Supplemental materials for "Detecting mediation effects with the Bayes factor: Performance evaluation and tools for sample size determination"

Table S1, Figure S1, and Figure S2 show the results with varied design prior odds for path α while fixing the design prior odds for path β as 1. Table S1 is parallel to Table 2 of the main text, where the sample size is 50. Figure S1 and Figure S2 are parallel to Figure 1 and Figure 2 of the main text, respectively, which present the results of the mediation Bayes factor with varied sample sizes.

Figure S3, Figure S4, Figure S5, and Figure S6 display the results of the true negative and false negative rates of the Bayes factor for testing mediation effects under varied sample sizes. The results were obtained with the absolute cutoff defining approach, where a Bayes factor value smaller than 1/3 is interpreted as support for the null hypothesis. Specifically, in Figure S3 and Figure S4, the design prior odds values for path α are varied while that for path β is fixed at 1; in Figure S5 and Figure S6, the design prior odds values for path β are varied while that for path α is fixed at 1.

Table S1

Probabilities of the mediation Bayes factors (BFs) supporting the presence of mediation correctly (i.e., true positive rates), cutoffs relative to 5% probabilities of supporting the presence of mediation incorrectly (i.e., 5% false positive rates), and false positive rates with the cutoff value 3. The sample size was 50.

	BF cutoff: Relative				BF cutoff: 3				Joint-significance test	
Design prior odds	True positive rates		Cutoffs for 5% false positive rates		True positive rates		False positive rates		Power	Type I error rate
	BF^{med}		BF^{med}		BF^{med}		BF^{med}			
$PriorOdds^{\beta} = 1$	[design]	[default]	[design]	[default]	[design]	[default]	[design]	[default]		
$PriorOdds^{\alpha}$	True effect size: $\alpha = 0.14, \beta = 0.59$									
0.01	0.23	0.26	1.92	2.36	0.15	0.20	0.02	0.03	0.16	0.02
0.33	0.24	0.27	2.08	2.30	0.17		0.03	0.03		0.02
1	0.29	0.29	2.10	2.10	0.20		0.03	0.03		0.02
3	0.40	0.35	2.43	1.77	0.32		0.03	0.02		0.02
100	**0.96**	**0.45**	2.06	1.37	**0.94**		0.03	0.01		0.01
	True effect size: $\alpha = 0.59, \beta = 0.14$									
0.01	**0.97**	**0.89**	1.30	1.12	**0.92**	0.26	0.02	0.01	0.15	0.01
0.33	0.50	0.44	3.56	1.83	0.63		0.07	0.02		0.01
1	0.29	0.29	2.65	2.65	0.26		0.04	0.04		0.02
3	0.21	0.22	2.16	3.59	0.15		0.03	0.07		0.03
100	0.16	0.16	1.88	4.71	0.10		0.03	0.11		0.05
	True effect size: $\alpha = 0.14, \beta = 0.14$									
0.01	**0.17**	**0.16**	1.23	1.07	**0.07**	0.02	0.02	0.01	0.03	0.01
0.33	0.15	0.14	1.28	1.13	0.04		0.01	0.01		0.01
1	0.13	0.13	1.17	1.17	0.02		0.01	0.01		0.01
3	0.13	0.12	1.26	1.24	0.03		0.01	0.01		0.01
100	0.16	0.10	1.85	1.34	0.10		0.03	0.01		0.01
	True effect size: $\alpha = 0.39, \beta = 0.39$									
0.01	**0.81**	**0.76**	1.72	1.90	**0.70**	0.63	0.02	0.02	0.55	0.02
0.33	0.68	0.73	2.95	2.11	0.68		0.05	0.03		0.02
1	0.68	0.68	2.52	2.52	0.63		0.04	0.04		0.03
3	0.67	0.65	2.39	2.77	0.61		0.03	0.04		0.03
100	0.71	0.58	2.18	3.52	0.65		0.03	0.06		0.03
	True effect size: $\alpha = 0.59, \beta = 0.59$									
0.01	**0.98**	**0.98**	1.99	2.38	**0.97**	0.97	0.03	0.03	0.94	0.03

