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ABSTRACT

In recent research the assessment of worry and emotionality as separate components of test anxiety has become a salient point. Because of theoretical advances in this field it seems to be necessary to include both aspects in the measures that are used to assess test anxiety. Some literature on this distinction is available, but no longitudinal study is known that investigates the structural stability of both aspects as well as time-specific effects. In this paper, the structural equations approach to the multitrait-multioccasion case is used to obtain more information on this point. In addition, the question of causal predominance arises: does worry influence emotionality during a certain time period, or vice versa? This question was explored by cross-lagged panel analysis. (Author/GK)

Ralf Schwarzer, Matthias Jerusalem & Bernward Lange *

A longitudinal study of worry and emotionality

Introduction

In recent research the assessment of worry and emotionality as separate components of test anxiety has become a salient point. Because of theoretical advances in this field it seems to be necessary to include both aspects in the measures that are used to assess test anxiety. Some literature on this distinction is available today but no longitudinal study is known that investigates the structural stability of both aspects as well as time-specific effects. By using the structural equations approach to the multitrait-multioccasion case we tried to obtain more information on this point. In addition, the question of causal predominance arises. Does worry influence emotionality during a certain time period or vice versa? This question was explored by cross-lagged panel analysis.

Theory

The cognitive orientation in psychology has led to more insight into the process of anxious arousal in evaluative situations. I. Sarason (1960, 1975) suggested that stress elicits a tendency to worry about possible failure and to direct more attention to self-related thoughts. The direction of attention hypothesis claims that highly test-anxious individuals turn their task-relevant cognitions into task-irrelevant cognitions as soon as the situation is appraised as threatful (Wine 1971, 1980). In test situations the evaluation of one's performance can be appraised as a threat to self-esteem. Highly test-anxious individuals are concerned with possible failure and self-doubts (Heckhausen 1980). They worry about their performance and direct their attention to the self as actor instead of to task at hand. This cognitive component of state test anxiety is responsible for the debilitating effect of anxiety on academic achievement. Autonomous arousal on the other hand seems to be less important in affecting the outcome in evaluative situations.

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Measures of test anxiety often do not measure exactly what their name denotes. Cognitive and emotional components of anxiety are confounded. Therefore it is hard to demonstrate the specific achievement debilitating impact that is due to the cognitive component only. Nicholls (1976) has shown that some of the items of the Test Anxiety Scale for Children (TASC) can be clustered together as a homogeneous subset which measures poor self-evaluation. This is in line with the suggestion of Liebert and Morris (1967) who see test anxiety as composed by worry and emotionality. The worry component refers to cognitions which include concerns about performance, poor self-evaluation, and consequences of failure. The worrying individual does not feel confident about his competence, thinks how much brighter others are, and perceives himself as more vulnerable toward failure. These cognitions are represented by worry items, whereas emotionality items refer to affective-physiological arousal which is experienced by the person in evaluative situations. Emotionality is not the arousal itself but the subjective perception of such internal events. Emotionality items include the beat of the heart, the upset stomach, nervous feelings, uneasiness and so on. Measures designed to assess worry and emotionality are reported by Morris and Liebert (1970), Spielberger et al. (1978, 1980) and Deffenbacher (1980).

In a review of the literature Deffenbacher (1980) concludes that the worry-emotionality distinction has been proved useful in psychological research during the last decade. The separation of these two components has to be seen relatively because they are not orthogonal. The author reports correlation coefficients between r=.55 and r=.76, indicating a moderate to high relationship between worry and emotionality that can be seen as a compromise of convergent and discriminant validity. From a theoretical point of view the components should assess different facets of anxiety, that is, they should be correlated. On the other hand this correlation should not be too high in order to detect validly the cognitive vs. emotional mechanisms in state anxiety. The covariation should be less than what is usual between congeneric tests. In several studies Deffenbacher (1980, 116) has determined the correlation between academic performance and the two aspects of anxiety. The coefficients linking achievement and emotionality were from .07 to .26, the coefficients linking achievement and worry from .26 to .36. This different relationship is consistent with the theory and lends confirmation to previous studies. More important is the stability of these relationships. By partial correlation analysis it could be shown that worry stayed to be correlated with performance when emotionality was partialed out. Worry consistently formed a negative relationship with test performance whereas the findings for emotionality were rather inconsistent. The author also reports some moderator effects of the cognitive component. At low levels of worry for example, emotionality did not debilitate test performance, but at high levels of worry it did. The reverse was true in another study. Further research is needed to clarify the contradictions of such findings.

