Supporting Information

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Table S1. Simple WM

Task and conditions	*N*	MUI	Metric	Refs.	Finding
Change detection task, no distractor trials, across target load (2, 4, 6, 8)	19 HMMs, 22 LMMs	MUQ	K	6	No ME grp
•Target load 2 only					•HMMs numerically lower
Change detection task, no distractor trials, across target load (2, 4, 6, 8)	13 HMMs	MUQ	K	13, Exp. 1	No ME grp
•Target load 2 only	10 LMMs				•HMMs numerically lower
Change detection task, no distractor trials, across target load (2, 4, 6, 8)	18 HMMs	MUQ	K	13, Exp. 2	No ME grp
•Target load 2 only	12 LMMs				•HMMs numerically lower
Change detection task, across distractors (0, 2, 4, 6), target load 2	139 total	MUQ	K or d′	11, rectangles task	**ME grp: HMMs lower**
•No distractor trials	36 HMMs, 36 LMMs				•HMMs numerically lower *Neg corr with MMI and d′*
Change detection task, across distractors (0, 2, 4, 6), target load 2	139 total	MUQ	K or d′	11, objects task	**ME grp: HMMs lower**
•No distractor trials	36 HMMs, 36 LMMs				•HMMs lower *Neg corr with MMI and d′*
Change detection task, across distractors (0, 2, 4, 6), target loads 2, 4, 6, 8	60 total 12 HMMs, 20 LMMs	MUQ	d′	14	**ME grp: HMMs lower**
Change detection task, across distractor (0, 2, 4, 6), target load 2	13 HMMs, 10 LMMs	MUQ	K	13, Exp. 1	**ME grp: HMMs lower**
Change detection task, across distractor (0, 2, 4, 6), target load 4	13 HMMs, 10 LMMs	MUQ	K	13, Exp. 1	No ME grp
Change detection task, across distractor (0, 2, 4, 6), target load 6	13 HMMs, 10 LMMs	MUQ	K	13, Exp. 1	No ME grp
Change detection task, across distractor (0, 2, 4, 6), target load 2	18 HMMs, 12 LMMs	MUQ	K	13, Exp. 2	*HMMs numerically lower*
Change detection task, across distractor (0, 2, 4, 6), target load 4	18 HMMs, 12 LMMs	MUQ	K	13, Exp. 2	No ME grp
Change detection task, across distractor (0, 2, 4, 6), target load 6	18 HMMs, 12 LMMs	MUQ	K	13, Exp. 2	No ME grp
Change detection task, across distractor (2, 10), target load 2	22 HMMs, 20 LMMs	MUQ	IES (d′, RT combined)	12	*ME grp: HMMs less efficient*

For all tables effects in bold surpass threshold for significance; effects in italics represent trends; effects in color but not bold represent numerical differences that do not pass threshold for significance. Effects in blue represent where HMMs underperform LMMs; red represents the opposite. Bulleted tests denote nonindependent subtests of the superordinate test. acc, accuracy; FA, false alarm; grp, group; intxn, interaction; ME, main effect; MUI, Media Use Instrument; MUQ, Media Use Questionnaire of ref. 6; neg corr, negative correlation; n.s., not significant. Note that, for the change detection task, Table S1 reports only main effects of group (to assess simple WM differences between groups); interactions between group and distractor load are reported below, in Table S4 (as these interactions assess filtering differences).

Table S2. Complex WM

Task and conditions	N	MUI	Metric	Refs.	Finding
AX-CPT without distractors, AX trials	15 HMMs, 15 LMMs	MUQ	d' or RT	6	No ME grp
AX-CPT without distractors, AX trials	60 total 12 HMMs, 20 LMMs	MUQ	IES	14	ME grp: HMMs less efficient
OSPAN	277 total	MUQ	acc	15	Neg corr with MMI
Automated Reading Span	221 total 33 HMMs, 36 LMMs	MUQ	acc	16	No ME grp
N-back (2- and 3-back)	15 HMMs, 15 LMMs	MUQ	d'	6	Grp*load intxn; HMMs worse on 3-back
N-back (2- and 3-back)	60 total 12 HMMs, 20 LMMs	MUQ	IES	14	ME grp: HMMs worse, no intxn
N-back (2- and 3-back)	13 HMMs, 10 LMMs	MUQ	d'	13, Exp. 1	No ME grp, no intxn
N-back (2- and 3-back)	17 HMMs, 9 LMMs	MUQ	d'	13, Exp. 2	No ME grp, no intxn
N-back (2- and 3-back)	265 total	MUQ and modified MUQ	d', omissions	17	Neg corr with MMI and d', Pos corr with MMI and omissions
N-back (2-, 3-, and 4-back)	94 total 19 HMMs, 13 LMMs	MUQ	d'	18	No ME grp, no intxn Null corr with MMI and d'
Backward digit span	22 HMMs, 20 LMMs	MUQ	acc	12	No ME grp

