Research report

Clustering of health risk behaviours and the relationship with mental disorders

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ABSTRACT

Background: Health risk behaviours tend to co-occur and are found to be related to mental health symptoms. This is the first study to identify health behaviour clusters in relation to mental disorders.
Methods: Data were used from the second wave of the Netherlands Mental Health Survey and Incidence Study (NEMESIS-2), a nationally representative sample of adults ($n=5303$). Latent class analysis was performed to identify clusters based on four health risk behaviours (smoking, heavy drinking, physical inactivity, and unhealthy diet). Concurrently, we examined the relationship between the identified clusters and a range of DSM-IV diagnoses, assessed with the Composite International Diagnostic Interview 3.0.
Results: Four distinct health behaviour clusters were identified: most healthy (mainly non-smokers, moderate drinkers, active, healthy diet; class 1: 79.3%); smokers, moderate drinkers, inactive, unhealthy diet (class 2: 13.2%); smokers, heavy episodic drinkers, active, unhealthy diet (class 3: 3.8%); Smokers, frequent heavy drinkers, active, low fruit (class 4: 3.6%). Despite their different lifestyles, individuals in all three unhealthy clusters had double the risk of depression. Unhealthy behaviour clusters were strongly associated with drug dependence (classes 2 and 3), alcohol abuse and dependence (classes 3 and 4), and social phobia (class 4).
Limitations: Due to the cross-sectional design, no conclusions about the causality of the relationship between HRB clusters and mental disorders can be drawn from the current study.
Conclusions: Health behaviour clusters are strongly associated with mental disorders. This co-existence of behaviours and disorders emphasises the importance of an integrative approach in the prevention of mental illnesses.

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1. Introduction

Health risk behaviours like smoking, heavy drinking, physical inactivity and unhealthy diet are associated with physical disorders, such as cardiovascular diseases and cancer (Mokdad et al., 2004; Ford et al., 2012; Lim et al., 2013). Less conventional is the association of these health risk behaviours (HRBs) with mental disorders, yet the evidence for this is growing (Walsh, 2011; Berk et al., 2013). Both smoking (Klungsøyr et al., 2006; Flensborg-Madsen et al., 2011) and physical inactivity (Goodwin, 2003; Barbour et al., 2007; NICE, 2009; ten Have et al., 2011) have been shown to predict major depressive disorder in prospective population studies. In addition, heavy drinking (Rodgers et al., 2000; Caldwell et al., 2002) and unhealthy diet (Allgöwer et al., 2001; Woo et al., 2006; Berk et al., 2013) have been shown to be related

to symptoms of depression in large cross-sectional studies. Also other mood disorders like dysthymia and anxiety disorders have been found to be associated with smoking (Degenhardt et al., 2001; Cuijpers et al., 2007), physical inactivity (Barbour et al., 2007; NICE, 2011a), heavy drinking (King et al., 1993; Marquenie et al., 2007; NICE, 2011a) and unhealthy diet (Jacka et al., 2010, 2012). Further, smoking is related to alcohol as well as drug use disorders (Cuijpers et al., 2007; Kalman et al., 2010; NICE, 2011b). In sum, there is growing evidence that health risk behaviours are, to a greater or lesser extent, associated with common mental disorders. The small number of studies that tried to understand the co-occurrence of health risk behaviours and mental disorders in general adult population samples suggest different (direct, indirect and bidirectional) mechanisms, like biological, genetic and psychosocial factors (Berk et al., 2013; Verger et al., 2009).

Health risk behaviours have been examined typically in isolation, while clear evidence exists for their co-occurrence (e.g. Dodd et al., 2010; Berk et al., 2013). For instance, heavy drinking has been associated with smoking, sedentary lifestyle and poor diet (Rosal et al., 2000). 28% of high-risk drinkers in a primary care

setting had a poor diet, 25% were smokers and 44% had a sedentary lifestyle (Rosal et al., 2000). Apart from expressing the interrelatedness of health risk behaviours by percentages or odds ratios, more recent population studies identified specific clusters of health risk behaviours (de Vries et al., 2008; Schneider et al., 2009; Conry et al., 2011; Reijneveld et al., 2012). For example, Conry et al. (2011) identified different health behaviour clusters, like a healthy lifestyle cluster (no smoking, moderate or no drinking, high physical activity, excellent diet), versus a multiple risk factor cluster (current smoking, moderate or problem drinking, moderately physically active, and poor diet), which occurred among 9% and 17% of the population, respectively. Whereas unconventionality has been suggested to explain clustering of HRBs among adolescents (e.g. substance use, risky sexual behaviour, delinquency), among adults a health enhancing lifestyle might be a common factor explaining the clustering of health behaviours (Jessor and Jessor, 1977; Jessor, 1991). Further, sociodemographic factors, like age and educational achievement might explain why some groups in the population have more HRBs than would be expected by chance. Insight into the prevalence and sociodemographic distribution in which clusters of health risk behaviours occur in the population may be important for prevention as this may enable the identification of subgroups that are most in need of behavioural change.

