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Measuring fluctuations in paranoia: Validity and psychometric properties of brief state versions of the Paranoia Checklist

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ABSTRACT

Research increasingly assesses momentary changes in paranoia in order to elucidate causal mechanisms. Observed or manipulated changes in postulated causal factors should result in fluctuations in state paranoid ideation. Previous studies often employed a state-adapted Paranoia Checklist (Freeman et al., 2005) to measure state paranoia. This study examined whether the Paranoia Checklist or subsets of its items are appropriate for this purpose.

Thirteen studies ($N=860$) were subjected to meta-analyses of each Paranoia Checklist item. We selected items based on (1) whether they showed pre-to-post change in the expected direction and (2) whether this effect was larger in experimental vs. control conditions. All resulting item selections were cross-validated on a hold-out sample ($n=1893$). Finally, we explored how much variation in paranoia was captured by the state-adapted version in a brief ambulatory assessment study ($N=32$).

A thirteen item *State Paranoia Checklist* as well as a five item and a three item *Brief State Paranoia Checklist* were extracted. Cross validation revealed better model fit and increased sensitivity to change. Multilevel analysis indicated 25-30% of the variance in the *Brief State Paranoia Checklists* to be due to intra-individual daily fluctuations in paranoia.

Our analyses produced reliable and valid revised scales. Increases in change sensitivity indicate that future assessment of state paranoia in experimental and ambulatory assessment studies can be optimized by using the revised scales.

1. Introduction

In their seminal work on the contribution of genetic and environmental causes of psychosis Van Os et al. (2010) emphasize the importance to pinpoint stressors and other environmental factors that contribute to the formation of psychotic symptoms. Since then, there has been a shift of research paradigms in favor of experimental studies that manipulate stressors in order to identify the causal mechanisms of psychotic symptoms such as paranoia (Garety and Freeman, 2013). In these studies, paranoid ideation is measured as a fluctuating state rather than as a stable symptom (Ben-Zeev et al., 2011; Kesting et al., 2013; Hartley et al., 2014).

However, most of the established self-report questionnaires capture trait levels of paranoid ideation (Fenigstein and Vanable, 1992; Peters et al., 1999; Stefanis et al., 2002; Freeman et al., 2005). So far, state paranoia has often been assessed by adapting trait paranoia scales (e.g., Thewissen et al., 2008; Lincoln et al., 2009). Others have applied self-construed scales (Bodner and Mikulincer, 1998; Ellett et al., 2013), which were then used by other researchers (Ellett and Chadwick, 2007; Kingston and Ellett, 2014; Flower et al., 2015). Finally, Freeman et al. (2007) developed a State Social Paranoia Scale and demonstrated its convergent validity, test-retest reliability and internal consistency.

In our research, we have used a state-adapted version of the Paranoia Checklist (Freeman et al., 2005), in which the presence of each paranoid thought is rated on Likert scales according to the extent to which it applies "at the moment" (e.g., Lincoln et al., 2014a).

Good reliability and validity have been demonstrated for the Paranoia Checklist (Freeman et al., 2005) and its state-adapted version (Lincoln et al., 2009, 2012), indicating equal psychometric quality when compared to generic state paranoia scales (Freeman et al., 2007; Ellett et al., 2013). However, the state-adapted Paranoia Checklist has never been formally validated. Specifically, the sensitivity to change across different settings and in response to stressors and interventions, which is a critical component required

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to ensure valid assessment of state paranoia, has never been formally tested. In fact, neither the state-adapted Paranoia Checklist nor generic state paranoia scales have been formally validated in this way. Instead, currently used state paranoia scales have been developed ad hoc for a given experiment. Using such a scale for another experiment, however, bears some risk because the assumption that a state paranoia scale measures fluctuations in paranoia in different settings is based on successful detection of change in only one specific experiment. Undisputedly, it is a reasonable decision to use a scale that has been field-tested once before. However, now that there is an abundance of research on state paranoia using the Paranoia Checklist, it is possible to evaluate whether this scale is a valid measure for state paranoia – in terms of change-sensitivity – across different experimental settings and in different samples (e.g., population vs. patient samples).

For the Paranoia Checklist, such a validation is all the more warranted, given that it was originally developed to measure the prevalence of paranoid thoughts over long periods of time (with anchor points ranging from "rarely" over "once a month" to "at least once a day"). The Paranoia Checklist may comprise items that are non-sensitive to momentary fluctuations. If that is the case, true changes in state paranoia might be underestimated by a state-adapted Paranoia Checklist unless only a subset of change sensitive items is used.