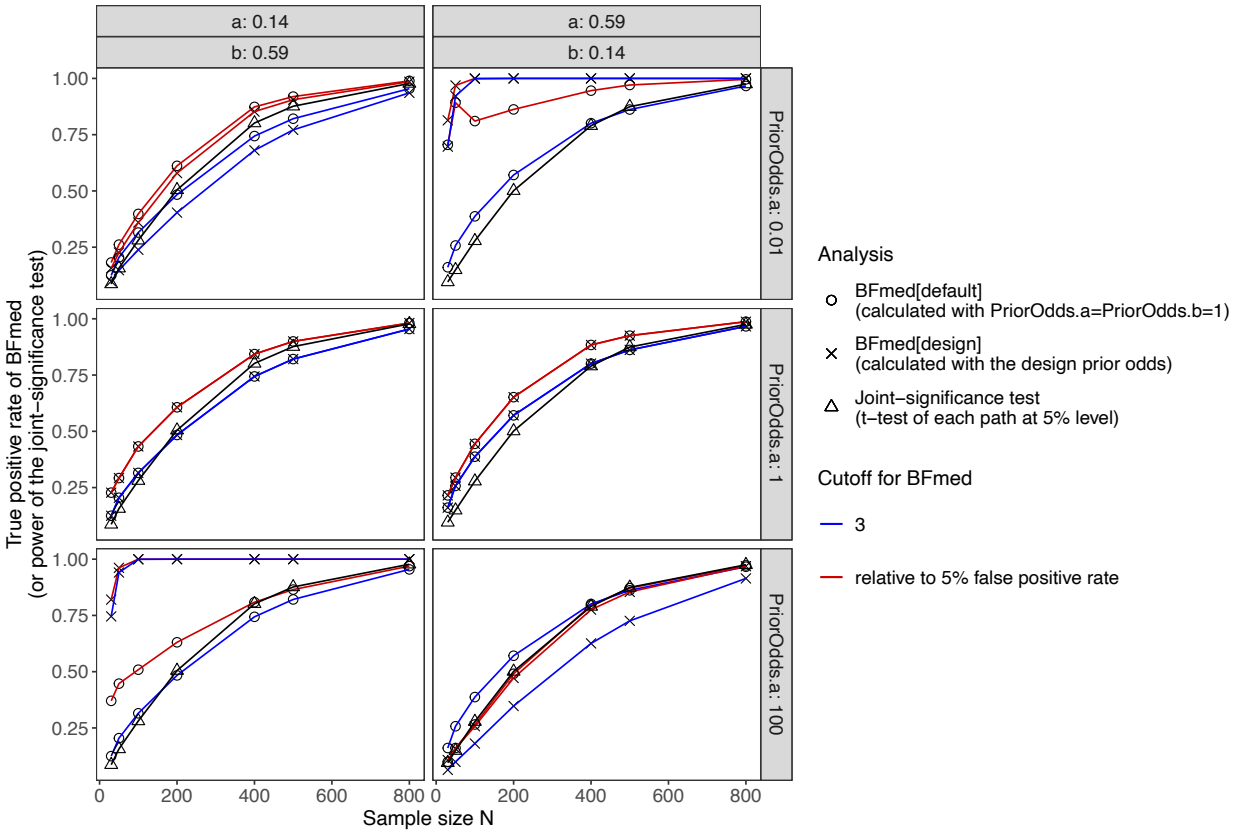
Table S1—Continued.

0.33	0.96	0.97	4.12	2.96	**0.97**	0.10	0.05	0.03
1	0.96	0.96	3.38	3.38	**0.97**	0.06	0.06	0.03
3	0.95	0.95	3.34	4.02	0.96	0.06	0.08	0.04
100	0.96	0.94	2.14	4.74	0.94	0.04	0.11	0.05

Note. BF^{med} [design]: mediation BF calculated with the design (i.e., data-generation) prior odds. BF^{med} [default]: mediation BF calculated with the prior odds for either path specified as 1. In the joint-significance test, the absence of mediation was rejected if the test of path α and the test of path β both had p-values smaller than 5%. In the data generation, $\tau' = 0$. Under each true effect size combination, the highlighted values are the highest true positive rates.

