

```
924 0 OUTPUT ACTIVATE KuderRichardsonFormula20Output.  
924 0 M> OUTPUT ACTIVATE KuderRichardsonFormula20Output.  
925 0 TITLE 'Kuder-Richardson Formula 20'.  
925 0 M> TITLE 'Kuder-Richardson Formula 20'.
```

Kuder-Richardson Formula 20

```

926 0
926 0 M>
927 0 GET DATA
927 0 M> GET DATA
928 0 /TYPE=TXT
928 0 M> /TYPE=TXT
929 0 /FILE='D:\DATA ANALYSIS\K Reliability and Agreement Tests\Kuder Ric
hardson Formula 20\dataset.csv'
929 0 M> /FILE='D:\DATA ANALYSIS\K Reliability and Agreement Tests\Kuder
Richardson Formula 20\dataset.csv'
930 0 /ENCODING='UTF8'
930 0 M> /ENCODING='UTF8'
931 0 /DELCASE=LINE
931 0 M> /DELCASE=LINE
932 0 /DELIMITERS=', '
932 0 M> /DELIMITERS=', '
933 0 /QUALIFIER='"'
933 0 M> /QUALIFIER='"'
934 0 /ARRANGEMENT=DELIMITED
934 0 M> /ARRANGEMENT=DELIMITED
935 0 /FIRSTCASE=2
935 0 M> /FIRSTCASE=2
936 0 /VARIABLES=
936 0 M> /VARIABLES=
937 0 school A8 sex A8 age F8.0 address A8 famsize A8 Pstatus A8
937 0 M> school A8 sex A8 age F8.0 address A8 famsize A8 Pstatus A8
938 0 Medu F8.0 Fedu F8.0 Mjob A16 Fjob A16 reason A16 guardian A16
938 0 M> Medu F8.0 Fedu F8.0 Mjob A16 Fjob A16 reason A16 guardian A16
939 0 traveltime F8.0 studytime F8.0 failures F8.0 schoolsup A8 famsup
A8
939 0 M> traveltime F8.0 studytime F8.0 failures F8.0 schoolsup A8 fams
up A8
940 0 paid A8 activities A8 nursery A8 higher A8 internet A8 romantic A
8
940 0 M> paid A8 activities A8 nursery A8 higher A8 internet A8 romanti
c A8
941 0 famrel F8.0 freetime F8.0 goout F8.0 Dalc F8.0 Walc F8.0 health F
8.0

```

Kuder-Richardson Formula 20

```

941 0 M> famrel F8.0 freetime F8.0 goout F8.0 Dalc F8.0 Walc F8.0 health F8.0
942 0 absences F8.0 G1 F8.0 G2 F8.0 G3 F8.0.
942 0 M> absences F8.0 G1 F8.0 G2 F8.0 G3 F8.0.
943 0 DATASET NAME KuderRichardsonFormula20Data.
943 0 M> DATASET NAME KuderRichardsonFormula20Data.
944 0 EXECUTE.
944 0 M> EXECUTE.
945 0
945 0 M>
946 0 COMPUTE subject_id=$CASENUM.
946 0 M> COMPUTE subject_id=$CASENUM.
947 0 COMPUTE Dalc_R=6-Dalc.
947 0 M> COMPUTE Dalc_R=6-Dalc.
948 0 COMPUTE Walc_R=6-Walc.
948 0 M> COMPUTE Walc_R=6-Walc.
949 0 RECODE schoolsup famsup paid activities higher internet ('no'=0) ('yes'=1)
949 0 M> RECODE schoolsup famsup paid activities higher internet ('no'=0) ('yes'=1)
950 0 INTO schoolsup_b famsup_b paid_b activities_b higher_b internet_b.
950 0 M> INTO schoolsup_b famsup_b paid_b activities_b higher_b internet_b.
951 0 RECODE G1 G2 G3 (LO THRU 9=1) (10 THRU 13=2) (14 THRU HI=3)
951 0 M> RECODE G1 G2 G3 (LO THRU 9=1) (10 THRU 13=2) (14 THRU HI=3)
952 0 INTO G1_cat3 G2_cat3 G3_cat3.
952 0 M> INTO G1_cat3 G2_cat3 G3_cat3.
953 0 RECODE G1 G3 (LO THRU 8=1) (9 THRU 10=2) (11 THRU 12=3) (13 THRU 14=4) (15 THRU HI=5)
953 0 M> RECODE G1 G3 (LO THRU 8=1) (9 THRU 10=2) (11 THRU 12=3) (13 THRU 14=4) (15 THRU HI=5)
954 0 INTO G1_cat5 G3_cat5.
954 0 M> INTO G1_cat5 G3_cat5.
955 0 VARIABLE LEVEL schoolsup_b famsup_b paid_b activities_b higher_b internet_b G1_cat3 G2_cat3 G3_cat3 G1_cat5 G3_cat5 (NOMINAL).
955 0 M> VARIABLE LEVEL schoolsup_b famsup_b paid_b activities_b higher_b internet_b G1_cat3 G2_cat3 G3_cat3 G1_cat5 G3_cat5 (NOMINAL).

