Concept Paper Template

Provisional Paper Title: Course of disordered gambling from age 18 to 45 in a longitudinal birth cohort and associations with adverse outcomes in mid-life

(The title will be revised after the paper is written and we know what the answer is)

Proposing Author: Wendy Slutske and Leah Richmond-Rakerd (Thomas Piasecki will also collaborate)

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P.I. Sponsor: Terrie Moffitt and Avshalom Caspi

Today's Date: 6 April 2020

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

Objective of the study:

Background. There is limited evidence from longitudinal research on the long-term stability of disordered gambling from age-homogenous cohorts that can allow one to home in on developmental trends. There are only three such studies that have examined the stability of disordered gambling across time spans of greater than 10 years: (1) a follow-up of 469 Missouri college students from ages 18 to 29 (Slutske et al, 2003), (2) a follow-up of a cohort of 1,358 Québec, Canada kindergarten students [enriched for children with disruptive behaviors] from ages 15 to 30 (Carbonneau et al., 2015), and (3) a follow-up of 939 individuals from a Dunedin, New Zealand birth cohort from ages 21 to 32 (Slutske et al, 2012). What we don't yet know is the longer-term stability of disordered gambling, whether there are distinct groupings of those affected based on ages of onset or course, and the extent to which new onsets are observed beyond the fourth decade of life. Evidence from a large cross-sectional survey suggested that the most common course of gambling disorder was a single episode lasting one year or less -- the majority of participants, 62%, reported experiencing only a single episode of gambling disorder, 11% reported two episodes, and 27% reported three or more (Slutske, 2006).

Studies of individuals who have sought treatment for disordered gambling have demonstrated a number of associated life consequences such as financial, legal, marital, and physical and mental health problems (Lesieur, 1998; Potenza et al, 2019). These observations have subsequently been confirmed in the 1999 Gambling Impact and Behavior study, which was the first systematic examination of the consequences of disordered gambling in a representative community sample (Gerstein et al, 1999). Unfortunately, the evidence to date has been based on cross-sectional investigations; there is limited evidence on the consequences in adulthood of disordered gambling from community-based longitudinal surveys. Much of the current published evidence comes from a 3-year follow-up (conducted in 2004-2005) of baseline assessments of disordered gambling (conducted in 2001-2002) in the National Epidemiologic Survey of Alcohol and Related Conditions (NESARC; note that disordered gambling was only assessed at Wave 1). To date, there have been 10 publications based on these data, focused primarily on predicting the onset of psychiatric or physical disorders from disordered gambling at baseline (Loo et al, 2019). Eight of these papers were based on age heterogeneous samples of the cohort, whose ages spanned 18-98+ (mean age = 46 years); two of these papers focused on individuals 55 years of age and older. Among those 55+ years at baseline, disordered gambling predicted the incidence of generalized anxiety disorder, panic disorder, mania, alcohol use disorder, nicotine dependence (Pilver et al 2013a) and arteriosclerosis (Pilver et al, 2013b). To our knowledge, there is only one study that used a source of information other than self-report;

using National Swedish registers, Karlsson and Håkansson (2018) found that a diagnosis of gambling disorder was significantly associated with mortality, especially among those under 50 years of age, and death by suicide.

Despite the recent intense international interest in confirming the episodic nature of disordered gambling (Mazar et al, 2019), this knowledge has not yet been integrated into other lines of research. For example, examinations of the adult correlates/consequences of disordered gambling have not yet considered the extent to which they may differ for those with persistent versus sporadic gambling disorder.

Proposed study. There are three objectives of the proposed study: (1) characterize the course of disordered gambling, (2) identify individuals with distinct courses of disordered gambling, including whether new onsets are observed beyond the fourth decade of life, and (3) examine mid-life outcomes of disordered gambling, and whether these differ for those with distinct courses.

Data analysis methods:

The primary focus of this study will be disordered gambling (defined as having experienced one or more symptoms of gambling disorder), but we will also be able present findings for two other gambling outcomes, any gambling and gambling versatility. We will also examine the correlates of four cross-wave disordered gambling phenotypes, and of informant-reports of disordered gambling. These measures are described below.

Any gambling and gambling versatility. We will examine the stability of any past-year gambling (available at ages 21, 32, and 45) and gambling versatility (the number of different activities in the past year, available at ages 32 and 45). We have created harmonized gambling versatility measure for these two assessment phases.

