Method

We performed an exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to assess reliability and validity of vaccine hesitancy scale (VHS). All analyses were conducted in SPSS 23.0 and AMOS 23.0. We randomly split the sample into two parts, one for EFA and another for CFA.

We reported the KMO value and Bartlett's test of sphericity to examine correlations between 10 items. Principle component analysis was performed to group those items together into factors that will maximize the variance in the data using a measure known as an eigenvalue. We retained only the factors that have eigenvalues of more than 1.0, and then used Kaiser normalization varimax rotation to identify if any of the items might be redundant within a factor.

We used CFA to confirm that whether each latent factor was being measured properly by each item. The index Chi square/DF($\chi 2$/DF), root mean square error of approximation (RMSEA), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), comparative fit index (CFI), Tucker-Lewis index (TLI), and standardized root mean square residual (SRMR) were used to evaluate the model fit. We calculated average variance extracted (AVE) and composite reliability (CR) to assess the degree of internal consistency among the items of each latent factor, namely convergent validity. The square root of AVE and correlations between latent factors to assess the discriminant validity.

In addition, we calculated Cronbach's α to determine internal consistency.

Results

The sample size was 1504 in EFA, and 1505 in CFA. The characteristics in two samples were not significantly different (Table S1). In category A VHS, the Bartlett's test of sphericity ($p < 0 .001$) showed that correlations between items were sufficient to conduct an EFA. Two factors were identified with eigenvalues more than one through EFA. Two factors explained 62.41% of the common variance of the 10 items scale (Table S2). Factor 1

explained more common variance than factor 2. There are seven items loading on Factor 1, and they are primarily related to vaccine confidence; there are three items loading on factor 2, related to vaccine risk and complacency. Similar results have shown in category B VHS.

In category A VHS, model fit was acceptable according to a series index (Table S3). For factor 1, factor loadings to four items were greater than 0.7 and three items were lower than 0.7 but greater than 0.6. The AVE of 0.5463 (>0.5) and CR of 0.8928 (>0.7) which indicated that the convergent validity was good (Table S4). However, the convergent validity for factor 2 need to been improved. The correlation between two latent factors was significant and was lower than the square root of AVE, which indicated the discriminant validity was good in category A VHS (Table S5).

In category B VHS, model fit need to been improved (Table S3). For factor 1, factor loadings to six items were greater than 0.7 and one items were lower than 0.7 but greater than 0.6. The AVE of 0.6579 (>0.5) and CR of 0.9303 (>0.7), which indicated that the convergent validity was good. Similarly, the convergent validity for factor 2 need to been improved. The correlation between two latent factors was significant and was lower than the square root of AVE, which indicated the discriminant validity was good in category B VHS.

In category A VHS, the factor 1 consisted of seven items with Cronbach's α of 0.875, and the factor 2 consisted of three items with Cronbach's α of 0.681. In category B VHS, the factor 1 consisted of seven items with Cronbach's α of 0.907, and the factor 2 consisted of three items with Cronbach's α of 0.706.

Table S1 Responders' characteristics in EFA sample and CFA sample (N= 3009)

Characteristic	EFA Sample (N= 1504)	CFA Sample (N= 1505)	P value
Children			
Age, y (Mean ± SD)	2.23 ± 2.43	2.25 ± 2.50	0.990
Age group			
<1	533	534	0.966
1 to <2	235	232	
2 to <3	160	161	
3 to <4	153	145	
4 to <5	148	165	
5 to <6	70	72	
≥6	205	196	
Gender			
Male	757	771	0.623
Female	747	734	
Firstborn			
Yes	509	518	0.739
No	995	987	
Parents			
Relationship with child			
Mother	1126	1119	0.746
Father	378	386	
Age, y (Mean ± SD)	31.24 ± 4.44	31.49 ± 4.47	0.309
Age group			
< 26	135	114	0.173
26 to <31	550	541	
31 to <36	576	586	

36 to <41	208	209	
≥41	35	55	
Educational level			
Junior high school or below	186	163	0.288
High school graduate or equivalent	264	299	
College or equivalent	943	935	
Master's Diploma or above	111	108	
Annual household income (10,000 RMB)			
<5	110	103	0.220
5 to < 10	428	448	
10 to <15	413	367	
≥15	553	587	
Healthcare background			
Yes	1414	1409	0.653
No	90	96	

Table S2 Results of EFA analysis

Item	Category A		Category B	
	Factor 1 loading	Factor 2 loading	Factor 1 loading	Factor 2 loading
L1	0.825	0.045	0.841	0.103
L2	0.839	0.065	0.867	0.069
L3	0.824	0.079	0.873	0.054
L4	0.787	0.079	0.761	0.089
L5	-0.007	0.763	-0.020	0.808
L6	0.707	0.108	0.724	0.101
L7	0.813	0.064	0.846	0.095
L8	0.707	-0.001	0.702	0.104
L9	0.134	0.797	0.126	0.827

L10	0.065	0.787	0.164	0.738
Eigenvalue	4.368	1.872	4.574	1.938
Variation	43.683	18.725	45.739	19.381
KMO	0.881		0.890	
Bartlett's test of sphericity	0.000		0.000	

Table S3 CFA model fit

Scale	X2/df	RMSEA	GFI	AGFI	IFI	TLI	SRMR
Category A VHS	3.879	0.044	0.967	0.946	0.877	0.834	0.0624
Category B VHS	6.450	0.060	0.945	0.942	0.853	0.804	0.0682
Suggested value for good fit	2–5	<0.06	>0.90	>0.90	>0.90	>0.90	<0.08

Table S4 Convergent validity of different VHS *

Scale	Item	Factor	Estimate loading	AVE	CR
Category A	L1	Factor 1	0.762		
	L2	Factor 1	0.791		
	L3	Factor 1	0.816		
	L4	Factor 1	0.646	0.5463	0.8928
	L6	Factor 1	0.659		
	L7	Factor 1	0.840		
	L8	Factor 1	0.628		
	L10	Factor 2	0.618		
	L9	Factor 2	0.723	0.4208	0.6839
	L5	Factor 2	0.598		
Category B	L1	Factor 1	0.867	0.6579	0.9303
	L2	Factor 1	0.918		

	L3	Factor 1	0.836		
	L4	Factor 1	0.743		
	L6	Factor 1	0.751		
	L7	Factor 1	0.842		
	L8	Factor 1	0.698		
	L10	Factor 2	0.682		
	L9	Factor 2	0.760	0.4977	0.7476
	L5	Factor 2	0.671		

*The following cutoff criteria were used: (a) AVE >0.5, (b) CR > 0.7

Table S5 Discriminant validity of different VHS

Scale		Factor1	Factor2
Category A	Factor1	0.739	
	Factor2	0.183*	0.827
Category B	Factor1	0.811	
	Factor2	0.270*	0.705

*P<0.001

Table S6 Internal consistency of different VHS

Value	Total sample			
	Category A		Category B	
	Factor 1	Factor 2	Factor 1	Factor 2
Cronbach's α	0.875	0.681	0.907	0.706