

Peer Community in Registered Reports: Stage 1 Snapshot

1. **Provisional title.** *Working memory performance in adverse environments: Enhanced, impaired, or intact?*
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3. **Field and keywords.** *Field: Cognitive development. Keywords: working memory; adversity; deficits; adaptations*
4. **Research question(s) and/or theory.** *Adversity (i.e., prolonged exposure to intense stress) significantly impacts working memory (WM)—a system for mentally building, maintaining, and updating immediately relevant information. The predominant deficit literature has focused on impairments in WM capacity, suggesting that people with more adversity exposure struggle to keep multiple pieces of information simultaneously available for further processing¹. However, while overall WM capacity might be lowered, there is emerging, albeit mixed, evidence suggesting that adversity enhances the ability to rapidly update information in WM^{2,3}. This is considered an adaptive ability that allows people to maintain an up-to-date overview of an unpredictable environment. Despite WMs complexity and diverse functions in everyday life, the association between adversity and WM is often studied by focusing on a narrow aspect of WM using one or a small set of tasks (e.g., n-back, complex span). This approach cannot account for the fact that every WM task requires the coordination of different processes, some of which may be enhanced and some of which may be impaired by adversity. For example, updating tasks also tax WM capacity, as people must hold information available until it is time to update it. This could lead us to underestimate—or altogether miss—ways in which adversity enhances WM. Here, we take a psychometric modeling approach to 1) get a reliable estimate of WM capacity from different sources, and 2) measure WM updating after accounting for overall capacity. **RQ1:** How does adversity relate to WM capacity? **RQ2:** How does adversity relate to WM updating after accounting for WM capacity? **RQ3:** Are these associations different for exposure to threat versus deprivation?*
5. **Hypotheses (where applicable).** *We expect adversity to be negatively associated with WM capacity. We expect adversity to be positively associated with WM updating after accounting for WM capacity.*
6. **Study design and methods.** *Data are collected online in Oct/Nov 2023 via the Dutch LISS panel but made available to the authors by LISS only after Stage 1 acceptance. We recruit 800 members between ages 20-55 from a representative sample for the Dutch population, oversampling for low socioeconomic backgrounds. First, participants complete two WM capacity tasks (Ospan and Rspan), and a task measuring both WM binding and updating. Second, they fill out questions about current and past (< age 18) levels of neighborhood violence and material deprivation. We will also leverage archived LISS measures of threat and deprivation exposure.*
7. **Key analyses that will test the hypotheses and/or answer the research question(s).** *We will use structural equation modeling to get latent estimates of WM capacity and updating. All manifest measures will load on a single latent WM capacity factor, reflecting the fact that WM capacity plays a role across all WM tasks. An additional latent factor will capture unique updating variance (i.e., variance unrelated to WM capacity). We will estimate the effect of adversity (threat and deprivation) on overall WM capacity and residual updating ability. We also assess the effect of adversity on residual variance in the WM capacity measures (Rspan, Ospan, and binding), to see if specific WM capacity tasks have unique features (e.g., content) that people from adversity struggle with more. We will test for intact performance through two one-sided tests (TOST) equivalence tests.*
8. **Conclusions that will be drawn given different results.** *For each ability, we could find either lowered, improved, or intact performance in relation to adversity, with different implications for deficit and adaptation theories. First, lowered performance on any WM ability would be consistent with deficit theories but inconsistent with adaptation theories. From an adaptation perspective, enhanced WM capacity would be surprising, as these researchers have previously used these frameworks to predict worse WM capacity¹. Third, intact performance would not be consistent with either theory, as it would suggest that the ability is unaffected by adversity.*
9. **Key references.** 1. Noble et al. (2007) <https://doi.org/10.1111/j.1467-7687.2007.00600.x> 2. Young et al. (2018) <http://dx.doi.org/10.1037/pspi0000124> 3. Frankenhuis et al. (2020) <https://doi.org/10.1016/j.tics.2020.03.007>