```

Kuder-Richardson Formula 20

```
956 0 FORMATS subject_id schoolsup_b famsup_b paid_b activities_b higher_b
internet_b G1_cat3 G2_cat3 G3_cat3 G1_cat5 G3_cat5 (F5
      .0).
956 0 M> FORMATS subject_id schoolsup_b famsup_b paid_b activities_b higher
_b internet_b G1_cat3 G2_cat3 G3_cat3 G1_cat5 G3_cat5
      (F5.0).
957 0 EXECUTE.
957 0 M> EXECUTE.
958 0
958 0 M>
959 0 * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
959 0 M> * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
960 0 TITLE 'Kuder Richardson Formula Twenty'.
960 0 M> TITLE 'Kuder Richardson Formula Twenty'.
```

Kuder Richardson Formula Twenty

```
961 0 SUBTITLE 'Item-specific p times q reliability for six dichotomous items'.
```

```
961 0 M> SUBTITLE 'Item-specific p times q reliability for six dichotomous items'.
```

```
>Warning # 2004 on line 961. Command name: SUBTITLE
```

```
>The subtitle given exceeds 60 characters in length. The first 60 characters  
>will be used.
```

Kuder Richardson Formula Twenty
Item-specific p times q reliability for six dichotomous item

```

962  0  RELIABILITY /VARIABLES=schoolsup_b famsup_b paid_b activities_b highe
r_b internet_b
962  0 M> RELIABILITY /VARIABLES=schoolsup_b famsup_b paid_b activities_b hi
gher_b internet_b
963  0  /SCALE('KR20 dichotomous items') ALL /MODEL=ALPHA
963  0 M> /SCALE('KR20 dichotomous items') ALL /MODEL=ALPHA
964  0  /STATISTICS=DESCRIPTIVE SCALE CORR /SUMMARY=TOTAL MEANS VARIANCE COR
R.
964  0 M> /STATISTICS=DESCRIPTIVE SCALE CORR /SUMMARY=TOTAL MEANS VARIANCE
CORR.

```

Reliability

Notes

Output Created		16-JUL-2026 21:09:56
Comments		
Input	Data	D:\DATA ANALYSIS\K Reliability and Agreement Tests\Kuder Richardson Formula 20\dataset.csv
	Active Dataset	KuderRichardsonFormula 20Data
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
	Matrix Input	D:\DATA ANALYSIS\K Reliability and Agreement Tests\Kuder Richardson Formula 20\kuder_richardson_form ula_20_spss_syntax.sps
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.

Kuder Richardson Formula Twenty
Item-specific p times q reliability for six dichotomous item

Notes

Syntax		RELIABILITY /VARIABLES=schoolsup_ b famsup_b paid_b activities_b higher_b internet_b /SCALE('KR20 dichotomous items') ALL /MODEL=ALPHA /STATISTICS=DESCRIPT IVE SCALE CORR /SUMMARY=TOTAL MEANS VARIANCE CORR.
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.03

[KuderRichardsonFormula20Data]

Scale: KR20 dichotomous items

Case Processing Summary

		N	%
Cases	Valid	649	100.0
	Excluded ^a	0	.0
	Total	649	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.211	.229	6

Kuder Richardson Formula Twenty
Item-specific p times q reliability for six dichotomous item

Item Statistics

	Mean	Std. Deviation	N
schoolsup_b	.10	.307	649
famsup_b	.61	.487	649
paid_b	.06	.238	649
activities_b	.49	.500	649
higher_b	.89	.308	649
internet_b	.77	.423	649

Inter-Item Correlation Matrix

	schoolsup_b	famsup_b	paid_b	activities_b	higher_b	internet_b
schoolsup_b	1.000	.075	.041	-.030	.085	-.026
famsup_b	.075	1.000	.094	-.007	.085	.072
paid_b	.041	.094	1.000	.066	.024	.032
activities_b	-.030	-.007	.066	1.000	.045	.082
higher_b	.085	.085	.024	.045	1.000	.070
internet_b	-.026	.072	.032	.082	.070	1.000

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance
Item Means	.487	.060	.894	.834	14.872	.118
Item Variances	.152	.057	.250	.194	4.422	.007
Inter-Item Correlations	.047	-.030	.094	.125	-3.118	.002

Summary Item Statistics

	N of Items
Item Means	6
Item Variances	6
Inter-Item Correlations	6

Kuder Richardson Formula Twenty
Item-specific p times q reliability for six dichotomous item