Figure S1

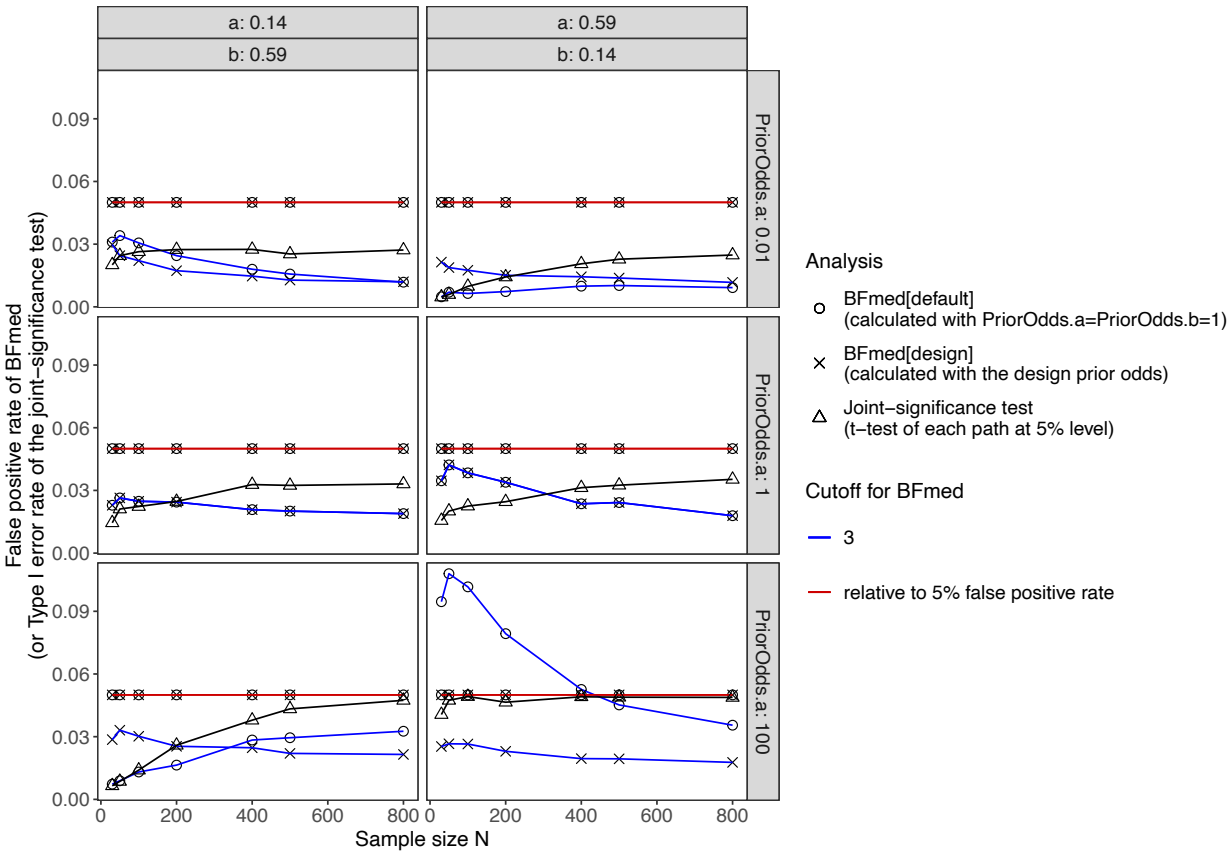
True positive rates of the mediation Bayes factors or power of the joint-significance test as functions of sample sizes. The design (i.e., data-generation) prior odds of path β was 1 and that of path α was 0.01, 1, or 100.



Note. b = path β. a = path α. PriorOdds.a = Prior odds of path α. PriorOdds.b = Prior odds of path β. The coefficient of treatment in the outcome model was $\tau' = 0$.