The above mentioned empirical results support the assumption that in evaluative situations highly test-anxious individuals direct their attention partly away from the task toward self-related topics which in turn leads to a debilitating effect on intellectual performance. The opposite assumption that autonomous arousal is primarily responsible for a disorganized activity seems to be without sufficient empirical confirmation. But a remark of caution is necessary. Emotionality and physiological arousal do not mean the same construct. Emotionality is the perception of experienced arousal by the individual, that is subjective arousal which is only moderately correlated with objective arousal.

Morris and Liebert (1970) found a correlation of r=.54 for this relationship. This has to be considered in interpreting findings based on self-reported worry and emotionality. Another point is the limitation of most findings to state anxiety, not trait anxiety. The concept of worry and emotionality has been originally formulated with respect to test anxiety as a state. Deffenbacher (1980, 124) concludes that, although both components separate out as elements of state anxiety, they may cluster together as elements of trait anxiety. Fortunately, the research of some other authors focusses now on worry and emotionality as components of trait anxiety too. Spielberger et al. (1978) have developed a new instrument called Test Anxiety Inventory (TAI) that allows for a total score as well as two separate scores indicating worry and emotionality. ".... it is not possible to classify the test anxiety scales definitely as either measures of A-Trait or A-State, but the bulk of the evidence is consistent nevertheless with the assumption that test anxiety is a situation-specific measure of anxiety proneness (A-Trait) in test situations" (Spielberger et al. 1978, 186). The correlation between the two components was r=.71 for males and r=.64 for females, which can be seen as a desirable relationship. The worry and emotionality subscales seem to work as separate measures of dispositions indicating a situation-specific tendency to be concerned with one's own performance and to be aware of one's own physiological arousal.

Method

In our study we used a short form of the Test Anxiety Inventory (TAI). The TAI is a recently developed self-report scale that was designed to measure individual differences in test anxiety as a situation-specific trait (Spielberger 1980). It consists of 20 items which are to be responsed by using a four-point rating-scale format. In addition to a total score, separate scores for worry and emotionality can be obtained. There are two 8-item subscales for this purpose. The scales are internally consistent which is demonstrated by median alphas of .88 and .90, respectively.

Spielberger and his collaborators have separated the two components by exploratory factor analysis using varimax rotation. The 8 items of the worry subscale had higher loadings on the worry factor compared to their loadings on the emotionality factor. The reverse was true for the emotionality items.

The German version, which was developed by Hodapp, Laux & Schaffner (1979), is still a preliminary version.*It is designed to assess the two components that are represented by 10 worry items and also 10 emotionality items. In one of our recent studies we gave these items to 1.848 students who attended grades 6 or 9 (Schwarzer 1982 a). We specified a latent trait model with worry and emotionality as unobserved variables both linked to the corresponding 10 items. This model was tested by confirmatory factor analysis. Several respecifications had been necessary. Finally, after eliminating some items a solution could be found that was replicated successfully with another sample. The final worry scale consisted of 6 items, the final emotionality scale consisted of 9 items.

These new measures were used in a longitudinal study with 173 students in West Germany. At the first point in time, in June 1980, the students attended grade 4 in primary school. After this, a transition to secondary school took place where students are grouped into different tracks according to their achievement level. The second point in time was in September 1980, the third point in time was in February 1981 when the students were still attending grade 5. After eliminating all students with missing values the sample size was reduced to N= 126. The data allowed to investigate the stability and change of the two measures and the relationship among them. This was done by using the multitrait-multioccasion approach that was suggested by Jöreskog (1971, 1977, 1979). In addition, the question of causal predominance arised. To answer this question cross-lagged panel analysis was performed. (Kenny, 1979). The most sophisticated method today which can be used to describe an explicit set of theoretically relevant dimensions is <u>confirmatory factor analysis</u> (Bentler 1980, Jöreskog & Sörbom 1978, 1979, Kenny 1979). This is a kind of multivariate analysis with latent variables using structural equations.

* We are grateful to the authors for having the opportunity to use their preliminary version 4 A of the German TAI.

It is not used as a data exploration method but as a hypothesis-testing method. The dimensions are defined in advance with respect to theoretical reasons and previous empirical results. In our study, worry and emotionality are defined as latent variables which are linked each with a set of 10 congeneric items. Every item is defined as an observed variable containing two kinds of variance, common variance by a causal dimension and error variance due to unmeasured and unknown factors. The model can be specified in different ways depending on the hypotheses. For our problem it was necessary to allow for a correlation between the two traits. On the other hand, the errors of the observed variables were not allowed to correlate with each other. Each item was specified as having one loading. This implies that the corresponding loading on the other factor has to be zero. The main question in confirmatory factor analysis is whether the model fits the data. There are two indications to answer this question. A chi-square value informs about goodness of fit. Unfortunately, with large samples this value almost never leads to a good fit. The problem is discussed by Bentler (1980, 428). The LISREL IV program, which we used, delivers another indication of goodness of fit, that is the matrix of residuals. It informs about the precision of the reproduced correlation coefficients compared to the input matrix. A rule of thumb says, there should be no residual coefficient greater than .10. If the fit is satisfying the attention can be directed to the parameter estimates. LISREL yields maximum likelihood estimates of the factor loadings and all other parameters that are specified as free, for example the intercorrelation of the two traits.

