Available online at www.sciencedirect.com
ScienceDirect
Schizophrenia Research 95 (2007) 179–185
SCHIZOPHRENIA RESEARCH
www.elsevier.com/locate/schres

Prospective memory in schizophrenia: Primary or secondary impairment?

Julie D. Henry [a,*], Peter G. Rendell [b], Matthias Kliegel [c], Mareike Altgassen [c]

[a] School of Psychology, University of New South Wales, Australia
[b] School of Psychology, Australian Catholic University, Australia
[c] Department of Psychology, University of Zurich, Switzerland

Received 21 April 2007; received in revised form 28 May 2007; accepted 6 June 2007
Available online 13 July 2007

Abstract

Although a number of studies have now shown that schizophrenia is associated with impaired memory for future intentions (prospective memory), the degree and nature of the impairment remains to be clarified, as does the degree to which this impairment is secondary to deficits in other aspects of cognition. In the present study thirty participants with schizophrenia were compared with demographically matched controls on Virtual Week, a measure that closely represents the types of prospective memory tasks that actually occur in everyday life, and provides an opportunity to investigate the different sorts of prospective memory failures that occur. Participants with schizophrenia were significantly and comparably impaired on Virtual Week, irrespective of the specific prospective memory task demands. Importantly, after controlling for general cognitive functioning, executive functioning and retrospective memory, although the absolute magnitude of the deficit was reduced, significant impairment remained. These results suggest that individuals with schizophrenia experience generalized difficulties with prospective memory, and that whilst other cognitive deficits contribute to these difficulties, there is something unique to prospective remembering that is additionally disrupted in schizophrenia.

Keywords: Schizophrenia; Neuropsychological functioning; Cognition; Memory; Executive functioning; Delayed intentions

1. Introduction

Much cognitive research involving schizophrenia has focused on retrospective memory, and almost invariably deficits in this aspect of cognition have been reported (Heinrichs and Zakzanis, 1998). However, perhaps of greater importance for day to day functioning is capacity for *prospective memory*, i.e., memory for future intentions. It has been shown that problems with prospective memory cause more deficits in activities of daily living, instrumental activities of daily living and caregiver burden than retrospective memory failures (Smith et al., 2000), and also have important implications for the management and rehabilitation of clinical patients (Kurtz et al., 2001).

Successfully performing a prospective memory task requires not only recall of something that is to be done in the future, but also retrieval of what it is that needs to be done. Thus, since retrospective memory is disrupted in schizophrenia, it would be surprising if deficits in

* Corresponding author. Tel.: +61 2 9385 3936; fax: +61 2 9385 3641.
E-mail address: julie.henry@unsw.edu.au (J.D. Henry).

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doi:10.1016/j.schres.2007.06.003

prospective memory were not also observed in this population. However, relative to retrospective memory, prospective memory is believed to be more dependent on self-initiated processes (Craik, 1986). Since an important aspect of executive functioning is self-directed behavior (Crawford and Henry, 2005) and there is considerable evidence for executive dysfunction in schizophrenia (Walker et al., 2004), deficits may therefore also be anticipated because of the increased demands prospective remembering places upon self-initiated behavior.

Six studies have now investigated how schizophrenia affects prospective remembering. However, two of these did not include a control group, and thus did not allow the presence or nature of any prospective memory impairment to be quantified (Kondel, 2002; Ritch et al., 2003). Further, two of the studies that did include a control group (and found evidence of significant prospective memory impairment in the participants sampled) included a prospective memory task that indexed only one type of prospective memory (regular, event-based remembering). Thus, in both of these studies participants were instructed to regularly perform the same target action in response to the same specific prompt over repeated trials (Elvevåg et al., 2003; Kumar et al., 2005). These studies therefore provide relatively limited information regarding the extent, scope or implications of problems experienced by those with schizophrenia.

Indeed, in the prospective memory literature a particularly important distinction has been made between time- and event-based prospective remembering. Whereas the former requires the participant to perform a specified behavior after the passage of a given amount of time, for the latter the required behavior is prompted by an external cue. Both of the two remaining studies that have investigated prospective remembering in relation to schizophrenia differentiated between these types of prospective responding. However, whilst in Shum et al.'s (2004) study participants with schizophrenia were found to be disproportionately impaired on the time-based measure, Woods et al. (2007) found these different types of prospective remembering to be comparably impaired.

Thus, whilst it has consistently been documented that prospective memory is impaired, there is only limited information with respect to whether schizophrenia particularly disrupts specific types of prospective memory processing. Additionally, the degree to which any observed prospective memory impairment may be regarded as primary, or instead secondary to other cognitive deficits, remains unclear. As noted previously, prospective remembering is considered to depend upon both executive functioning and retrospective memory, both of which are disrupted in schizophrenia. Thus, any deficits in prospective remembering associated with schizophrenia may simply be attributable to more generalized impairment in these other aspects of cognition.

Particular importance has been assigned to the potential role of executive dysfunction as a determinant of prospective memory performance in schizophrenia (Kondel, 2002; Shum et al., 2004; Woods et al., 2007). However, in the only study to statistically control for other cognitive variables (Elvevåg et al., 2003), executive functioning was not assessed. Thus, although Elvevåg et al. (2003) found that the group effect for omission errors on prospective memory remained significant after controlling for IQ, short term memory and working memory, it remains unclear whether these group effects would have remained had executive functioning also been controlled.

The aim of the current study was to conduct the most comprehensive assessment of how prospective memory is affected in schizophrenia to date, by investigating the different sorts of prospective memory failures that occur. Further, it will be assessed whether deficits in prospective memory represent primary deficits, or instead are a consequence of deficits in other aspects of cognition known to be affected in schizophrenia.

2. Methods

2.1. Participants

Thirty clinical participants were recruited from outpatient and rehabilitation clinics in Sydney. Participants were selected on the basis that they had been diagnosed with schizophrenia or schizoaffective disorder using DSM-IV criteria. All participants were aged over 18 and in a stable phase of illness. Whilst all participants with schizophrenia were receiving atypical antipsychotic medication, there was considerable variability with respect to the different types and combinations of drugs being taken. Antipsychotic drugs differ in potency, and these differences are typically expressed as differences in chlorpromazine equivalence (CPZe). Whilst this conversion is controversial as applied to atypical antipsychotics (see; Taylor et al., 2003), it is nevertheless useful for assessing broad trends across patient groups. Humberstone et al.'s (2003) guidelines provide conversion equivalents for all drugs taken by participants in the present study, with the exception of amisulpride and aripiprazole, for which The Maudsley Prescribing Guidelines (Taylor et al., 2003) were used to calculate CPZe, based on the minimum recommended