Figure S2

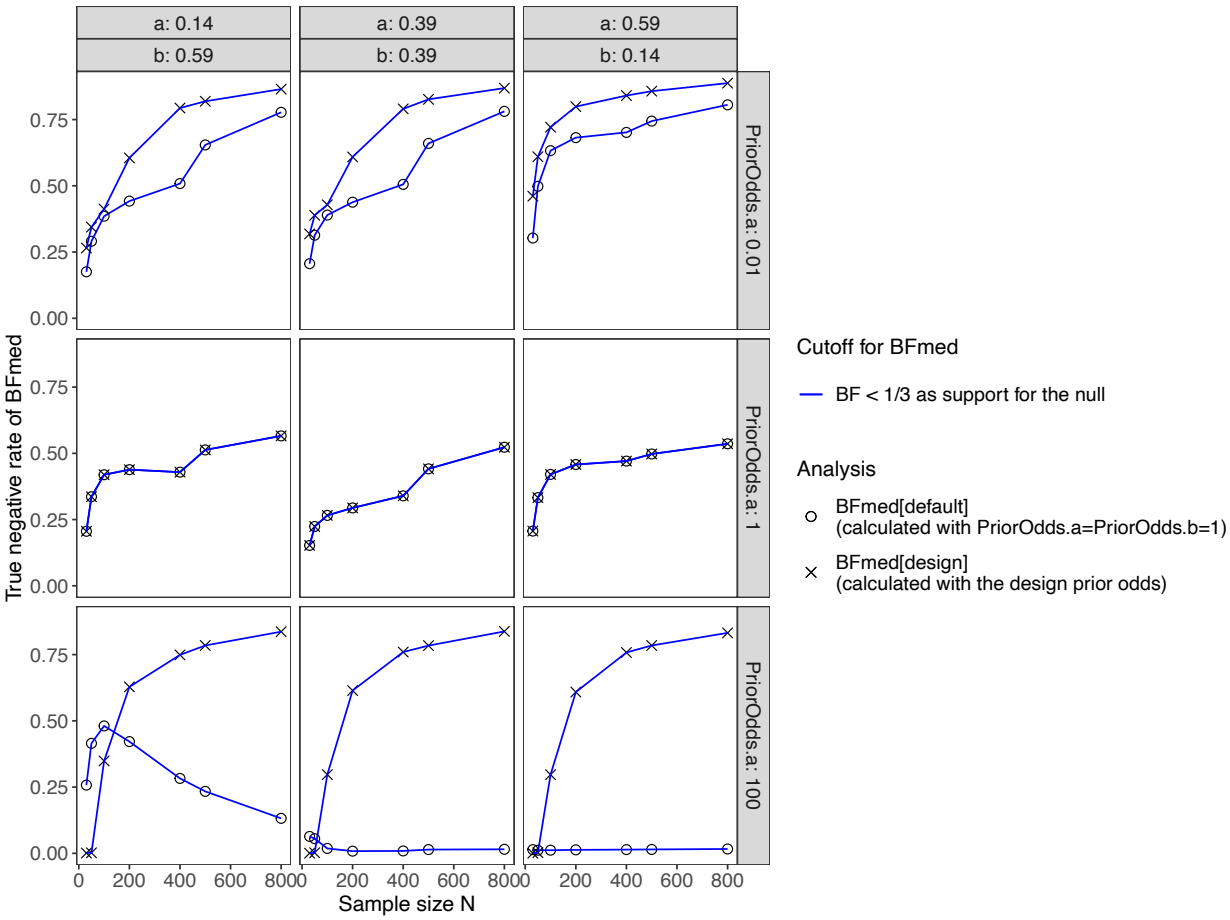
False positive rates of the mediation Bayes factors or power of the joint-significance test as functions of sample sizes. The design (i.e., data-generation) prior odds of path β was 1 and that of path α was 0.01, 1, or 100.



Note. b = path β. a = path α. PriorOdds.a = Prior odds of path α. PriorOdds.b = Prior odds of path β. The coefficient of treatment in the outcome model was $\tau' = 0$.