The model

Two traits and three occasions had to be analyzed. The variation and the covariation in the six observed variables is to be seen as determined by five systematic sources. The three observed worry measures are influenced by one latent trait (worry) and by three occasion factors, the three observed emotionality measures are influenced by the other latent trait (emotionality) and by the same three occasion factors.

The impact of an occasion factor is comparable to what is usually denoted as method variance.
The specification of three occasion factors is an alternate way to assess longitudinal effects if the errors of measurement are correlated over time. The simplest model would be to establish two trait factors at each point in time, the first two causing the second two, and the second two causing the third two. But in this case the model will not be identified because of autocorrelated errors. If one specifies the uniqueness of each observed variable as to be correlated with itself at each point in time there would be too many free parameters and the model would be underidentified. Therefore we used the multitrait-multi-occasion approach suggested by Jöreskog (1971, 1977, 1979). The model is depicted in figure 1.

/ insert figure 1 here /

The three occasion factors should be unrelated whereas the two trait factors should be related to each other. This is indicated by a path with two arrows. To conduct the analysis we used the LISREL IV program (Jöreskog & Sörbom 1978). Six occasion-related factor loadings, six trait-related loadings, six disturbances and, finally, the inter-relationship of worry and emotionality had to be estimated. This is an amount of 19 free parameters compared to 21 correlation coefficients (including the diagonal of the matrix). But in spite of the still resulting two overidentifying restrictions one of the free parameters turned out to be not identified. Therefore an alternative model was specified. One suggestion made by Alwin (1974) is to assume equal method effects. We have used this procedure already successfully in another study (Schwarzer 1982 b). Occasion factors should not be allowed to have a different impact on worry and emotionality. Both pathes have to be fixed to be equal. The specification of this model is shown in table 1.

A more restricted model would assume that all six occasion-related loadings were fixed to be equal. That is, at each point in time the same amount of occasion-specificity influences each of the six observed variables.
The second model is presented in table 2.
Our concern is to test both models in order to find out which one would yield the best fit to the data.

