Supplementary Table 1. Empirical power of trend tests for equality of three means with a Normal (0, 1) error distribution (100,000 simulations)

			Parametric tests					Parametric tests based on rank-based INT					Rank-based tests				
Model	δ	MAF	F (2 df)	T_{ADD}	T_{DOM}	T_{REC}	MAX3	F (2 df)	T_{ADD}	T_{DOM}	T_{REC}	MAX3	KW	MJT	FW_{DOM}	FW_{REC}	MAX3
ADD	0.2	0.03	14.88	19.27	19.02	5.96	15.41	14.88	19.24	19.00	5.96	15.42	13.36	18.61	18.41	4.71	13.18
		0.05	21.33	27.64	27.06	6.93	22.42	21.30	27.64	27.06	6.93	22.41	20.25	26.65	26.18	6.56	21.06
		0.1	37.76	47.29	45.31	12.75	40.48	37.74	47.30	45.29	12.75	40.46	35.97	45.58	43.61	12.24	38.65
		0.2	61.30	71.50	66.47	30.86	65.47	61.28	71.50	66.41	30.80	65.42	59.26	69.46	64.45	29.73	63.33
		0.3	73.78	82.43	74.60	50.34	77.74	73.73	82.41	74.57	50.26	77.70	71.51	80.67	72.50	48.43	75.66
		0.4	79.79	87.24	76.72	64.76	83.51	79.78	87.21	76.70	64.74	83.46	77.78	85.74	74.78	62.65	81.74
		0.5	81.35	88.54	73.15	73.21	84.94	81.29	88.48	73.11	73.18	84.88	79.50	87.00	71.08	71.25	83.14
DOM	0.14	0.03	24.29	31.08	31.57	5.34	24.84	24.23	31.06	31.56	5.34	24.80	22.81	30.00	30.36	4.24	22.54
		0.05	36.33	44.95	45.94	5.90	37.56	36.32	44.89	45.90	5.93	37.57	34.86	43.46	44.26	5.61	35.83
		0.1	58.58	66.45	68.91	7.97	60.73	58.53	66.38	68.89	7.94	60.65	56.43	64.58	67.00	7.72	58.47
		0.2	77.03	80.68	85.04	12.89	79.08	77.01	80.68	85.04	12.88	79.07	74.95	78.97	83.41	12.56	77.06
		0.3	80.50	80.78	87.72	15.98	82.38	80.47	80.78	87.70	15.97	82.35	78.63	79.14	86.32	15.65	80.49
		0.4	77.09	73.93	85.13	16.36	79.01	77.06	73.91	85.15	16.35	79.00	75.07	71.91	83.50	15.87	76.95
		0.5	67.51	59.73	77.19	14.43	69.65	67.52	59.74	77.10	14.42	69.59	65.35	57.72	75.20	13.94	67.41
REC	0.15	0.03	5.26	5.00	5.00	5.48	5.27	5.25	4.98	5.00	5.47	5.25	3.85	5.01	5.00	4.32	3.41
		0.05	5.74	5.14	5.06	6.17	5.69	5.72	5.16	5.03	6.18	5.70	5.25	5.12	4.97	5.82	5.25
		0.1	8.70	5.93	5.25	10.39	8.62	8.74	5.94	5.25	10.36	8.57	8.39	5.82	5.18	9.98	8.25
		0.2	19.83	11.73	6.42	25.79	20.27	19.82	11.77	6.44	25.72	20.28	18.98	11.40	6.30	24.82	19.29
		0.3	38.62	25.65	9.08	48.60	40.02	38.62	25.64	9.09	48.57	39.96	37.14	24.64	8.88	46.62	38.27
		0.4	58.91	46.29	12.84	68.99	60.86	58.87	46.28	12.80	68.93	60.86	56.74	44.46	12.48	67.01	58.56
		0.5	74.41	65.98	15.98	82.73	76.32	74.38	65.94	15.99	82.70	76.25	72.26	63.99	15.61	81.14	74.18
UMB	0.15	0.03	26.89	32.91	34.40	4.89	26.87	26.91	32.94	34.34	4.92	26.83	25.53	31.78	33.11	3.86	24.49
		0.05	40.30	46.03	49.19	5.00	39.89	40.32	46.02	49.13	4.98	39.88	38.65	44.49	47.45	4.68	38.02
		0.1	63.02	62.21	70.21	5.17	60.84	62.99	62.13	70.17	5.19	60.82	61.02	60.21	68.30	5.11	58.61
		0.2	80.62	62.22	81.44	7.29	74.01	80.60	62.16	81.41	7.26	74.01	78.59	60.20	79.79	7.20	71.82
		0.3	85.15	41.04	78.75	14.26	73.28	85.08	41.03	78.67	14.27	73.21	83.49	39.52	76.82	13.96	71.01
		0.4	85.89	15.22	67.42	28.94	67.64	85.84	15.21	67.36	28.91	67.60	84.19	14.77	65.50	27.83	65.36
		0.5	86.09	4.76	49.05	49.02	64.63	86.06	4.75	49.02	49.02	64.59	84.39	4.79	47.39	47.25	62.23

Maximum standard error of estimates 0.16%. Abbreviations: ADD - additive, DOM - dominant, REC - recessive, UMB - umbrella.

