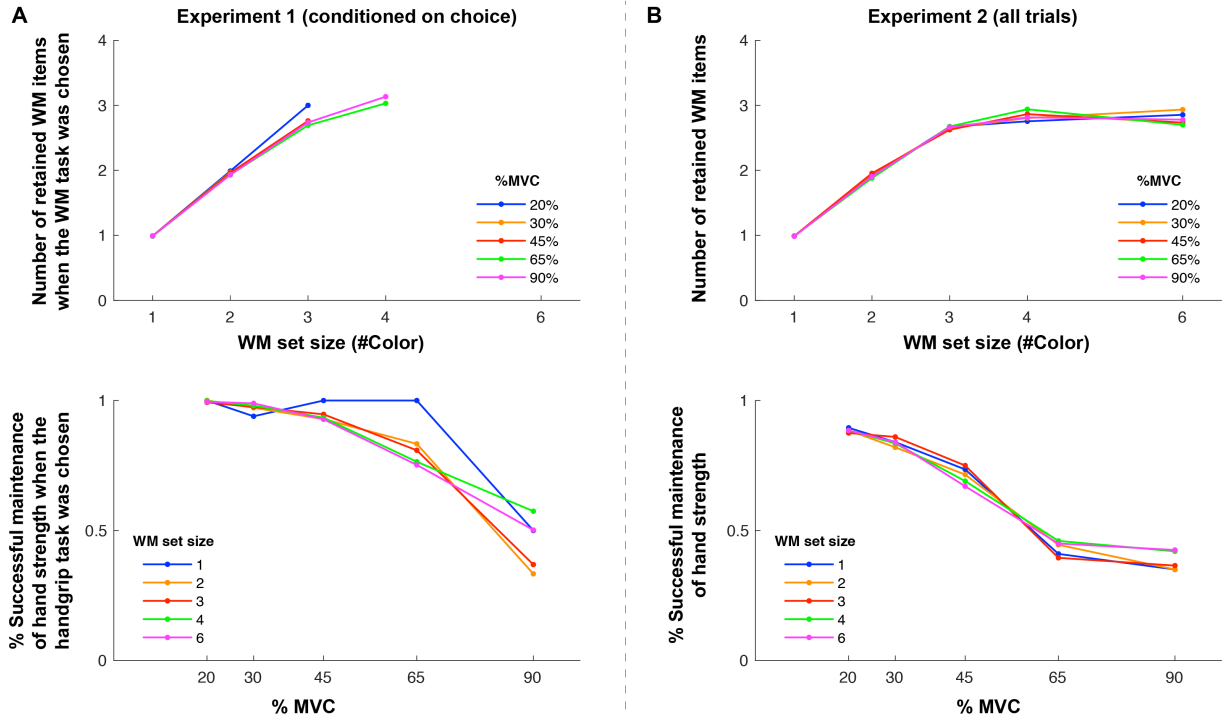**Supplementary Information**
(starting from the next page)