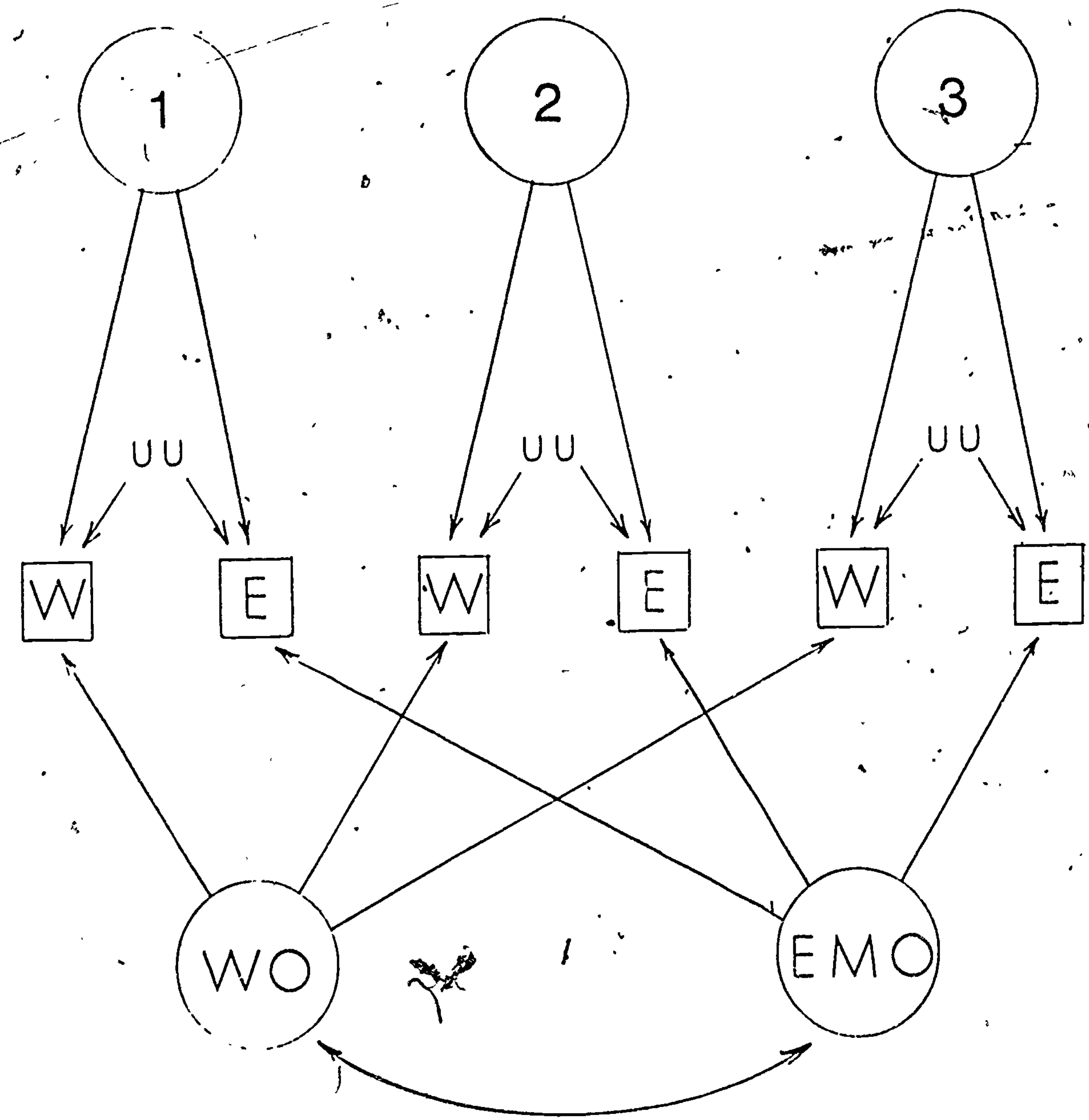

1
2
3
UU
UU
UU
W
E
W
E
W
E
WO
EMO

Table 1: Specification of the equal occasion effects model

LAMBDA Y

	ETA 1	ETA 2	ETA 3	ETA 4	ETA 5
WORRY1	1	0	2	0	0
EMO1	0	3	2	0	0
WORRY2	4	0	0	5	0
EMO2	0	0	0	5	0
WORRY3	7	0	0	0	8
EMO3	0	9	0	0	8

PSI

	EQ. 1	EQ. 2	EQ. 3	EQ. 4	EQ. 5
EQ. 1	[illegible]				
EQ. 2	10	0			
EQ. 3	0	0	0		
EQ. 4	0	0	0	0	
EQ. 5	0	0	0	0	0

THETA EPS

WORRY1	EMO1	WORRY2	EMO2	WORRY3	EMO3
11	12	13	14	15	16

Table 2: **Specification of the overall equal occasion effects model**

LAMBDA Y

	ETA 1	ETA 2	ETA 3	ETA 4	ETA 5
WORRY1	1	0	2	0	0
EMO1	0	3	2	0	0
WORRY2	4	0	0	2	0
EMO2	0	0	0	2	0
WORRY3	[illegible]	0	0	0	2
EMO3	0	7	0	0	2

PSI

	EQ. 1	EQ. 2	EQ. 3	EQ. 4	EQ. 5
EQ. 1	0				
EQ. 2	0	0			
EQ. 3	0		0		
EQ. 4	0		0	0	
EQ. 5	0	0	0	0	0

THETA EPS

	WORRY1	EMO1	WORRY2	EMO2	WORRY3	EMO3
WORRY1	9					
EMO1	0	[illegible]				
WORRY2	0	[illegible]	11			
EMO2	0	0	0	12		
WORRY3	0	0	0	0	13	
EMO3	0	0	0	0	0	14

Results

1. Preliminary findings

First, the internal consistencies of each observed variable were calculated based on samples of about 400 to 600 students. Our sample at hand is a subsample of this group . Table 3 displays the results.

Table 3: Cronbach's Alpha for each variable obtained at two points in time.

	Occasion 2	Occasion 3
Worry	.74	.77
Emotionality	.86	.97

As can be seen, each measure yields a satisfying internal consistency. Also, the test-retest correlations are available. They are included in the multitrait-multioccasion matrix that is the starting point for all following analyses (table 4).

Table 4: Multitrait-multioccasion matrix based on a sample of 123 students.