Figure S3

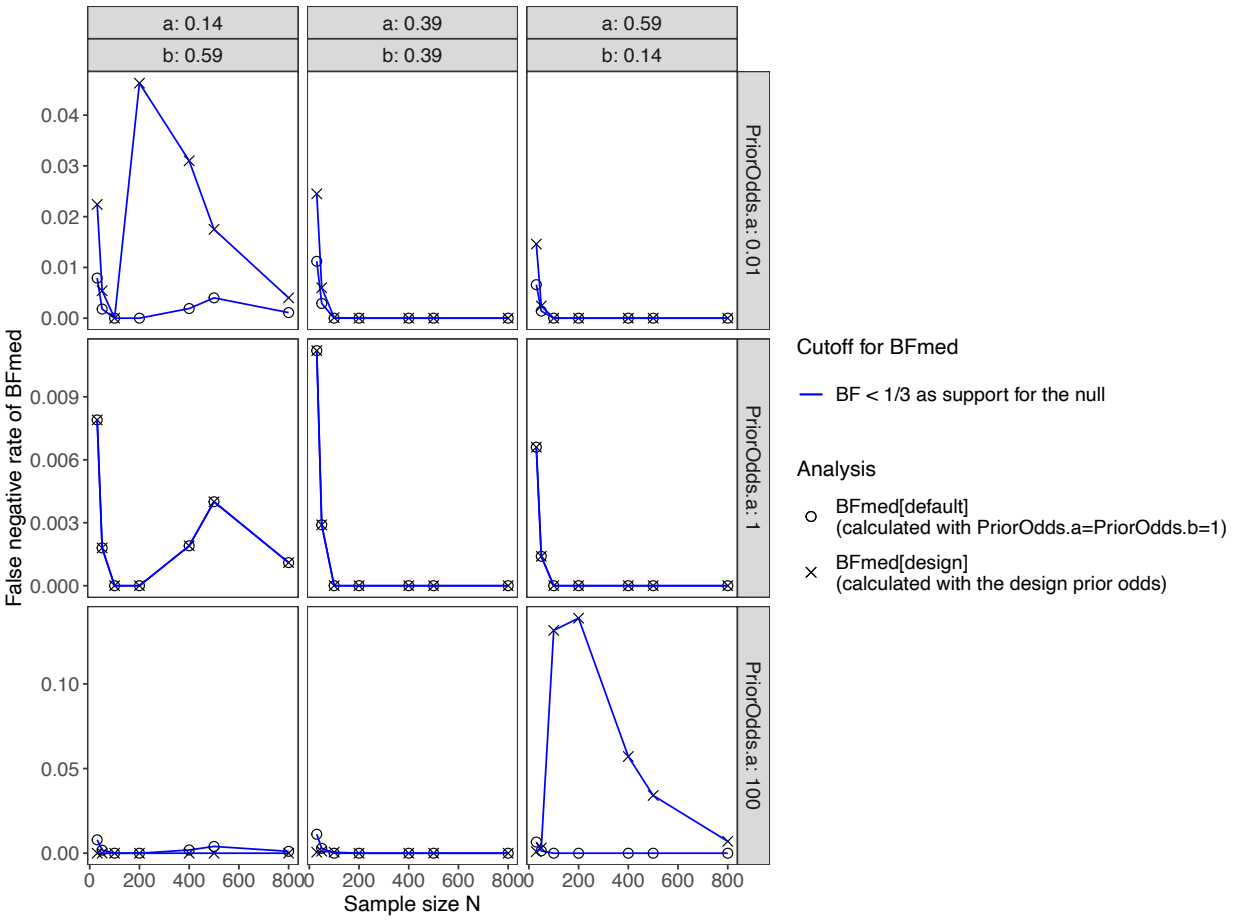
True negative rates of the mediation Bayes factors as functions of sample sizes. The design (i.e., data-generation) prior odds of path β was 1 and that of path α was 0.01, 1, or 100.



Note. b = path β. a = path α. PriorOdds.a = Prior odds of path α. PriorOdds.b = Prior odds of path β. The coefficient of treatment in the outcome model was $\tau' = 0$.

