



Original article

Worry and cognitive control predict course trajectories of anxiety in older adults with late-life depression

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ABSTRACT

Background: Many older adults with depressive disorder manifest anxious distress. This longitudinal study examines the predictive value of worry as a maladaptive cognitive emotion regulation strategy, and resources necessary for successful emotion regulation (i.e., cognitive control and resting heart rate variability [HRV]) for the course of anxiety symptoms in depressed older adults. Moreover, it examines whether these emotion regulation variables moderate the impact of negative life events on severity of anxiety symptoms.

Methods: Data of 378 depressed older adults (CIDI) between 60 and 93 years (of whom 144 [41%] had a comorbid anxiety disorder) from the Netherlands Study of Depression in Older Adults (NESDO) were used. Latent Growth Mixture Modeling was used to identify different course trajectories of six-months BAI scores. Univariable and multivariable longitudinal associations of worry, cognitive control and HRV with symptom course trajectories were assessed.

Results: We identified a course trajectory with low and improving symptoms (57.9%), a course trajectory with moderate and persistent symptoms (33.5%), and a course trajectory with severe and persistent anxiety symptoms (8.6%). Higher levels of worry and lower levels of cognitive control predicted persistent and severe levels of anxiety symptoms independent of presence of anxiety disorder. However, worry, cognitive control and HRV did not moderate the impact of negative life events on anxiety severity. **Conclusions:** Worry may be an important and malleable risk factor for persistence of anxiety symptoms in depressed older adults. Given the high prevalence of anxious depression in older adults, modifying worry may constitute a viable venue for alleviating anxiety levels.

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1. Introduction

Anxiety is among the most prevalent and debilitating mental health problems in older adults [1] and often co-occurs with depression [2]. Few studies have traced course trajectories of anxiety disorder and anxiety symptoms and its prognostic course determinants in a cohort of community-dwelling older adults [3,4]. A rather unfavorable long-term outcome of anxiety after 6 years has been observed, predicted by female gender and higher levels of neuroticism at baseline.

Cognitive emotion regulation strategies have never been studied as determinants of the course of anxiety in older adults. Cognitive emotion regulation strategies are cognitive responses to

emotion-eliciting events that consciously or unconsciously attempt to modify the magnitude and/or type of individuals' emotional experience or the event itself [5]. An example of a largely adaptive strategy is cognitive reappraisal, which involves changing the way we are thinking about a situation in order to change how we feel. Maladaptive strategies (such as rumination and suppression) are strongly associated with various forms of psychopathology, such as anxiety and depression [6]. In younger adults, it has been repeatedly shown that worry is a dysfunctional cognitive emotion regulation strategy implicated in onset, maintenance and relapse of anxiety (and depressive) disorders [7].

Inhibitory control is a key mechanism for successful emotion regulation as people are required to inhibit prepotent emotional responses in service of more desirable and appropriate ones. As there are age-related declines in cognitive control, it can be assumed that older adults will have more difficulty to regulate their emotions [8]. Moreover, research in late-life anxiety has

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shown that anxiety disorders result in cognitive control deficits arising from disturbances in goal maintenance due to disruption of the ability to inhibit task irrelevant information [9]. Reduced cognitive functioning through aging coupled with late-life anxiety suggest that anxiety and aging pose an enhanced risk for impaired cognitive control of emotion.

Ageing also causes a decrease in parasympathetic tone at rest that is manifested by a decrease in heart rate variability (HRV) [10]. Autonomic control of the heart as measured by HRV is related to attentional control and affective information processing and as such constitutes an important resource for adequate emotion regulation [11]. Individuals with better emotion regulation skills manifest higher levels of resting HRV, and HRV appears to be increased during successful performance on emotion regulation tasks [12]. Moreover, decreases in HRV in response to complex negative situations that affected multiple life domains have been found to be more pronounced in older people than in younger adults [13].

The aim of the present study is to examine whether depressed older adults with higher levels of worry and lower levels of cognitive control and lower levels of HRV will be more likely to show an unfavorable course of anxiety symptoms. Moreover, we studied whether exposure to negative life events possibly overtaxing emotion regulation capacities will result in more severe anxiety symptoms in depressed older adults with higher levels of worry and lower levels of cognitive control and HRV.