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
schoolsup_b	2.82	.984	.047	.015	.211
famsup_b	2.31	.773	.112	.025	.160
paid_b	2.86	.997	.112	.015	.177
activities_b	2.44	.805	.057	.014	.222
higher_b	2.03	.934	.130	.020	.157
internet_b	2.16	.846	.106	.017	.166

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
2.92	1.107	1.052	6

```
965  0  COMPUTE kr20_score=SUM(schoolsup_b,famsup_b,paid_b,activities_b,high
r_b,internet_b).
```

```
965  0 M>  COMPUTE kr20_score=SUM(schoolsup_b,famsup_b,paid_b,activities_b,hi
gher_b,internet_b).
```

```
966  0  FREQUENCIES VARIABLES=schoolsup_b famsup_b paid_b activities_b higher
_b internet_b kr20_score /STATISTICS=MEAN STDDEV VARIA
NCE /HISTOGRAM.
```

```
966  0 M>  FREQUENCIES VARIABLES=schoolsup_b famsup_b paid_b activities_b hig
her_b internet_b kr20_score /STATISTICS=MEAN STDDEV VA
RIANCE /HISTOGRAM.
```

Frequencies

Kuder Richardson Formula Twenty
Item-specific p times q reliability for six dichotomous item

Notes

Output Created		16-JUL-2026 21:09:56
Comments		
Input	Data	D:\DATA ANALYSIS\K Reliability and Agreement Tests\Kuder Richardson Formula 20\dataset.csv
	Active Dataset	KuderRichardsonFormula 20Data
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data.
Syntax		FREQUENCIES VARIABLES=schoolsup_b famsup_b paid_b activities_b higher_b internet_b kr20_score /STATISTICS=MEAN STDDEV VARIANCE /HISTOGRAM.
Resources	Processor Time	00:00:01.64
	Elapsed Time	00:00:01.22

Statistics

		schoolsup_b	famsup_b	paid_b	activities_b	higher_b	internet_b
N	Valid	649	649	649	649	649	649
	Missing	0	0	0	0	0	0
Mean		.10	.61	.06	.49	.89	.77
Std. Deviation		.307	.487	.238	.500	.308	.423
Variance		.094	.238	.057	.250	.095	.179

Kuder Richardson Formula Twenty
Item-specific p times q reliability for six dichotomous item

Statistics

		kr20_score
N	Valid	649
	Missing	0
Mean		2.9245
Std. Deviation		1.05211
Variance		1.107

Frequency Table

schoolsup_b

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	581	89.5	89.5	89.5
	1	68	10.5	10.5	100.0
	Total	649	100.0	100.0	

famsup_b

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	251	38.7	38.7	38.7
	1	398	61.3	61.3	100.0
	Total	649	100.0	100.0	

paid_b

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	610	94.0	94.0	94.0
	1	39	6.0	6.0	100.0
	Total	649	100.0	100.0	

Kuder Richardson Formula Twenty
Item-specific p times q reliability for six dichotomous item

activities_b

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	334	51.5	51.5	51.5
	1	315	48.5	48.5	100.0
	Total	649	100.0	100.0	

higher_b

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	69	10.6	10.6	10.6
	1	580	89.4	89.4	100.0
	Total	649	100.0	100.0	