Table S3. Simple and complex WM in adolescents

Task and conditions	N	MUI	Metric	Refs.	Finding
N-back •0-back •1-back •2-back •3-back	74 total	Modified MUQ	Hits - FAs	20	Neg corr with MMI •Neg corr with MMI •n.s. neg corr with MMI •Neg corr with MMI •Neg corr with MMI
Count span	74 total	Modified MUQ	acc	20	Neg corr with MMI
Digit span (across forward and backward)	523 total 51 HMMs, 53 LMMs	Modified tween MUQ	Combined acc	19	n.s. neg corr with MMI, no ME grp

Table S4. Managing interference: Filtering

Task and conditions	N	MUI	Metric	Refs.	Finding
Change detection task, across distractors (0, 2, 4, 6), target load 2	19 HMMs, 22 LMMs	MUQ	K	6	Grp*distractor load intxn, with HMMs more affected by load
Change detection task, across distractors (0, 2, 4), target load 4	19 HMMs, 22 LMMs	MUQ	K	6	No grp*distractor load intxn
Change detection task, across distractors (0, 2), target load 6	19 HMMs, 22 LMMs	MUQ	K	6	No grp*distractor load intxn
Change detection task, across distractors (0, 2, 4, 6), target load 2	60 total 12 HMMs, 20 LMMs	MUQ	K	14	Numerical grp*distractor load intxn, with HMMs more affected by load
Change detection task, across distractors (2, 10), target load 2	22 HMMs, 20 LMMs	MUQ	IES	12	No grp*distractor load intxn
Change detection task, across distractors (0, 2, 4, 6), target load 2	139 total 36 HMMs, 36 LMMs	MUQ	K or d′	11, rectangles task	No grp*distractor load intxn
Change detection task, Across Distractors (0, 2, 4, 6), Target load 2	139 total 36 HMMs, 36 LMMs	MUQ	K or d′	11, objects task	No grp*distractor load intxn
Change detection task, across distractors (0, 2, 4, 6), target load 2	13 HMMs, 10 LMMs	MUQ	K	13, Exp. 1	No grp*distractor load intxn
Change detection task, across distractors (0, 2, 4, 6), target load 4	13 HMMs, 10 LMMs	MUQ	K	13, Exp. 1	Grp*distractor load intxn, with LMMs falling to HMM perf at high load
Change detection task, across distractors (0, 2, 4, 6), target load 6	13 HMMs, 10 LMMs	MUQ	K	13, Exp. 1	No grp*distractor load intxn
Change detection task, across distractors (0, 2, 4, 6), target load 2	18 HMMs, 12 LMMs	MUQ	K	13, Exp. 2	No grp*distractor load intxn
Change detection task, across distractors (0, 2, 4, 6), target load 4	18 HMMs, 12 LMMs	MUQ	K	13, Exp. 2	No grp*distractor load intxn
Change detection task, across distractors (0, 2, 4, 6), target load 6	18 HMMs, 12 LMMs	MUQ	K	13, Exp. 2	No grp*distractor load intxn
AX-CPT with vs. without distractors, AX and BX trials	15 HMMs, 15 LMMs	MUQ	RT	6	Grp*distractor intxn, with HMMs more affected by distraction
AX-CPT with distractors, AX trials	15 HMMs, 15 LMMs	MUQ	RT	6	ME grp: HMMs slower
AX-CPT with distractors, BX trials	15 HMMs, 15 LMMs	MUQ	RT	6	ME grp: HMMs slower
AX-CPT with distractors	60 total 12 HMMs, 20 LMMs	MUQ	IES	14	ME grp: HMMs less efficient No grp*distractor intxn
AX-CPT with distractors, AX trials	13 HMMs, 10 LMMs	MUQ	RT	13, Exp. 1	No ME grp
AX-CPT with distractors, BX trials	13 HMMs, 10 LMMs	MUQ	RT	13, Exp. 1	ME grp: HMMs slower
AX-CPT with distractors, AY trials	13 HMMs, 10 LMMs	MUQ	RT	13, Exp. 1	No ME grp
AX-CPT with distractors, BY trials	13 HMMs, 10 LMMs	MUQ	RT	13, Exp. 1	ME grp: HMMs slower
AX-CPT with distractors, AX trials	18 HMMs, 12 LMMs	MUQ	RT	13, Exp. 2	ME grp: HMMs slower
AX-CPT with distractors, BX trials	18 HMMs, 12 LMMs	MUQ	RT	13, Exp. 2	No ME grp: HMMs numerically slower
AX-CPT with distractors, AY trials	18 HMMs, 12 LMMs	MUQ	RT	13, Exp. 2	No ME grp
AX-CPT with distractors, BY trials	18 HMMs, 12 LMMs	MUQ	RT	13, Exp. 2	No ME grp
Sentence comprehension while ignoring distracting sentences in another modality	149 total	Tween MUQ	acc	21	Neg corr with absolute time spent MM, and trend MMI*distraction
Pip-and-pop	10 HMMs, 9 HMMs	MUQ	acc	24	ME grp: HMMs less likely to filter covertly diagnostic info
Flanker (arrows)	22 HMMs, 20 LMMs	MUQ	IES	12	ME grp: HMMs worse
Flanker (letter)	28 HMMs, 28 LMMs	Modified MUQ	RT, acc, IES	26	No ME grp on RT, acc, or IES