MATRIX TO BE ANALYZED

	WORRY1	EMO1	WORRY2	EMO2	WORRY3	EMO3
WORRY1	1.000					
EMO1	.572	1.000				
WORRY2	.432	.226	1.000			
EMO2	.384	.414	.593	1.000		
WORRY3	.420	.279	.418	.322	1.000	
EMO3	.319	.352	.252	.436	.569	1.000

Worry at occasion 1 is correlated .432 with worry at occasion 2 and .420 with worry at occasion 3. Worry at occasion 2 is correlated .418 with worry at occasion 3.
Emotionality at occasion 1 is correlated .414 with emotionality at occasion 2 and .352 with emotionality at occasion 3. Emotionality at occasion 2 is correlated .436 with emotionality at occasion 3.
These six coefficients are rather low and rather similar to each other. This indicates a low time stability of both measures during the whole time period. Because of some background knowledge we know that this is due to the changes of reference groups after the transition from primary school to secondary school. The children really change in their perception of threat in academic situations. This result is perfectly consistent with our theoretical assumptions and our previous findings (Schwarzer 1979, 1981, Schwarzer & Bowler 1982, Schwarzer & Jerusalem 1981, Schwarzer & Lange 1980, Schwarzer & Schwarzer 1981).
Another finding is obvious by inspection of the multitrait-multioccasion matrix. The structural relationship between worry and emotionality remains stable over time. Worry and emotionality are correlated .572, .593, and .569 respectively at three points in time. The degree of relationship is in line with previous results (Deffenbacher 1980, Schwarzer 1982 a).

2. The test of the two structural equation models

LISREL analysis of the equal occasion effects model yielded the following estimates (table 5).

Table 5: LISREL estimates for the equal occasion effects model

LISREL ESTIMATES

LAMBDA Y

	ETA 1	ETA 2	ETA 3	ETA 4	ETA 5
WORRY1	.669	0.000	.539	0.000	0.000
EMO1	0.000	.549	.539	0.000	0.000
WORRY2	.653	0.000	0.000	.511	0.000
EMO2	0.000	.756	0.000	.511	0.000
WORRY3	.628	0.000	0.000	0.000	.549
EMO3	0.000	.601	0.000	0.000	.549

PSI

	EQ. 1	EQ. 2	EQ. 3	EQ. 4	EQ. 5
EQ. 1	1.000				
EQ. 2	.714	1.000			
EQ. 3	0.000	0.000	1.000		
EQ. 4	0.000	0.000	0.000	1.000	
EQ. 5	0.000	0.000	0.000	0.000	1.000

THETA EPS

	WORRY1	EMO1	WORRY2	EMO2	WORRY3	EMO3
WORRY1	.257					
EMO1	0.000	.394				
WORRY2	0.000	0.000	.315			
EMO2	0.000	0.000	0.000	.184		
WORRY3	0.000	0.000	0.000	0.000	.306	
EMO3	0.000	0.000	0.000	0.000	0.000	.339

TEST OF GOODNESS OF FIT
CHI SQUARE WITH 5 DEGREES OF FREEDOM IS 1.6004
PROBABILITY LEVEL = .9012

RESIDUALS : S - SIGMA

	WORRY1	EMO1	WORRY2	EMO2	WORRY3	EMO3
WORRY1	.005					
EMO1	.019	.014				
WORRY2	-.005	-.030	-.003			
EMO2	.023	-.001	-.021	-.016		
WORRY3	.001	.034	.009	-.016	.000	
EMO3	.032	.022	-.029	-.018	-.001	-.002

Table 6: LISREL estimates for the overall equal occasion effects model

LISREL ESTIMATES

LAMBDA Y

	ETA 1	ETA 2	ETA 3	ETA 4	ETA 5
WORRY1	.672	0.000	.533	0.000	0.000
EM01	0.000	.554	.533	0.000	0.000
WORRY2	.644	0.000	0.000	.533	0.000
EM02	0.000	.744	0.000	.533	0.000
WORRY3	.633	0.000	0.000	0.000	.533
EM03	0.000	.610	0.000	0.000	.533

PSI

	EQ. 1	EQ. 2	EQ. 3	EQ. 4	EQ. 5
EQ. 1	1.000				
EQ. 2	.715	1.000			
EQ. 3	0.000	0.000	1.000		
EQ. 4	0.000	0.000	0.000	1.000	
EQ. 5	0.000	0.000	0.000	0.000	1.000

THETA EPS

	WORRY1..	EM01 ..	WORRY2..	EM02 ..	WORRY3..	EM03 ..
WORRY1	.258					
EM01	0.000	.393				
WORRY2	0.000	0.000	.314			
EM02	0.000	0.000	0.000	.188		
WORRY3	0.000	0.000	0.000	0.000	.309	
EM03	0.000	0.000	0.000	0.000	0.000	.338