internet_b

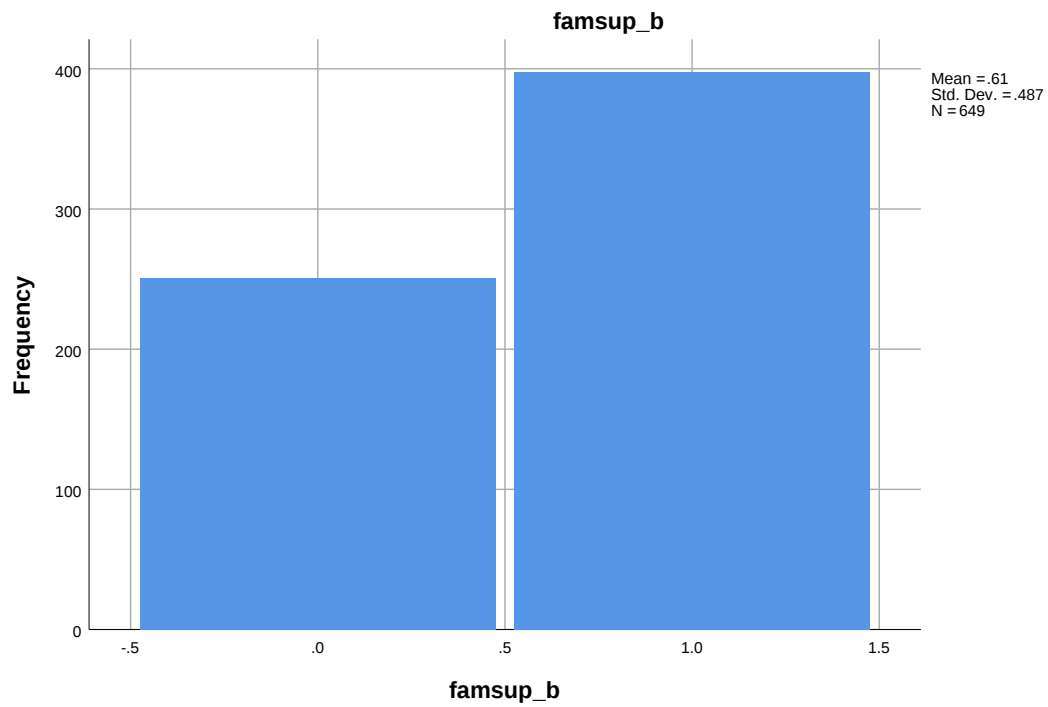
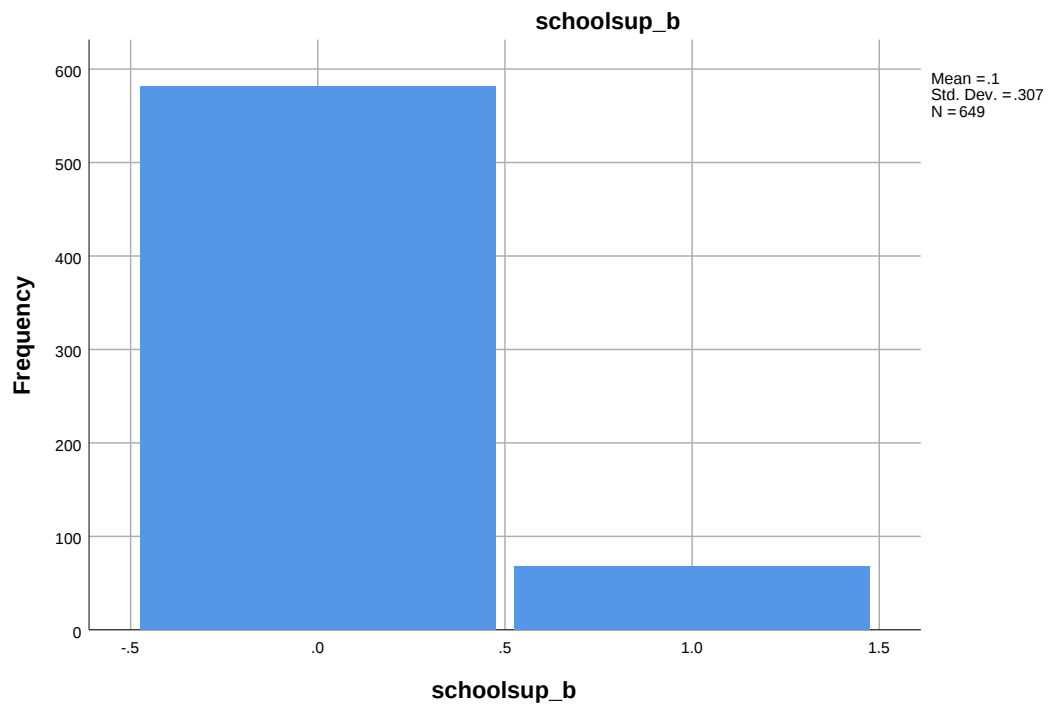
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	151	23.3	23.3	23.3
	1	498	76.7	76.7	100.0
	Total	649	100.0	100.0	