Figure S4

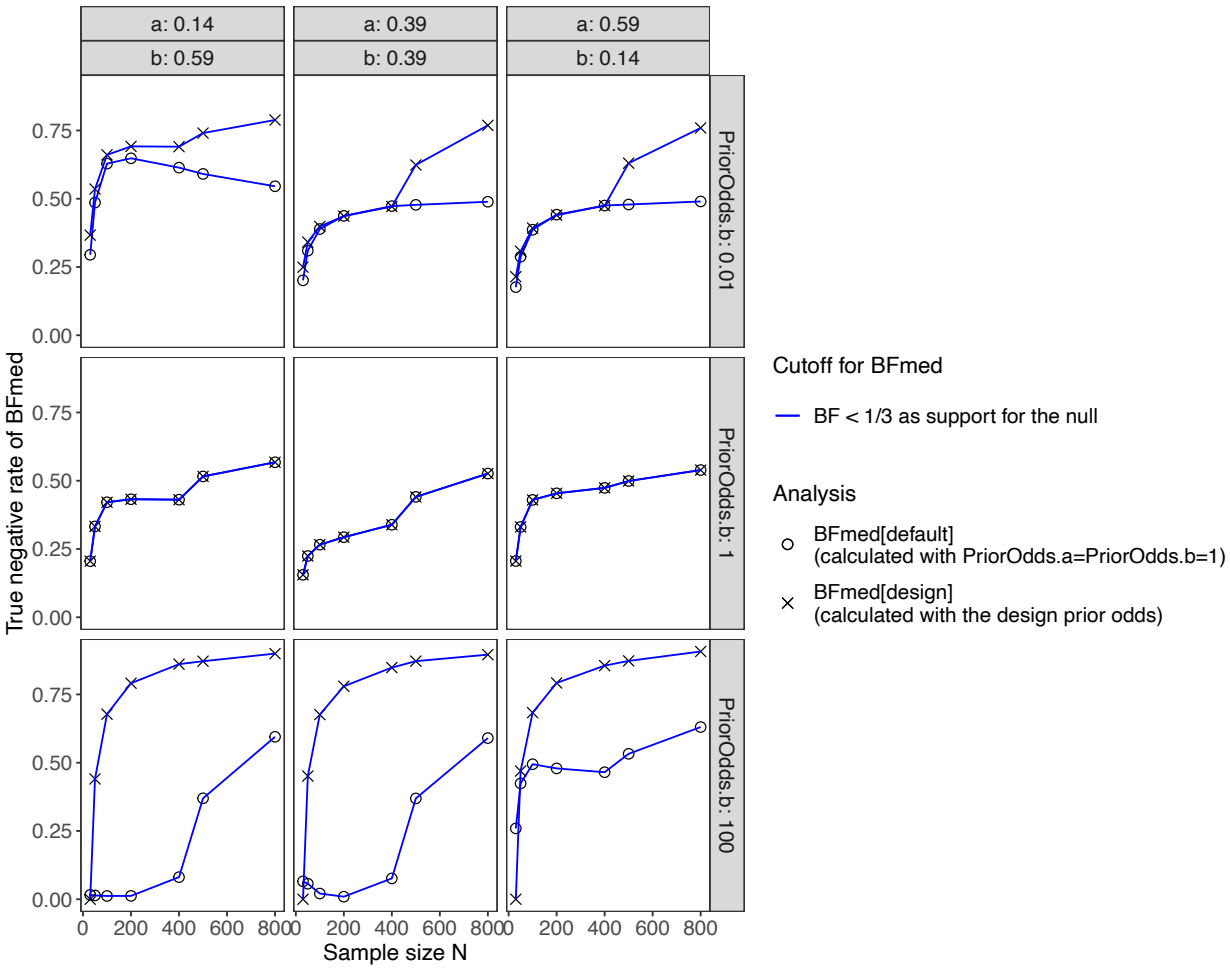
False negative rates of the mediation Bayes factors as functions of sample sizes. The design (i.e., data-generation) prior odds of path β was 1 and that of path α was 0.01, 1, or 100.



Note. b = path β. a = path α. PriorOdds.a = Prior odds of path α. PriorOdds.b = Prior odds of path β. The coefficient of treatment in the outcome model was $\tau' = 0$.