TEST OF GOODNESS OF FIT

CHI SQUARE WITH 7 DEGREES OF FREEDOM IS 1.6940

PROBABILITY LEVEL = .9748

RESIDUALS : S - SIGMA

	WORRY1..	EM01 ..	WORRY2..	EM02 ..	WORRY3..	EM03 ..
WORRY1	.007					
EM01	.022	.016				
WORRY2	-.000	-.029	-.012			
EM02	.027	.001	-.033	-.026		
WORRY3	-.005	.028	.011	-.015	.007	
EM03	.026	.014	-.029	-.018	.009	.006

This is a nearly perfect solution. For reasons of comparison let us first display the alternative model (table 6). Also, this is a nearly perfect solution. Both results are very similar to each other. There is no significant difference in goodness of fit.

/ insert table 6 here //

For the interpretation we now use the second result. The worry factor has loadings of .672, .644 and .633 at the three points in time. The loadings of the emotionality factor are .554, .744 and .61. The six pathes of the three latent time variables are all .533 indicating that there is a respectable amount of occasion-specific variance at each point in time. The correlation between the worry and the emotionality factor is .715. This is more than expected but it is still in line with the coefficients reported in the literature (Deffenbacher 1980, Schwarzer 1981, 1982 a). The observed correlations had been .57, .59 and .57. The now obtained latent correlation exceeds these values because it is cleaned from other sources of variance. The coefficient of .715 can be seen as the "true" correlation. The uniqueness differs between the observed variables. Emotionality is strained by a high disturbance at the first point in time (.393) but is very reliable at the second point (.188). The whole model yields a nearly perfect fit as can be seen by the low chi-square value of 1.69. Also, the matrix of residuals does not contain any coefficient that exceeds a value of .033. The original correlation could have been reproduced nearly perfectly.

The decomposition of effects in table 7 shows the distribution of the variance components over trait, occasion and uniqueness. As can be seen most of the variance is due to the latent dimensions worry and emotionality . Occasion-specifity and uniqueness share the rest. In sum, we have confirmed a very useful causal model with longitudinal data avoiding the problem of autocorrelated errors.

Table 7: Decomposition of effects

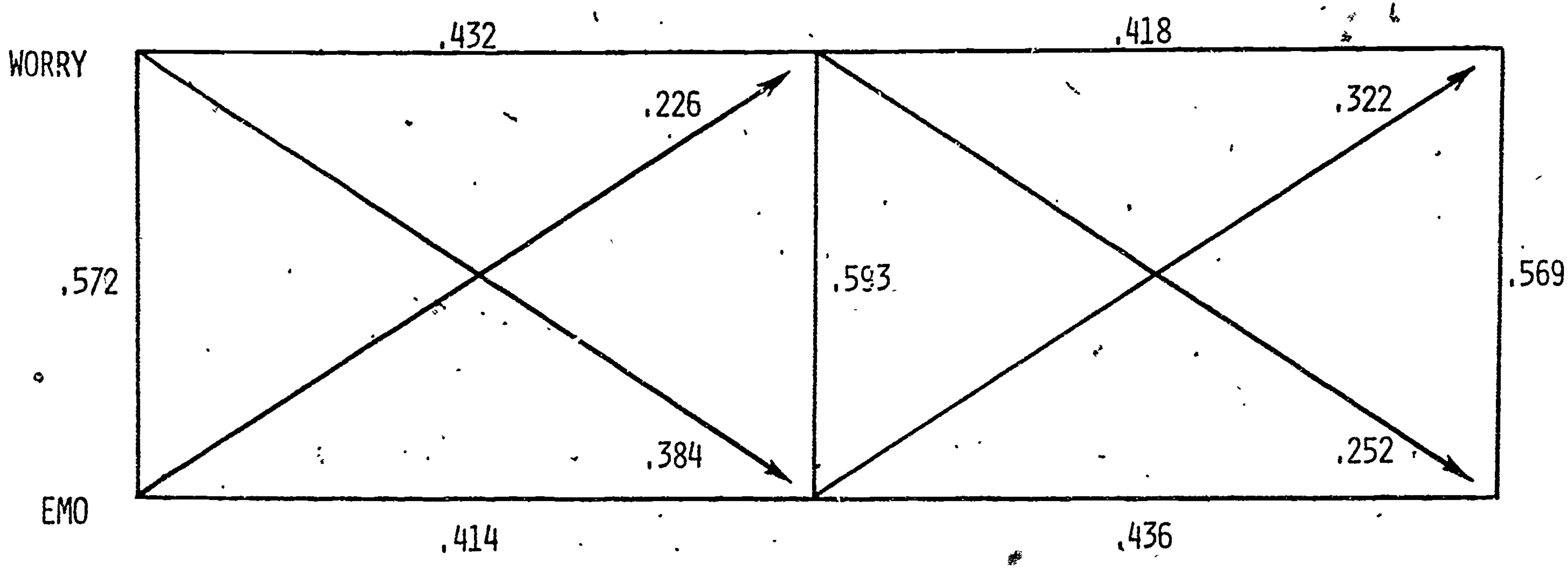
	Trait	Occasion	Uniqueness
Worry 1	.452	.284	.258
Emotionality 1	.307	.284	.393
Worry 2	.415	.284	.314
Emotionality 2	.554	.284	.188
Worry 3	.401	.284	.309
Emotionality 3	.372	.284	.338

