Agreement

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☒	My project is covered by the Duke ethics committee OR I have /will obtain ethical approval from my home institution.
☒	I will treat all data as "restricted" and store in a secure fashion. My computer or laptop is: a) encrypted (recommended programs are FileVault2 for Macs, and Bitlocker for Windows machines) b) password-protected c) configured to lock-out after 15 minutes of inactivity AND d) has an antivirus client installed as well as being patched regularly.
☒	I will not "sync" the data to a mobile device.
☒	In the event that my laptop with data on it is lost, stolen or hacked, I will immediately contact Moffitt or Caspi.
☒	I will not share the data with anyone, including my students or other collaborators not specifically listed on this concept paper.
☒	I will not post data online or submit the data file to a journal for them to post. *Some journals are now requesting the data file as part of the manuscript submission process. Study participants have not given informed consent for unrestricted open access, so we have a managed-access process. Speak to Temi or Avshalom for strategies for achieving compliance with data-sharing policies of journals.*
☒	I will delete all data files from my computer after the project is complete. Collaborators and trainees may not take a data file away from the office. This data remains the property of the Study and cannot be used for further analyses without an approved concept paper for new analyses.
☒	I have read the Data Use Guidelines and agree to follow the instructions.

Signature: avshalom caspi

Variables needed:

familyid
atwinid
btwinid
rorderp5
torder
risks
cohort
sampsex
zygosity_2018
seswq35

alcsxe18
alcsxy18
alccritscE18
alccritscY18

marjsxe18
marjsxy18
marjcritscE18
marjcritscY18

drugsxe18
drugsxy18
drugcritscE18
drugcritscY18

CigsDayE18
CigsDayY18

smkftndE18
smkftndY18

cdsxe18
cdsxy18

SR_insum18E
SR_insum18Y
SR_hysum18E
SR_hysum18Y
SR_symtot18e
SR_symtot18y

Gadsxe18
Gadsxy18
gadCritScE18
gadCritScY18

mdesxe18
mdesxy18
mdeCritScE18
mdeCritScY18

eatcritscE18
eatCritScY18

PTSDscale_e18
PTSDscale_y18
PTSDcritsc_E18
PTSDcritsc_Y18

psysympe18
psysympy18

ff15e18
ff16e18
ff17e18
ff18e18
ff19e18
ff20e18
ff15y18
ff16y18
ff17y18
ff18y18
ff19y18
ff20y18

Iq5e
Iq5y
Fsiq5e
Fsiq5y

fhanypm12

harme512
harmy512

Lowsc510E
Lowsc510Y

polyve512c
polyvy512c

polyvctze18
polyvctzy18
polyvctzce18
polyvctzcy18

CRPmgLE18
CRPmgLY18

IL6pgmLE18
IL6pgmLY18

suPARngml_E
suPARngml_Y

iq18e
iq18y
fsiq18e
fsiq18y

ACES_totalE18
ACES_totalY18