Supplementary Figure S1. Participants' performance in the WM and handgrip tasks across different task loads. (**A**) Participants' task performance conditioned on their choice in Experiment 1. As discussed in the main text, because participants' task performance is not independent of one's choice, we do not have sufficient data under certain task loads (e.g., high WM set sizes) to reliably measure task performance. Therefore, a compound measure of overall task accuracy regardless of which task one has chosen (Figure 3A) may be more appropriate to capture the overall behavioral performance in Experiment 1. (**B**) Participants' task performance across task loads in Experiment 2. Because participants were required to perform both tasks on each trial regardless of the task load combinations, we can obtain a better (or purer) estimate of task performance in Experiment 2. We have observed no significant interaction of task loads on task performance across modalities (see main text). We suspect that our randomized task order with some temporal separation between tasks could attenuate the competition between tasks, which is in contrast to the concurrent task design in Experiment 3.
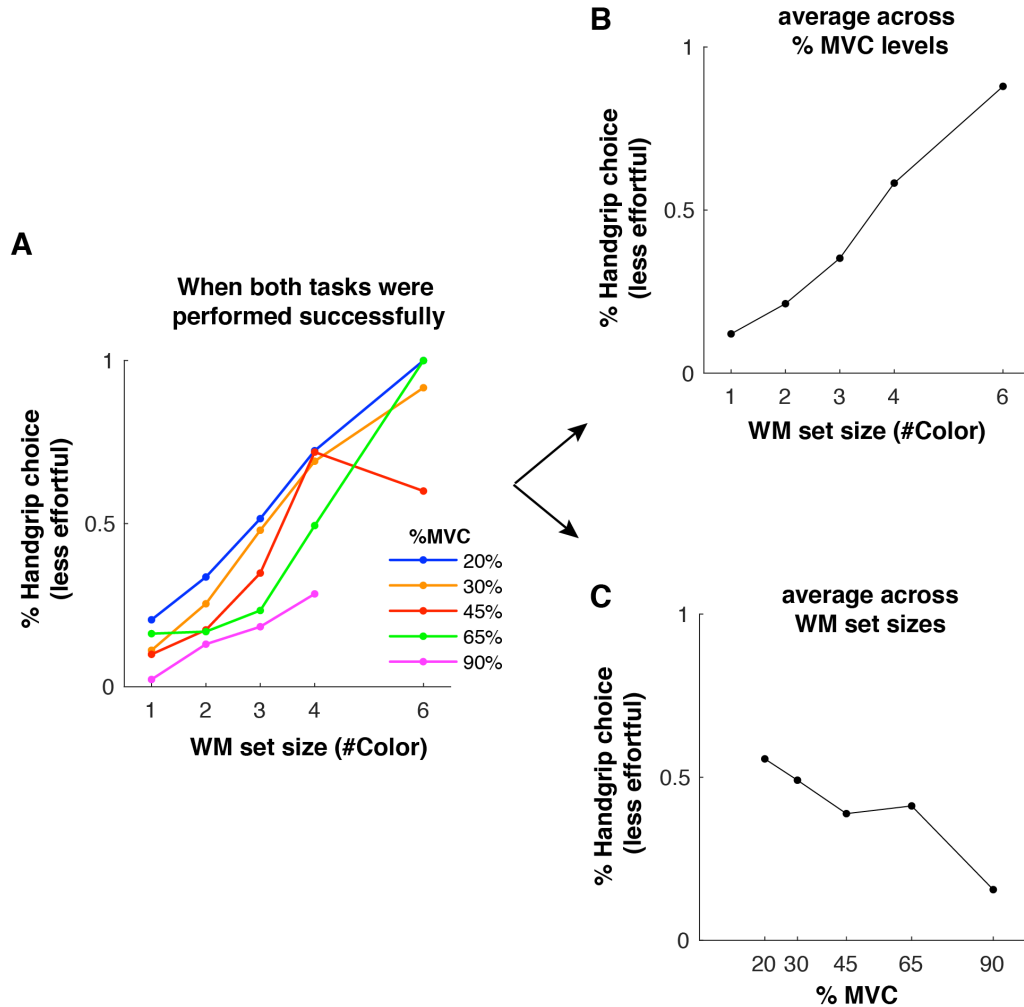
Supplementary Figure S2. **Participants' choice preference in Experiment 2 conditioned on correct responses for both handgrip and WM tasks** (**A**) Participants' choice preferences systematically varied based on task loads. (**B**) On average, participants would consider the handgrip task as less effortful, while the WM task as more effortful, when WM set size increases. (**C**) Conversely, when the physical load increases, participants would consider the handgrip task as more effort. Therefore, they are less likely to think that the handgrip task is easier as %MVC increases (to match the y-axis in **Figure 3B** of Experiment 1). Note, when the %MVC and WM set size reach the highest levels (i.e., 90% MVC paired with set size 6), participants rarely performed ***both*** tasks correctly on the same trials, although they could achieve correct performance for high cognitive or physical loads occasionally in different trials during the experiment.

Supplementary Table S1. **Measurement of MVC across Study Samples**

	Experiment 1			**Experiment 2**			**Experiment 3**		
	mean	s.e.m.	*n*	mean	s.e.m.	*n*	mean	s.e.m	*n*
all participants	127.45	8.63	40	121.28	10.44	20	124.53	8.75	20
male	173.78	12.85	16	159.97	26.28	5	176.96	25.23	4
female	96.55	5.92	24	108.38	9.17	15	111.43	5.67	16
male vs. female	t(36) = 6.07, p < .0001			t(18) = 2.39, p = 0.028			t(18) = 4.02, p = 0.0008		

Note: s.e.m. = standard error of the mean, which is the standard deviation of a measure divided by the square root of sample size (*n*). Across experiments, we obtained highly consistent mean estimates of MVC in our samples based on the hand dynamometer used in the current study (120 to 125 *Newton*). Furthermore, we consistently found that male participants have a higher MVC, as compared with female participants. These results suggest that the current measurement protocol can produce reliable estimates of MVC across individuals at the study level.