3. Cross-lagged panel correlation

Another strategy that can be employed if a structural equation model is not testable because of identification problems is cross-lagged panel correlation (CLPC). This is a research method which is recommended with caution by Cook & Campbell (1979), Kenny (1979) and others and which is refused by Rogosa (1980) and others. For details, the reader is referred to these references. In our case there are no objections against an exploratory use of this method since the necessary prerequisites are fulfilled. Most important of all, stationarity is nearly perfect because the three synchronous correlations are .572, .593, and .569. Also the six autocorrelations are similar to each other. The research question is if worry causes emotionality over time. Our theory predicts that the cognitive appraisal of threat leads to self-related concerns like self-doubts and self-derogation which in turn leads to emotional arousal. This is a state-specific assumption that may not be valid on the trait level. But in the course of personality development a high worry disposition may be a precursor of a high emotionality disposition. The test of each pair of cross-lagged correlations shall shed more light on this point. Figure 2 displays the design and the data.

/ insert figure 2 here /

The first pair of cross-lagged correlations to be tested linking occasions 1 and 2 is .384 versus .226. A test mentioned by Kenny (1979, 239) yields $z=1.67$ which is significant on the .05 level (one-tailed) supporting our theoretical assumptions. The second pair linking occasions 2 and 3 is .252 versus .322. A $z= .73$ results which is not significant. The third pair linking occasions 1 and 3 is .319 versus .279. Also, this is not significant ($z= .41$). So overall there is little support for our hypotheses. Only one of three tests led to the rejection of the null hypothesis. On the other hand there is no indication that emotionality causes worry. The direction of this causal relationship has been ruled out by our findings.


.432
.418
WORRY
.226
.322
.572
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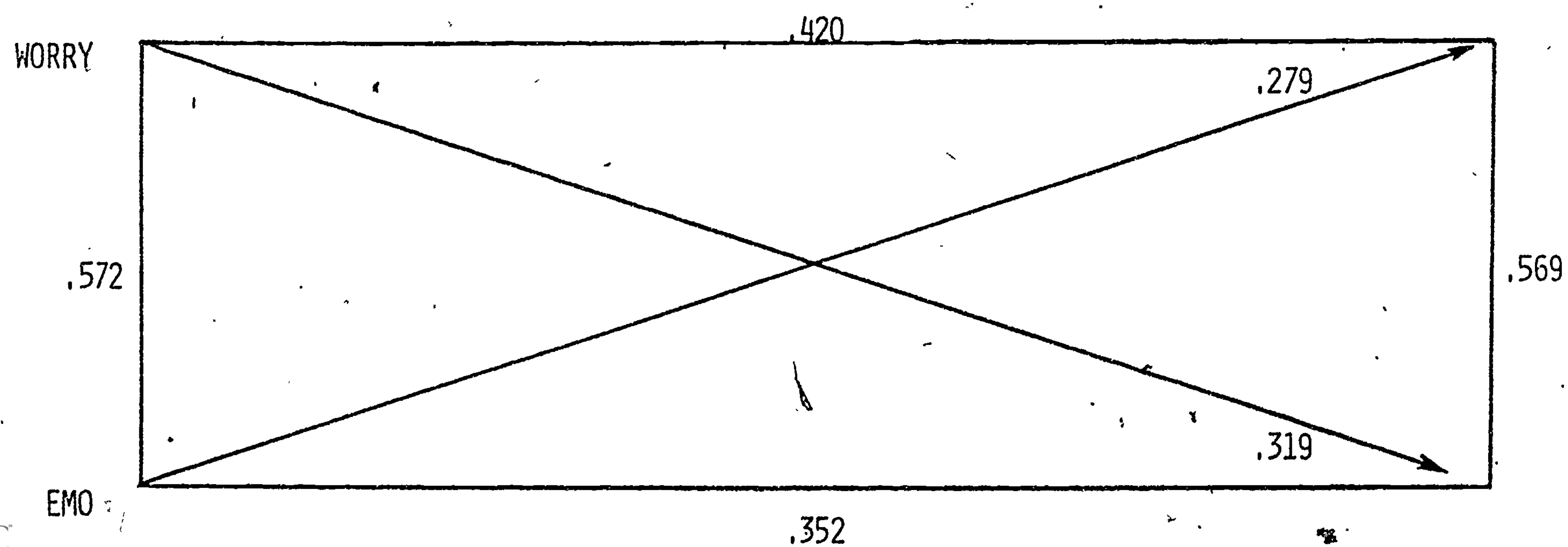
.569
.384
.252
EMO
.414
.436