kr20_score

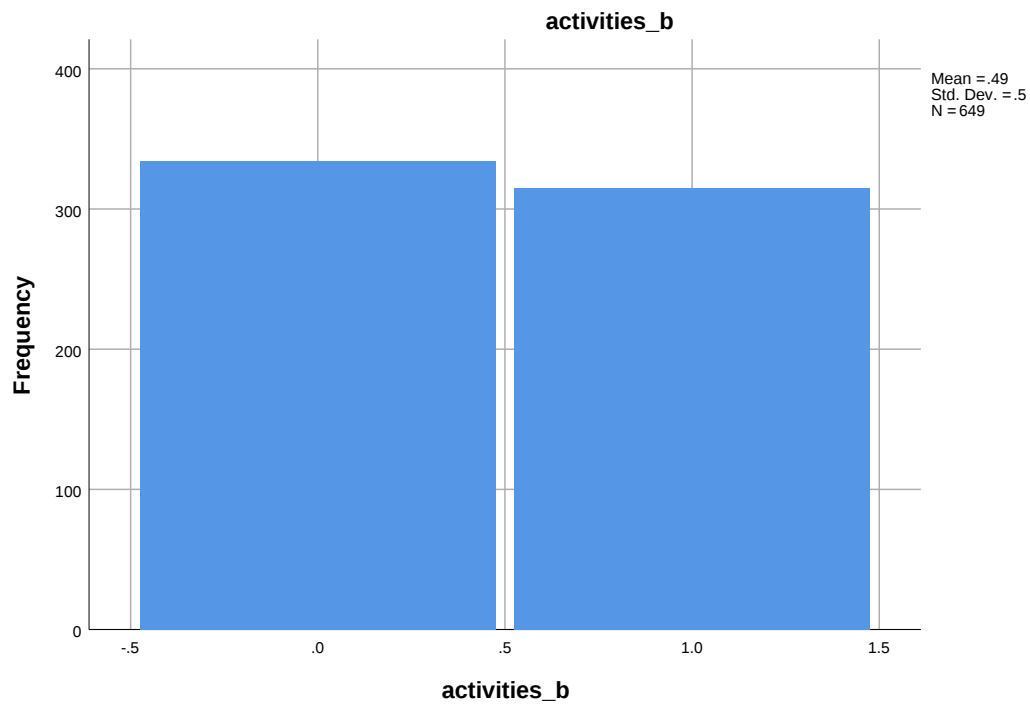
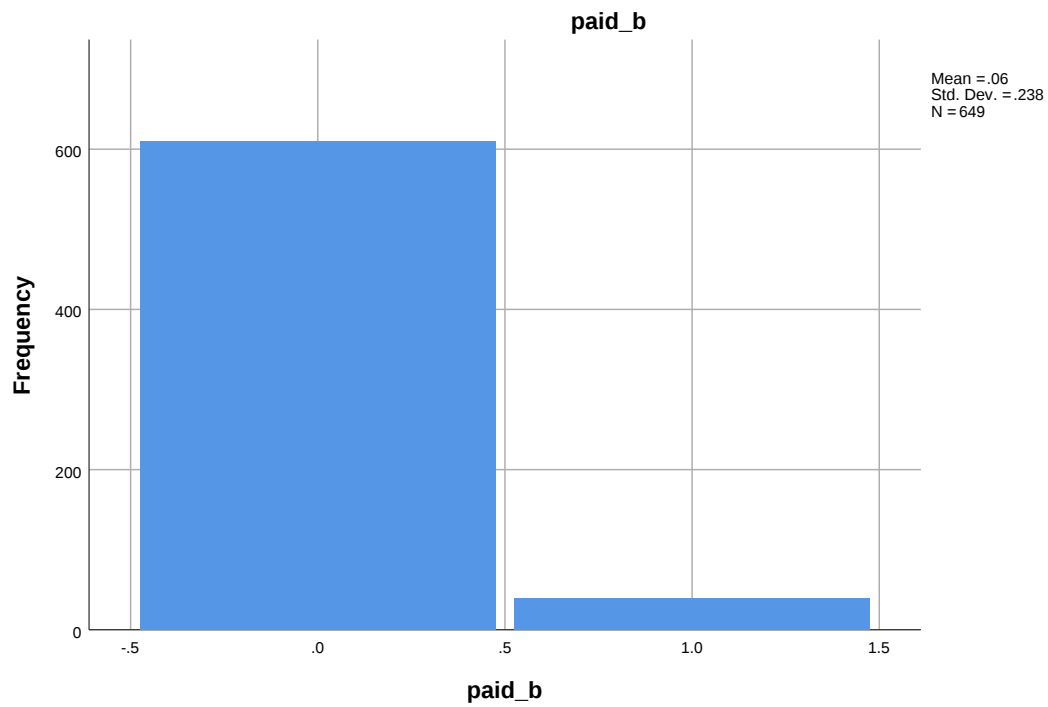
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	5	.8	.8	.8
	1.00	57	8.8	8.8	9.6
	2.00	145	22.3	22.3	31.9
	3.00	252	38.8	38.8	70.7
	4.00	159	24.5	24.5	95.2
	5.00	27	4.2	4.2	99.4
	6.00	4	.6	.6	100.0
	Total	649	100.0	100.0	

