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Unusual scaling in a discrete quantum walk with random long range steps

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Highlights:

- A quantum walk with random step length on a line is considered.
- The results show the behaviour $\langle x^2 \rangle \propto t^{3/2}$.
- Two quantities characterizing the decoherence are defined which vanish in a power law manner close to the non-random limit.
- In contrast, quantum walks with periodically varying step lengths show conventional scaling behaviour.