Supplementary Table 2. Empirical power of association tests under additive genetic model and different error distribution (100,000 simulations)

Error			Parametric tests					Parametric tests based on rank-based INT					Rank-based tests				
Distribution	δ	MAF	F (2 df)	T_{ADD}	T_{DOM}	T_{REC}	MAX3	F (2 df)	T_{ADD}	T_{DOM}	T_{REC}	MAX3	KW	MJT	FW_{DOM}	FW_{REC}	MAX3
Normal	0.2	0.03	14.88	19.27	19.02	5.96	15.41	14.88	19.24	19.00	5.96	15.42	13.36	18.61	18.41	4.71	13.18
(μ = 0, σ = 1)		0.05	21.33	27.64	27.06	6.93	22.42	21.30	27.64	27.06	6.93	22.41	20.25	26.65	26.18	6.56	21.06
		0.1	37.76	47.29	45.31	12.75	40.48	37.74	47.30	45.29	12.75	40.46	35.97	45.58	43.61	12.24	38.65
		0.2	61.30	71.50	66.47	30.86	65.47	61.28	71.50	66.41	30.80	65.42	59.26	69.46	64.45	29.73	63.33
		0.3	73.78	82.43	74.60	50.34	77.74	73.73	82.41	74.57	50.26	77.70	71.51	80.67	72.50	48.43	75.66
		0.4	79.79	87.24	76.72	64.76	83.51	79.78	87.21	76.70	64.74	83.46	77.78	85.74	74.78	62.65	81.74
		0.5	81.35	88.54	73.15	73.21	84.94	81.29	88.48	73.11	73.18	84.88	79.50	87.00	71.08	71.25	83.14
SDMA	0.1	0.03	6.55	8.82	8.90	2.65	7.36	7.40	9.37	9.23	4.80	7.68	6.51	9.56	9.41	3.88	6.37
(mean = 0,		0.05	8.25	10.88	10.83	3.37	9.23	9.54	12.34	11.97	5.38	10.04	9.65	12.70	12.35	5.40	10.02
SD = 1)		0.1	13.06	15.74	15.36	6.65	14.44	15.26	20.40	19.04	8.32	16.82	15.87	21.02	19.48	8.62	17.31
		0.2	19.27	24.31	22.41	11.59	21.69	27.39	35.34	30.36	17.50	30.80	28.20	36.27	31.04	18.36	31.61
		0.3	23.63	30.27	26.34	16.30	27.03	36.80	46.68	37.53	27.54	41.53	37.82	47.63	38.18	28.64	42.42
		0.4	26.73	34.38	27.59	21.41	30.67	43.01	53.43	40.89	35.72	48.19	44.10	54.50	41.56	36.61	49.10
		0.5	27.95	35.86	26.35	25.31	32.33	45.49	55.89	40.89	40.25	50.66	46.27	56.73	41.31	41.06	51.45
Lognormal	0.14	0.03	6.82	6.82	6.77	4.67	7.54	11.31	17.69	17.61	3.01	12.46	9.21	14.58	14.44	2.45	9.58
(μ = 0, σ = 1)		0.05	7.65	7.68	7.65	5.11	8.23	18.29	27.75	27.45	3.88	20.43	14.58	21.49	21.14	4.13	15.74
		0.1	8.94	9.92	9.64	6.08	9.69	36.85	49.98	48.42	8.50	41.03	27.51	37.86	36.21	8.36	30.43
		0.2	11.23	13.20	12.27	8.03	12.27	64.21	75.98	71.83	26.45	68.88	47.93	59.78	54.75	22.54	52.54
		0.3	12.66	15.74	13.93	10.07	14.28	78.43	87.08	80.99	48.97	82.32	60.38	71.32	62.63	39.07	65.20
		0.4	13.94	17.58	14.36	12.33	15.96	85.00	91.41	83.44	66.82	88.07	67.39	77.18	64.41	53.17	72.05
		0.5	14.21	18.23	13.68	14.05	16.43	87.33	92.77	81.59	77.38	90.03	69.14	78.65	61.10	61.73	73.75
Cauchy	0.38	0.03	5.99	6.99	7.05	1.04	6.62	12.33	15.85	15.62	5.27	12.70	14.82	20.52	20.21	4.25	14.62
(median = 0,		0.05	6.86	8.22	8.44	1.59	7.70	17.46	22.87	22.36	6.38	18.28	23.13	30.18	29.53	6.99	24.20
scale = 1)		0.1	4.56	5.54	7.89	3.23	5.25	30.04	38.77	37.04	10.79	32.37	40.92	50.98	49.00	13.29	43.81
		0.2	5.90	4.66	2.84	6.09	6.08	49.73	60.36	55.42	24.85	53.99	65.31	75.25	70.30	33.18	69.21
		0.3	7.11	5.77	2.37	8.51	7.60	61.61	71.95	63.59	40.66	66.43	77.57	85.47	78.21	53.33	81.21
		0.4	3.52	4.09	2.90	8.82	5.78	67.95	77.42	65.26	53.63	72.61	83.06	89.65	79.70	68.11	86.24
		0.5	2.58	3.72	4.29	4.17	3.46	69.96	79.30	62.08	61.97	74.67	84.97	90.92	76.72	76.64	87.78

Maximum standard error of estimates 0.16%. Abbreviations: ADD - additive, DOM - dominant, REC - recessive, UMB - umbrella.