As single health risk behaviours—which tend to co-occur—are related to mental disorders, it may well be worth studying the relationship between health risk behaviour clusters and mental disorders. Of the studies that identified clusters of health risk behaviours, only a few examined the relationship with mental health. These studies mainly focused on adolescents (Hallfors et al., 2004; Mistry et al., 2009; Dodd et al., 2010). Those studies which were performed among adults generally address (symptoms of) depression in relation to clusters of the "big-four" modifiable health behaviours (smoking, heavy drinking, physical inactivity and unhealthy diet) (Verger et al., 2009; Conry et al., 2011). For example, Conry et al. (2011) identified six clusters in a general adult population study, one of which (multiple risk factor cluster) placed individuals at a higher risk of psychological distress (Conry et al., 2011). Verger et al. (2009) identified five clusters in an adult sample, of which three (especially the "cumulate risk takers") incurred a higher risk of depressive symptoms. Yet, to our knowledge, the relationship between clusters of health risk behaviours and common mental disorders has never—either among adolescents or in adults—been studied using a reliable and valid diagnostic instrument.

The aims of this study are to:

a) Identify health risk behaviour clusters present in the general adult population and investigate their prevalence and socio-demographic distribution.
b) Examine the association of the identified health risk behaviour clusters with a broad range of common mental disorders, including mood, anxiety, and substance use disorders.

Data will be used from the second wave of the Netherlands Mental Health Survey and Incidence Study-2 (NEMESIS-2), a nationally representative survey of the adult population ($N=5303$).

2. Method

NEMESIS-2 is a psychiatric epidemiological cohort study of the Dutch general population. It is based on a multistage, stratified random sampling of households, with one respondent randomly selected in each household.

In the first wave (T_0), performed from November 2007 to July 2009, a total of 6646 individuals were interviewed (response rate 65.1%; average interview duration: 95 min). This sample was nationally representative, although younger subjects were somewhat underrepresented (de Graaf et al., 2010). The interviews were laptop computer-assisted and almost all were held at the respondent's home.

All T_0 respondents were approached for follow-up, 3 years after T_0 from November 2010 to June 2012. Of this group, 5303 persons were interviewed again (response rate 80.4%, with those deceased excluded; average interview duration: 84 min). Attrition was not significantly associated with all main categories and individual 12-month mental disorders at baseline, after controlling for socio-demographic characteristics (de Graaf et al., 2013a). As nutrition was only assessed at T_1, in this study only data from the second wave were used, when respondents were aged 21–67.

The study was approved by a medical ethics committee. After having been informed about the study aims, respondents provided written informed consent. A more comprehensive description of the design is provided in de Graaf et al. (2010).

3. Measures

3.1. Smoking

Respondents were asked whether they had smoked in the last 4 weeks and if so how many cigarettes (roll-ups, cigars or pipes) they had smoked on an average day during the last 4 weeks. Response categories were: "none" (0), "less than one a week" (0.1), "less than one a day" (0.5), "1–5 a day" (3), "6–10 a day" (8), "11–20 a day" (15.5), and "more than 20 a day" (20).

3.2. Alcohol use

As various drinking patterns may pose a different risk to mental health (Berk et al., 2013; Grant et al., 2009), three variables concerning alcohol use were included. 1) *Mean number of drinking days a week* was based on the question "In the past 12 months, how often did you usually have at least one drink?" Response categories were "every day" (7), "nearly every day" (5.5), "3 to 4 days a week" (3.5), "1 to 2 days a week" (1.5), "1 to 3 days a month" (0.5), or "less than once a month" (0.1). 2) *Mean number of glasses of alcohol per drinking day* was based on the question "On the days you drank in the past 12 months, about how many drinks did you usually have per day?". Answers ranged from 0 to 20.3) *Number of heavy episodic drinking days a week* was based on the question "How often in the past 12 months, did you have 5 or more drinks on a single day?". Response categories were the same as those of the mean number of drinking days a week.

3.3. Physical activity

Physical activity was assessed with a single question: "How many hours a week did you spend in physical exercise/sport lately?" It was stressed that engaging in passive pursuits like chess and fishing did not count. Answers ranged from 0 to 30.

3.4. Nutrition

Seven items concerning dietary habits were included. Respondents were asked how many days a week they generally eat *breakfast, vegetables* (raw or cooked), *fresh fruit, salty snacks* (e.g. chips, cheese, sausages), *sweet snacks in between meals* (e.g. pastry, cake, large cookies, candy bars or chocolate), *deep-fried meals* and *sweet soft drinks* (like coke, or other soft drinks with sugar, not including light soft drinks with artificial sweeteners or unsweetened fruit juices). Response categories ranged from "Never or less than once a week" (0) to "seven days a week" (7).