2. Methods

2.1. Participants

Data from the Netherlands Study of Depression in Older people (NESDO) [14] were used. NESDO is a multi-site prospective cohort study, including 378 depressed and 132 non-depressed older people (60–93 years). Depressed people were included when they fulfilled the DSM-IV-TR criteria for major depression (95.0%), dysthymia (26.5%) in the previous 6 months or current minor depression (5.0%). Of the depressed older people, 144 (41.0%) also displayed a comorbid anxiety disorder. The population and methods of the NESDO study have been described in detail elsewhere [14]. The study was approved by the ethical boards of the participating institutes and written informed consent was obtained from all participants. In the present study, only depressed people with and without comorbid anxiety were included ($n = 378$) of whom 285 (75.4%) completed the two-year follow-up assessments [15].

2.2. Measurements

2.2.1. Psychiatric diagnoses

Diagnoses of depression and anxiety at baseline and two-year follow-up were assessed with the Composite International Diagnostic Interview (CIDI; World Health Organization [WHO] version 2.1) according to DSM-IV-TR criteria [16].

2.2.2. Symptom severity

The severity of anxiety symptoms was assessed with the Beck Anxiety Inventory (BAI) [17] at baseline and 6-, 12-, 18-, and 24-months follow-up. Severity of depressive symptoms at baseline was assessed with the self-report version of the Inventory of Depressive Symptomatology (IDS-SR) [18].

2.2.3. Negative life events

The occurrence of recent negative life events (NLE), such as experiencing serious illness or major financial loss, was assessed

using the Brugha questionnaire [19,20]. These events reflect the presence of life stressors during the last 12 months before baseline or last six months before the 6-, 12-, 18-, and 24-months follow-up.

2.2.4. Worry

Symptoms of worrying at baseline were assessed with a revised version of the Worry Scale [21]. This questionnaire is especially developed for use with older adults and does not measure the process of worry in general, but comprises subscales that reflect the severity of specific types of worry about financial, health, and social concerns. Based on factor loadings, skewness of mean scores on each item, 15 items were selected for the shortened version [22].

2.2.5. Cognitive control

Cognitive control was measured with the abbreviated version of the Stroop color-word test [23]. This test consisted of three subtasks; the first card (I) had color words (red, blue, green, yellow) printed in black, the second card (II) had colored patches of the same colors, and the last card (III) had color words printed in incongruent colored ink. During the third task, the participants were shown cards displaying names of colors in a non-matching color and asked to name the color of the ink as fast and as accurate as possible. Cognitive control was assessed with the interference score calculated by the following formula: $(t_{III} - 0.5 \times (t_I + t_{II})) / (0.5 \times (t_I + t_{II}))$ (t = time in seconds) [24].

2.2.6. Heart rate variability

Physiological measurements were performed with the “Vrije Universiteit Ambulatory Monitoring System” recording the electrocardiogram (ECG) and changes in thorax impedance (dZ) from six electrodes placed on the chest and back of the participants [25]. NESDO participants wore the Vrije Universiteit Ambulatory Monitoring System device during around 116 minutes of the NESDO baseline assessment. The assessment procedure has been described in more detail elsewhere [26]. The interbeat interval (IBI) time series was extracted from the ECG signal to obtain HR. Respiratory sinus arrhythmia (RSA) is a reliable index of cardiac parasympathetic control [27] and was used as a measure of HRV. RSA was obtained by combining the IBI time series with the filtered (0.1–0.4 Hz) dZ signal, which corresponds to the respiration signal. RSA was obtained by subtracting the shortest IBI during HR acceleration in the inspirational phase from the longest IBI during deceleration in the expirational phase for all breaths, as described in detail elsewhere [25]. As several studies have suggested that research investigating RSA should take respiratory rate (RR) into account as a confounder [28], all RSA analyses were adjusted for RR.

2.3. Statistical analyses

The Stroop interference scores were log-transformed to obtain a near-normal distribution. Moreover, we categorized the number of life events measurements as none, one or two or more life events. The other measures showed a normal distribution. In the moderation analyses, scores for worry, cognitive control and HRV were transformed to z-scores.

As it is unlikely that a single growth trajectory of anxiety symptoms will adequately describe the course of anxiety symptoms among depressed older adults, we first tried to identify different course trajectories of anxiety symptoms, based on repeated BAI scores during 2-year follow-up using Latent Growth Mixture Modeling (LGMM). LGMM assesses whether multiple unobserved latent trajectories are available within an observed overarching group of individuals allowing for different groups of individual growth trajectories to vary around different means. In LGMM, each subgroup trajectory is defined by two latent variables:

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