Table S5. Managing interference: Proactive interference

Task and conditions	N	MUI	Metric	Refs.	Finding
N-back (2- and 3-back), FA rate	15 HMMs, 15 LMMs	MUQ	FA rate across task	6	HMMs FA'd more in 3- vs. 2-back, and effect increased across task
Additional singleton	21 HMMs, 21 LMMs	MUQ	RT	27	HMMs more primed by color singleton if encountered on n-1 trial (grp*trial position intxn)
Recent probes	27 HMMs, 26 LMMs	MUQ	RT and acc	16	No ME grp; no intxn

Table S6. Managing interference in adolescents

Task and conditions	N	MUI	Metric	Refs.	Finding
Visuospatial WM probe (2 targets, 0 or 2 distractors)	74 total	Modified MUQ	acc	20	No MMI*distractor intxn
Flanker arrows	523 total	Modified tween MUQ	RT	19	*Grp*interference intxn*
●Incongruent trials	51 HMMs, 53 LMMs				●HMMs faster

Table S7. Attention

Task and conditions	N	MUI	Metric	Refs.	Finding
Metronome response task	73 total	MUQ	RT variability	29, Exp. 1	MMI neg corr with sustained attention
Metronome response task	146 total	MUQ	RT variability	29, Exp. 3a	MMI neg corr with sustained attention
SART	109 total	MUQ	A′	29, Exp. 4	MMI neg corr with sustained attention (attenuated to trend when accounting for age)
ANT	22 HMMs, 20 LMMs	MUQ	Alerting, orienting, executive	16	No ME grp on any measure
Posner spatial cueing paradigm, dual-cue variant	33 HMMs, 33 LMMs	MUQ	RT	30	MMI neg corr with speed, further slowed when probe appeared outside cued location