Thus, we aimed to derive and validate a state-adapted Paranoia Checklist from its original item pool. We combined factor analysis with a meta-analytic approach and integrated data from thirteen studies, in which the state-adapted version of the Paranoia Checklist was used to assess changes in paranoid thoughts before and after an active/experimental or control intervention. Sensitivity to change was evaluated on single item basis, along the two criteria Lambert and colleagues (Lambert et al., 1996; Vermeersch et al., 2000) established for a clinical assessment scale: an item changes in the theoretically proposed direction following an intervention (criterion 1) and the change measured on an item is greater in individuals treated by an evidently effective intervention than in untreated individuals or individuals treated with a control intervention (criterion 2).

In a first step (item selection), we assessed both criteria for each item of the Paranoia Checklist using meta-analyses. Based on these results, we aimed to exclude all items that lacked sensitivity to change. Furthermore, we aimed to create a brief state Paranoia Checklist including items with the highest sensitivity to change. This version was derived for use in experimental or experience sampling research which requires parsimonious assessment. In a second step (scale validation), psychometric properties of these item selections were tested on a large hold-out sample. Moreover, a subset of studies from the item selection procedure was used to compare criterion validity of the abbreviated scales with the 18 item version. In a final step (ambulatory assessment pilot test), we collected new data in an ambulatory assessment study to test how much intra-individual variation is captured by the brief version.

2. Item selection

2.1. Methods

2.1.1. Source material and participants

Data for the analyses were derived from thirteen previous studies of the authors that used the state-adapted Paranoia Checklist in a repeated measure design. All of these studies included either a form of anxiety or stress induction assumed to increase paranoia or an intervention aimed at decreasing paranoia as well as measurement of state paranoia with the Paranoia Checklist prior to and after the induction/intervention. No further eligibility or quality criteria were imposed on the source material, since this study compared relative item effect sizes rather than trying to determine "true" effect sizes of a given variable. An exploratory literature search on PsycInfo (full text search for "Paranoia Checklist" and "state") yielded no further candidate studies. Data for this study were derived from the full datasets of these thirteen studies, which allowed for calculation of group means and standard deviations for each single item within each study.

An overview of the included studies with a total of 860 participants (of which $n=288$ were patients with psychosis), who completed the Paranoia Checklist in online ($n=279$) or laboratory studies ($n=581$), is shown in Table 1. The included studies were comprised of seven non-controlled pre-to-post designs (Lincoln et al., 2009, 2014a, 2014b; Moritz et al., 2011, 2014a, 2014b; Jung, 2012; Hartmann et al., 2013) and six pre-to-post-control designs (Lincoln et al., 2012; Roggenbuck, 2012; Kesting et al., 2013; Ascone, 2014; Moritz et al., 2015a, 2015b) consisting of an active intervention/experimental induction and a control condition. Only two clinical subsamples from a large correlational panel study ($N=1966$, Moritz et al., 2014a) were included because its full sample size exceeded the combined size of all other studies. This remaining sample ($n=1893$) served as a hold-out sample for scale validation.

2.1.2. Materials: Paranoia Checklist

The Paranoia Checklist comprises of 18 items, which include statements that range from tapping into mild persecutory ideas (e.g., "There might be negative comments being circulated about me") to more severe paranoid ideations (e.g., "There is a possibility of a conspiracy against me."). In its state-adapted version, participants indicate to what extent each item applies to them "at the moment". Participants provide their answers on Likert scales ranging from "not at all" to "very much". The majority of the studies used all 18 items of the Paranoia Checklist and a five point Likert scale as answer form. Three studies (Lincoln et al., 2012; Roggenbuck, 2012; Ascone, 2014) excluded one item from the scale based on low variance in participant responses ("I can detect coded messages about me in the press/TV/radio"), while a fourth study only used 5 items, which were assumed to be the most change sensitive (Hartmann et al., 2013). Furthermore, three studies changed the answer format to an eleven point Likert scale (Lincoln et al., 2012; Hartmann et al., 2013; Ascone, 2014).

2.1.3. Analyses

Item selection is based on the sensitivity to change over a variety of settings. In order to analyze the integrated sensitivity to change of each item, we conducted separate meta-analyses for all 18 items. We calculated standardized effect sizes based on item gain scores, gain score standard deviations and correlation of pre- and post-test item scores in each sample. All effect sizes were calculated in such a way that positive effect sizes indicated an effect in the expected direction. Effect sizes were integrated with random effects meta-analyses. To determine whether an item i fulfills criterion 1 (i.e., changes in the theoretically proposed direction following an intervention), we calculated the average effect size of pre-to-post (PP) change for each experimental and control sample (see formula 1), resulting in 28 samples for this comparison. To determine whether an item fulfills criterion 2 (i.e., higher change in an experimental group E compared to a control group C), meta-analyses of the pre-to-post-control (PPC) effect sizes were conducted. For the six PPC interventions included in these analyses, the effect sizes were based on mean gain scores and gain scores standard deviations of the treatment and control group (see formula 2, Lipsey and Wilson, 2000).