Histogram

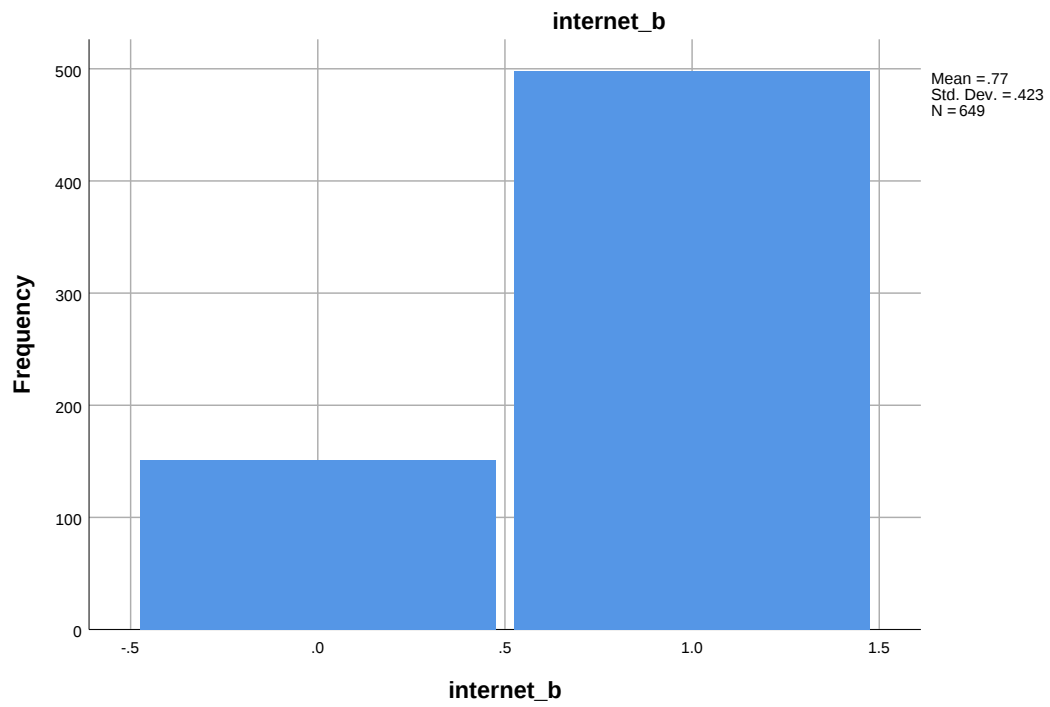
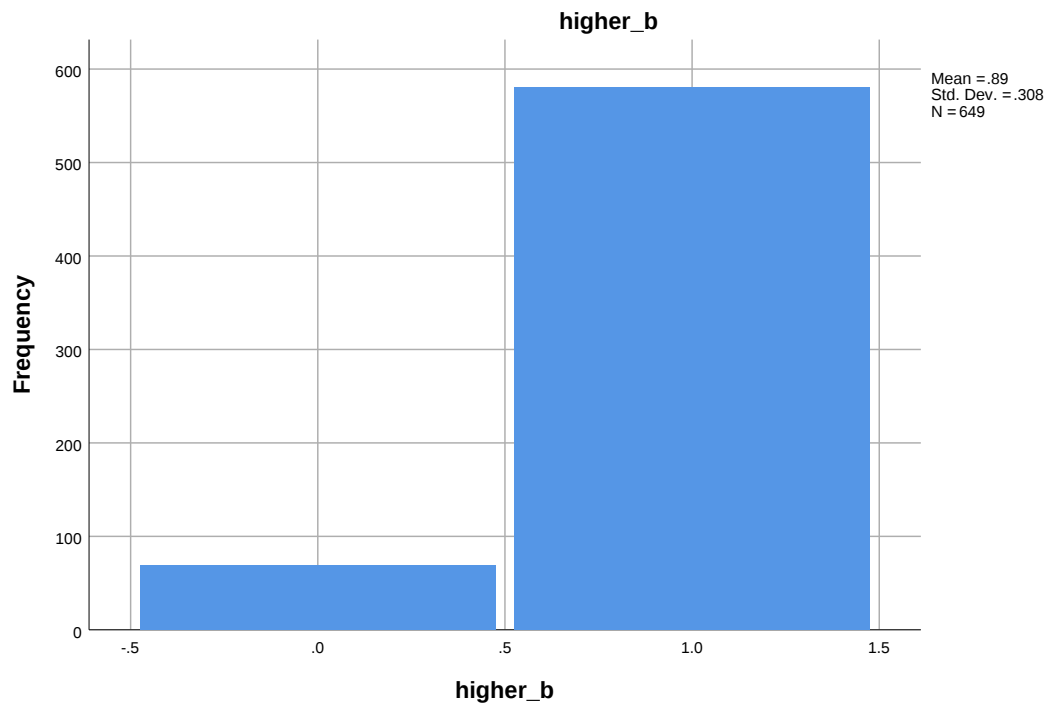
Kuder Richardson Formula Twenty
Item-specific p times q reliability for six dichotomous item