Disordered gambling. Multi-item assessments of gambling behaviors and disorder were conducted at ages 21, 32, and 45. There were also single-item assessments of disordered gambling in the delinquency section of the interview at ages 18, 26, 32, and 38. This yields information about disordered gambling at six different phases of the Dunedin study, from ages 18 to 45.

The multi-item gambling assessments at ages 21, 32, and 45 differed considerably. This might be dealt with in two ways. For descriptive analyses, we might conform to the assessment of disordered gambling as originally intended for the measure. For multivariate cross-wave analyses we will use a harmonized measure that includes five symptoms that are roughly equivalent across the three phases.

Given the low prevalence of diagnosable gambling disorder, the main analyses will be based on using a cut-off of at least one disordered gambling symptom in the past year. This was the approach taken using data from phases 21 and 32 in a previous paper (Slutske et al, 2012).

Means/prevalences of three gambling outcomes at three phases and combined (lifetime)				
	Phase 21	Phase 32	Phase 45*	Lifetime*
Any gambling	86%	79%	78%	96%
Harmonized gambling versatility (mean)	NA	1.80	1.50	1.92
Harmonized DG	13%	6%	3%	16%
Note: * based on an incomplete dataset				

Cross-wave disordered gambling phenotypes. We will examine the correlates of four cross-wave disordered gambling phenotypes. Earlier/later onset will be based on first being diagnosed with disordered gambling at ages 18 or 21 versus first being diagnosed at later assessments (earlier: 72%, later: 28% of participants with any DG). Persistent/sporadic will be based on being diagnosed with disordered gambling at more than one phase, or at only one phase (persistent: 27%, sporadic: 73%). (Despite their similar

prevalences, these two dichotomies were uncorrelated.) An alternative will be to focus on the number of phases in which a diagnosis of disordered gambling was made. Finally, we will derive a lifetime measure of disordered gambling based on being diagnosed at any phase (16% based on the harmonized measure).

Informant report of gambling disorder. This will be examined as an outcome, in addition to being employed to validate the self-report measures.

Variables needed at which ages:

Gambling variables.

Full gambling assessments at Phases 21, 32, and 45.
SRD item at Phases 18, 26, 32, and 38
Composite informant report of gambling problems at age 45

Adult correlates (all adult correlates at age 45 unless otherwise noted).

Adult SES
Educational attainment
Credit score
Financial Literacy
Long-term unemployment (26-45)
Cohabitation status
Court convictions (18-45)
Suicide attempts (21-45)
Major depression or anxiety disorder diagnosis
Alcohol use disorder diagnosis
Obesity
Mental health or substance use treatment (21-45)
Register information (social welfare benefits, hospital-bed nights, prescription drug fills, injury insurance claims, convictions for crime)

Control variables (?).

Data analyses. Logistic or linear regression will be used to predict each of the outcomes from disordered gambling or disordered gambling subtype.

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

The Dunedin study brings several unique strengths to this investigation: (1) it represents the longest-running longitudinal study of disordered gambling (2) in an age homogeneous cohort (3) that has achieved higher retention rates than all other follow-up studies of disordered gambling (important because disordered gambling is related to study attrition) (4) and has used multimodal and repeated measures of important life outcomes, including New Zealand National registers. The contribution of this primarily descriptive study will be a much-improved portrait of the natural history of disordered gambling.

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Data Security Agreement

Provisional Paper Title	Course of disordered gambling from age 18 to 45 in a longitudinal birth cohort and associations with adverse outcomes in mid-life
Proposing Author	Wendy Slutske and Leah Richmond-Rakerd
Today's Date	April 4, 2020

Please keep one copy for your records and return one to the PI Sponsor

Please initial your agreement

ws	I am current on Human Subjects Training (CITI (www.citiprogram.org) or equivalent)
ws	My project is covered by Duke or Otago ethics committee OR I have /will obtain ethical approval from my home institution.
ws	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.
ws	I will not "sync" the data to a mobile device.
ws	In the event that my laptop with data on it is lost, stolen or hacked, I will immediately contact Professor Moffitt or Caspi. (919-684-6758, tem11@duke.edu, ac115@duke.edu)
ws	I will not share the data with anyone, including my students or other collaborators not specifically listed on this concept paper.
ws	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. The Dunedin Study Members have not given informed consent for unrestricted open access, so we have a managed-access process. Speak to Terrie or Avshalom for strategies for achieving compliance with data-sharing policies of journals.*
ws	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. The data remains the property of the Study and cannot be used for further analyses without an approved concept paper for new analyses.

Signature: _____