Table S8. Managing task goals: Task switching

Task and conditions	N	MUI	Metric	Refs.	Finding
Number–letter task switch, unpredictable switching	15 HMMs, 15 LMMs	MUQ	RT switch cost	6	ME grp: HMMs greater switch cost
Number–letter task switch, unpredictable switching	13 HMMs, 10 LMMs	MUQ	RT switch cost	13, Exp. 1	ME grp: HMMs greater switch cost
Number–letter task switch, unpredictable switching	19 HMMs, 11 LMMs	MUQ	RT switch cost	13, Exp. 2	HMMs numerically greater switch cost
Number–letter task switch, unpredictable switching	80 total 20 HMMs, 20 LMMs	MUQ	RT switch cost	31, Exp. 1	ME grp: HMMs smaller switch cost
Number–letter task switch, unpredictable switching	49 total 13 HMMs, 13 LMMs	MUQ	RT switch cost	31, Exp. 2	ME grp: HMMs smaller switch cost
Number–letter task switch, unpredictable switching	221 total 33 HMMs, 36 LMMs	MUQ	RT switch cost	16, Exp. 1	No ME grp
Number–letter task switch, unpredictable switching	60 total 12 HMMs, 20 LMMs	MUQ	RT switch cost (IES)	14	No ME grp
Number–letter/Animal–furniture/Plant–transportation task switch, unpredictable switching	142 total 35 HMMs, 35 LMMs	MUQ	RT switch cost	32	No ME grp; MMI positively related with task set reconfiguration speed
Number–letter task switch, predictable switching	22 HMMs, 20 LMMs	MUQ	RT switch cost	16, Exp. 3	No ME grp
Number task switch (odd/even or >5/<5), predictable switching	22 HMMs, 20 LMMs	MUQ	RT switch cost (IES)	12	No ME grp
●No attention training HMMs vs. LMMs			●Overall RT		●HMMs overall less efficient

Table S9. Managing task goals: Dual tasking

Task and conditions	N	MUI	Metric	Refs.	Finding
Composing essays while solving anagrams	75 total	MUQ	acc	33	Null corr with MMI
Number–letter dual task	80 total 20 HMMs, 20 LMMs	MUQ	RT	31, Exp. 1	No ME grp, null corr with MMI
Sentence comprehension in multiple modalities	149 total	Tween MUQ	acc	21	Null corr with MMI

Table S10. Managing task goals in adolescents

Task and conditions	N	MUI	Metric	Ref.	Finding
Dots–triangles switching task	523 total 51 HMMs, 53 LMMs	Modified tween MUQ	acc	19	No ME grp, null corr with MMI

Table S11. Inhibitory control

Task and conditions	N	MUI	Metric	Refs.	Finding
SART, impulsivity variant	76 total	MUQ	RT and errors	29, Exp. 2	Null corr with MMI on errors or RT
SART, impulsivity variant	143 total	MUQ	RT and errors	29, Exp. 3b	Neg corr with MMI and accuracy (higher MMI shows more errors); n.s. when controlling for age and RT
SART, impulsivity variant	22 HMMs, 20 LMMs	MUQ	IES	12	ME grp: HMMs less efficient
Stop-signal task	19 HMMs, 22 LMMs	MUQ	acc	6	No ME grp
Delay discounting task	206 total 23 HMMs	MUQ	K	37, Exp. 2	Neg corr with MMI and delay of gratification (higher MMI shows less delay of gratification) ME grp: HMMs display higher discounting rates
Go/no-go task	20 LMMs, 28 HMMs 28 LMMs	Modified MUQ	RT and errors	26	No ME grp (although observed grp differences between LMM/HMM and intermediate MM)

Table S12. Relational reasoning

Task and conditions	N	MUI	Metric	Refs.	Finding
RPM, standard version	221 total 33 HMMs, 36 LMMs	MUQ	acc	16, Exp. 1	ME grp: HMMs worse
RPM, advanced version	27 HMMs, 30 LMMs	MUQ	acc	16, Exp. 2	ME grp: HMMs worse; attenuated to trend when controlling for motor impulsivity
RPM, advanced version	27 HMMs, 30 LMMs	MUQ	RT	16, Exp. 2	ME grp: HMMs slower; n.s. when controlling for motor impulsivity
RPM	142 total	MUQ	acc	32	Neg corr with MMI

Table S13. Explicit and implicit LTM

Task and conditions	N	MUI	Metric	Refs.	Finding
Explicit recognition memory test, target objects	139 total 36 HMMs, 36 LMMs	MUQ	d′	11, objects task	ME grp: HMMs worse
Explicit recognition memory test, distractor objects	139 total 36 HMMs, 36 LMMs	MUQ	d′	11, objects task	HMMs numerically worse
Implicit contextual cueing task	94 total 19 HMMs, 13 LMMs	MUQ	RT benefit over time	18	ME grp: HMMs worse (did not benefit from contextual cueing) Neg corr with MMI

Table S14. LTM in adolescents

Task and conditions	N	MUI	Metric	Ref.	Finding
Implicit weather prediction task	74 total	Modified MUQ	acc	20	Null corr with MMI