Remembering the link: Free-recall performance in individuals at risk for schizophrenia

Aslıhan İmamoğlu[1], Claudia Foubert[1], Chris Wahlheim[2], Stephanie Langella[1], Aysenil Belger[1], & Kelly Giovanello[1]
[1]University of North Carolina, Chapel Hill; [2]University of North Carolina, Greensboro

INTRODUCTION

• **Schizophrenia** is a mental disorder that affects approximately 1% of people worldwide[1].
• Cognitive changes, specifically **impairments of episodic memory**, are widespread in schizophrenia[2], as well as in first-degree relatives[3], who are at risk for developing the disorder (i.e. 10-16%)[4].
• Other risk factors include having a first-degree relative with **schizoaffective (SZA)** and/or **bipolar disorder (BP)**[5] (i.e. high-risk) and having **ADHD** and/or **anxiety disorders** (i.e. mid-risk)[6,7].
• Disruptions in **context-processing** may mediate these episodic memory changes[8].
• Prior studies have decomposed recall performance in schizophrenia patients and schizotypal individuals[9,10,11].
• To investigate the status of context processing and episodic memory impairments in high-risk individuals, we employed a free-recall task and decomposed free recall performance into measures of first recall probability, serial position functions, and inter-item response times.

HYPOTHESES

❖ We hypothesized that the high-risk group would demonstrate greater context deficits on the free recall task than the mid- and low-risk groups.
❖ Specifically, we hypothesized that recall deficits would be highest for the high-risk group, followed by the mid-risk and low-risk groups in a stepwise fashion.
❖ We expected lower first recall probability, depressed serial position functions, and longer interresponse times for the high-risk group.

METHODS

|| **Participants** Children and adolescents (N = 58; age range: 9-16) at varying risk factors for schizophrenia completed a 5-trial, free-recall task.

Risk Group	N	Age	Characteristics
High risk	16	13.7	Nonpsychotic first-degree relatives of people with a DSM-V diagnosis of schizophrenia, SZA, or BP.
Mid risk	22	13.9	Non-relatives with ADHD and/or an anxiety disorder.
Low risk	20	13.5	Non-relatives with ADHD/anxiety, DSM-V diagnosis, or family history with schizophrenia, SZA, or BP

|| **Test Procedure**

| 1 | Study Phase | Participants read aloud and memorized 10 words presented individually for 4 seconds on a computer screen. |
| 2 | Distraction Phase | Participants completed addition and subtraction problems for 30 seconds (e.g. 34 + 22 = ?). |
| 3 | Test Phase | Participants were given 60 seconds to recall as many words as they could in any order. |

|| **Measures**
• **First Recall Probability (FRP):** likelihood of initiating retrieval with the first list item.
• **Serial Position Function:** describes recall patterns (primacy & recency effects).
• **Interresponse Times (IRTs):** demonstrates response latency. Longer IRTs typically indicate impaired use of context to limit search time.

RESULTS

Correct Recall Summary Scores

M=4.8 (High), M=5.6 (Mid), M=6.0 (Low)

Note. * <.05

• Participants in different risk-groups significantly differed in the model-estimated probabilities for correct recall, $\chi^2(2) = 6.60$, $p = .036$. Pairwise comparisons demonstrated that high-risk participants recalled fewer words than low-risk participants, $t(55.1) = -2.55$, $p = .035$ while the mid-risk participants did not significantly differ from other groups ($ps > .05$).

RESULTS

First Recall Probability
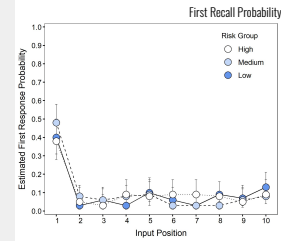
• Significant effect of input position, $\chi^2(9) = 256.67$, $p < .001$, showing all participants most often initiated recall from the first position.

• No significant Risk Group x Input Position interaction, $\chi^2(18) = 21.24$, $p = .267$, suggesting that differences in recall are not due differences in recall initiation.

Serial Position Curve
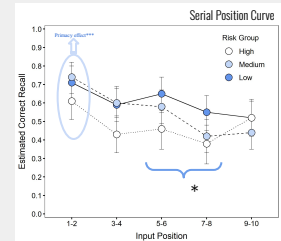
• Significant effect of Input Position, $\chi^2(4) = 69.28$, $p < .001$, showing primacy effects for all risk groups.

• Significant Risk Group x Input Position interaction, , $\chi^2(8) = 17.55$, $p = .025$, displaying that largest group differences are between the high- and low-risk groups in the intermediate positions.

Note. *** <.001, ** <.01, * <.05.

Inter-item Response Times
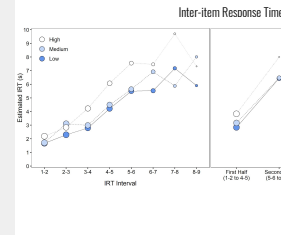
• Significant effect of IRT Intervals, $\chi^2(7) = 166.05$, $p < .001$, showing all participants got progressively slower throughout the recall period.

• No significant Risk Group x IRT Interval interaction, $\chi^2(14) = 9.41$, $p = .80$, indicating participants in different risk groups did not differ on context use to limit search time.

DISCUSSION

• These results demonstrate context processing deficits in high risk, first-degree relatives.
• **First recall probabilities** indicate that high-risk participants do not initiate recall differently than mid- and low-risk participants.
• Differences in **serial position curves** suggest that context processing deficits seen in high-risk individuals are more prominent towards the middle of the recall period.
• Participants from all risk groups showed progressively slower IRTs across recall period, suggesting that participants did not differ in their use of context to limit search time.
• However, it is plausible that our final sample was not powered enough to detect an effect in FRPs and IRTs.
• Future research could utilize tasks that require less contextual processing to further expand on our findings.

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