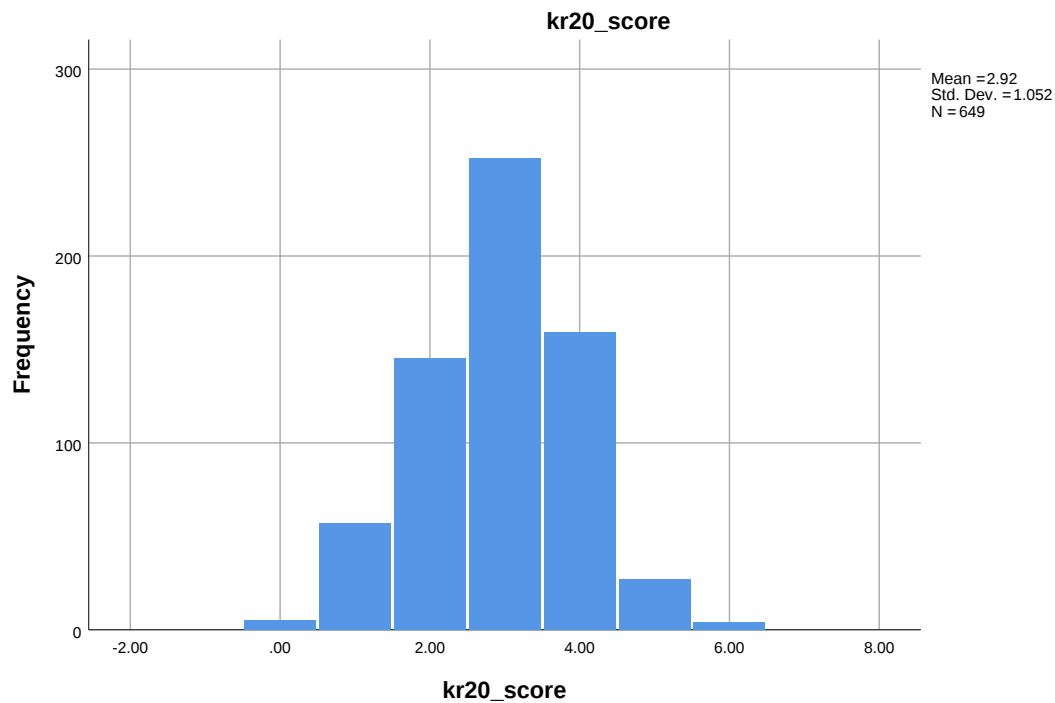
Kuder Richardson Formula Twenty
Item-specific p times q reliability for six dichotomous item



Kuder Richardson Formula Twenty
Item-specific p times q reliability for six dichotomous item



Kuder Richardson Formula Twenty
Item-specific p times q reliability for six dichotomous item



```
967 0 CORRELATIONS /VARIABLES=schoolsup_b famsup_b paid_b activities_b high  
er_b internet_b /PRINT=TWOTAIL NOSIG /MISSING=PAIRWISE
```

```
967 0 M> CORRELATIONS /VARIABLES=schoolsup_b famsup_b paid_b activities_b h  
igher_b internet_b /PRINT=TWOTAIL NOSIG /MISSING=PAIRW  
ISE.
```

Correlations

Kuder Richardson Formula Twenty
Item-specific p times q reliability for six dichotomous item

Notes

Output Created		16-JUL-2026 21:09:57
Comments		
Input	Data	D:\DATA ANALYSIS\K Reliability and Agreement Tests\Kuder Richardson Formula 20\dataset.csv
	Active Dataset	KuderRichardsonFormula 20Data
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		CORRELATIONS /VARIABLES=schoolsup_ b famsup_b paid_b activities_b higher_b internet_b /PRINT=TWOTAIL NOSIG /MISSING=PAIRWISE.
Resources	Processor Time	00:00:00.11
	Elapsed Time	00:00:00.08

Kuder Richardson Formula Twenty
Item-specific p times q reliability for six dichotomous item

Correlations

		schoolsup_b	famsup_b	paid_b	activities_b	higher_b
schoolsup_b	Pearson Correlation	1	.075	.041	-.030	.085*
	Sig. (2-tailed)		.055	.303	.442	.030
	N	649	649	649	649	649
famsup_b	Pearson Correlation	.075	1	.094*	-.007	.085*
	Sig. (2-tailed)	.055		.016	.850	.030
	N	649	649	649	649	649
paid_b	Pearson Correlation	.041	.094*	1	.066	.024
	Sig. (2-tailed)	.303	.016		.094	.540
	N	649	649	649	649	649
activities_b	Pearson Correlation	-.030	-.007	.066	1	.045
	Sig. (2-tailed)	.442	.850	.094		.253
	N	649	649	649	649	649
higher_b	Pearson Correlation	.085*	.085*	.024	.045	1
	Sig. (2-tailed)	.030	.030	.540	.253	
	N	649	649	649	649	649
internet_b	Pearson Correlation	-.026	.072	.032	.082*	.070
	Sig. (2-tailed)	.509	.067	.418	.036	.073
	N	649	649	649	649	649

Kuder Richardson Formula Twenty
Item-specific p times q reliability for six dichotomous item

Correlations

		internet_b
schoolsup_b	Pearson Correlation	-.026
	Sig. (2-tailed)	.509
	N	649
famsup_b	Pearson Correlation	.072
	Sig. (2-tailed)	.067
	N	649
paid_b	Pearson Correlation	.032
	Sig. (2-tailed)	.418
	N	649
activities_b	Pearson Correlation	.082 [*]
	Sig. (2-tailed)	.036
	N	649
higher_b	Pearson Correlation	.070
	Sig. (2-tailed)	.073
	N	649
internet_b	Pearson Correlation	1
	Sig. (2-tailed)	
	N	649