Figure S5

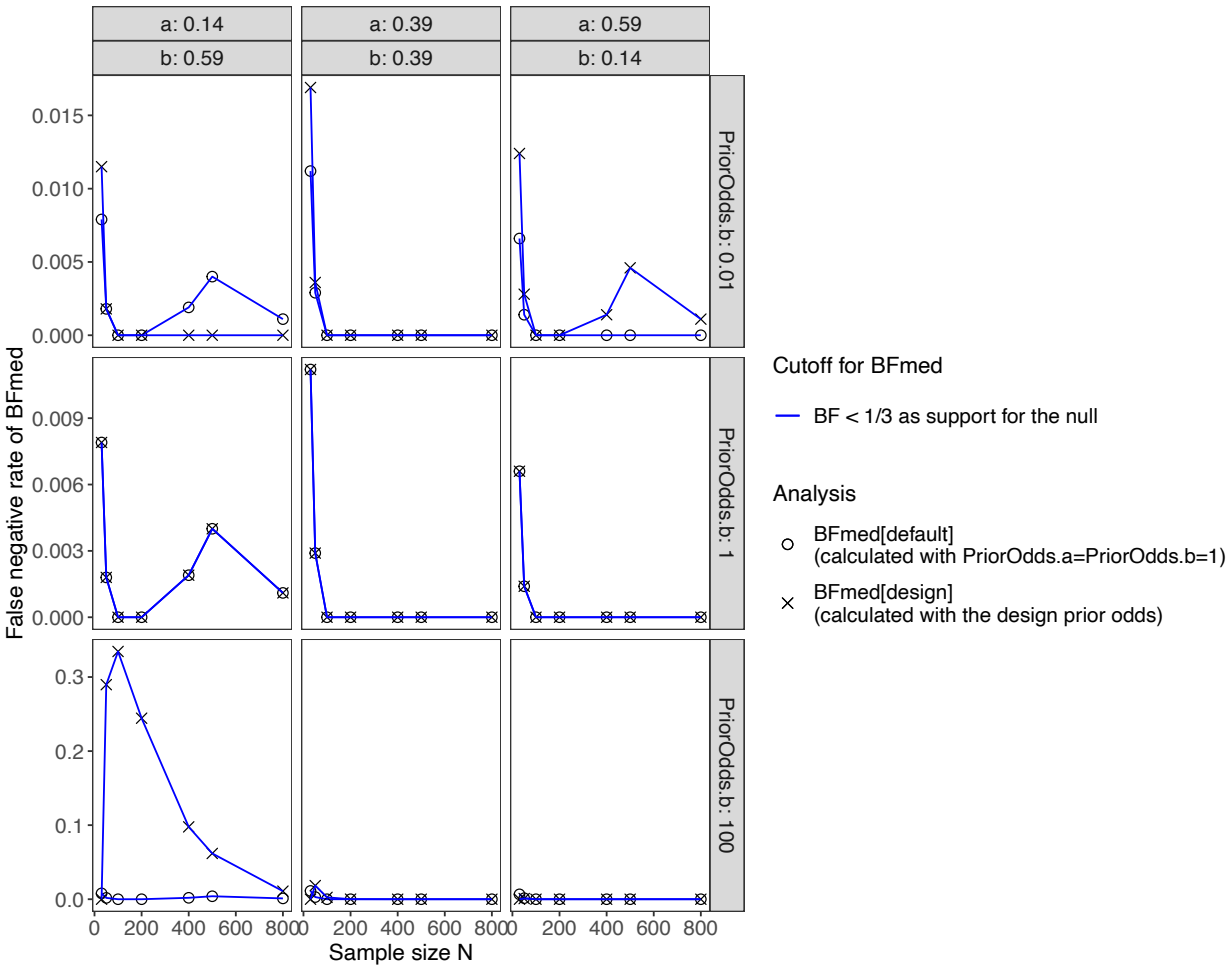
True negative rates of the mediation Bayes factors as functions of sample sizes. The design (i.e., data-generation) prior odds of path α was 1 and that of path β was 0.01, 1, or 100.



Note. b = path β. a = path α. PriorOdds.a = Prior odds of path α. PriorOdds.b = Prior odds of path β. The coefficient of treatment in the outcome model was $\tau' = 0$.

Figure S6

False negative rates of the mediation Bayes factors as functions of sample sizes. The design (i.e., data-generation) prior odds of path α was 1 and that of path β was 0.01, 1, or 100.



Note. b = path β. a = path α. PriorOdds.a = Prior odds of path α. PriorOdds.b = Prior odds of path β. The coefficient of treatment in the outcome model was $\tau' = 0$.