*. Correlation is significant at the 0.05 level (2-tailed).

```

968 0 * END METHOD-SPECIFIC SPSS WORKFLOW.
968 0 M> * END METHOD-SPECIFIC SPSS WORKFLOW.
969 0
969 0 M>
970 0 SAVE OUTFILE='D:\DATA ANALYSIS\K Reliability and Agreement Tests\Kude
r Richardson Formula 20\SPSS_Output\sav\kuder-richards
on-formula-20_spss_ready_data.sav' /COMPRESSED.
970 0 M> SAVE OUTFILE='D:\DATA ANALYSIS\K Reliability and Agreement Tests\K
uder Richardson Formula 20\SPSS_Output\sav\kuder-richa
rdson-formula-20_spss_ready_data.sav' /COMPRESSED.
971 0
971 0 M>

```

Kuder Richardson Formula Twenty
Item-specific p times q reliability for six dichotomous item

```

972  0  ECHO '=====
====='.
972  0 M>  ECHO '=====
====='.
=====
973  0  ECHO 'KUDER-RICHARDSON FORMULA 20'.
973  0 M>  ECHO 'KUDER-RICHARDSON FORMULA 20'.
KUDER-RICHARDSON FORMULA 20
974  0  ECHO 'Design: Internal consistency of six unequal-difficulty binary s
upport/intention items.'.
974  0 M>  ECHO 'Design: Internal consistency of six unequal-difficulty binar
y support/intention items.'.
Design: Internal consistency of six unequal-difficulty binary support/intentio
n items.
975  0  ECHO 'Null hypothesis: The binary composite has no internal-consisten
cy reliability.'.
975  0 M>  ECHO 'Null hypothesis: The binary composite has no internal-consis
tency reliability.'.
Null hypothesis: The binary composite has no internal-consistency reliability.
976  0  ECHO 'Formula: KR-20=k/(k-1)[1-sum p_i q_i/s_total^2].'.
976  0 M>  ECHO 'Formula: KR-20=k/(k-1)[1-sum p_i q_i/s_total^2].'.
Formula: KR-20=k/(k-1)[1-sum p_i q_i/s_total^2].
977  0  ECHO 'Variables: schoolsup, famsup, paid, activities, higher, interne
t'.
977  0 M>  ECHO 'Variables: schoolsup, famsup, paid, activities, higher, inte
rnet'.
Variables: schoolsup, famsup, paid, activities, higher, internet
978  0  ECHO 'Rows analyzed: 649'.
978  0 M>  ECHO 'Rows analyzed: 649'.
Rows analyzed: 649
979  0  ECHO 'items = 6'.
979  0 M>  ECHO 'items = 6'.
items = 6
980  0  ECHO 'kr20 = 0.21264912139527564'.
980  0 M>  ECHO 'kr20 = 0.21264912139527564'.
kr20 = 0.21264912139527564
981  0  ECHO 'n_cases = 649'.
981  0 M>  ECHO 'n_cases = 649'.
n_cases = 649

```

Kuder Richardson Formula Twenty
Item-specific p times q reliability for six dichotomous item

```

982 0 ECHO 'total_score_variance = 1.1069451577926155'.
982 0 M> ECHO 'total_score_variance = 1.1069451577926155'.
total_score_variance = 1.1069451577926155
983 0 ECHO 'items = 6'.
983 0 M> ECHO 'items = 6'.
items = 6
984 0 ECHO 'kr20 = 0.21264912139527564'.
984 0 M> ECHO 'kr20 = 0.21264912139527564'.
kr20 = 0.21264912139527564
985 0 ECHO 'n_cases = 649'.
985 0 M> ECHO 'n_cases = 649'.
n_cases = 649
986 0 ECHO 'total_score_variance = 1.1069451577926155'.
986 0 M> ECHO 'total_score_variance = 1.1069451577926155'.
total_score_variance = 1.1069451577926155
987 0 ECHO 'Cross-check status: pass'.
987 0 M> ECHO 'Cross-check status: pass'.
Cross-check status: pass
988 0 ECHO '=====
====='.
988 0 M> ECHO '=====
====='.
=====
989 0
989 0 M>
990 0 OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\K Reliability and Agreement Tes
ts\Kuder Richardson Formula 20\SPSS_Output\spv\kuder-r
richardson-formula-20_spss_output.spv'.
990 0 M> OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\K Reliability and Agreement
Tests\Kuder Richardson Formula 20\SPSS_Output\spv\kude
r-richardson-formula-20_spss_output.spv'.
991 0 OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=PRI
NTSETTING
991 0 M> OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=
PRINTSETTING

```