.420
WORRY
.279
.572
.569
.319
EMO
.352

Conclusions

Worry and emotionality as distinguishable facets of test anxiety were investigated in a panel study. The objectives were (1) to find out the structural stability of these variables with respect to occasion-specific variance, and (2) to test the causal predominance of worry over emotionality. The scales were presented at three points in time every four months to 173 students who experienced a transition from grade 4 to grade 5. This means in West Germany a transition from one type of school to another. Therefore the stabilities of measures over time are rather low.

On the other hand the structural equation analysis yields substantial results indicating the existence of two construct factors and three occasion factors as predicted by theory. The LISREL model that explicitly specified a correlation between the two constructs and orthogonality for all other dimensions was confirmed. Also, the analysis of equal occasion effects turned out to be adequate. A decomposition of effects clarified the variance components due to trait, occasion and uniqueness.

The question of causal predominance was answered by cross-lagged panel analysis.

There was support in one of three cases that worry is a causal precursor of emotionality. It may be possible that this assumption is limited to the state level and cannot be generalized to the trait level.

References

Alwin, D. F.: Approaches to the interpretation of relationship in the multitrait-multimethod matrix. In: H. L. Costner (Ed.): Sociological Methodology 1973-1974. San Francisco: Jossey-Bass 1974, 79-105.

Bentler, P. M.: Multivariate Analysis with Latent Variables: Causal Modeling. Annual Review of Psychology 1980, 31, 419-456.

Cook, T. D. & Campbell, D. T: Quasi-experimentation. Design and analysis issues for field settings. Chicago: Rand McNally 1979.

Deffenbacher, J. L.: Worry and Emotionality in Test Anxiety. In: I. G. Sarason (Ed.): Test Anxiety. Hillsdale: Erlbaum 1980, 111-128.

Heckhausen, H.: Task-irrelevant cognitions during an exam: Incidence and effects. In: Krohne, H. W., Laux, L. (Eds.): Achievement, stress and anxiety. Washington: Hemisphere 1980.

Hodapp, V.: Causal Inference from Non-Experimental Research on Anxiety and Educational Achievement. In: H. W. Krohne und L. Laux (Eds.): Achievement, Stress and Anxiety. Washington: Hemisphere 1980.

Jöreskog, K. G.: Statistical estimation of structural models in longitudinal-developmental investigations. In: J. R. Nesselroade & P. B. Baltes (Eds.): Longitudinal research in the study of behavior and development. New York: Academic Press 1979, 303-352.

Jöreskog, K. G.: Structural equation models in the social sciences: Specification, estimation and testing. In: P. R. Krishnaiah (Ed.) Applications of Statistics. Amsterdam: No. Holland 1977, 265-287.

Jöreskog, K. G.: Statistical analysis of sets of congeneric tests. Psychometrika, 1971, 109-133.

Jöreskog, K. G. & Sörbom, D.: LISREL Analysis of Linear Structural Relationships by the Method of Maximum Likelihood. Version IV. Chicago: NER 1978.

Jöreskog, K. G. & Sörbom, D.: Advances in Factor Analysis in Structural Equation Models. Cambridge, Mass.: Abt. Books 1979.

Kenny, D. A.: Correlation and causality. New York: Wiley 1979.

Liebert, R. M., Morris, L.W.: Cognitive and emotional components of test anxiety: A distinction and some initial data. Psychological Reports, 1967, 20, 975-978.

Morris, L. W., Liebert, R. M.: Relationship of cognitive and emotional components of test anxiety to physiological arousal and academic performance. Journal of Consulting and Clinical Psychology, 1970, 35, 332-337.

Nicholls, J. G.: When a Scale Measures More than its Name denotes: The case of the Test Anxiety Scale for Children. Journal of Consulting and Clinical Psychology 1976, 44, 976-985.

Rogosa, D.: A critique of cross-lagged correlation. Psychological Bulletin, 1980, 88, 245-258.

Sarason, I. G.: Anxiety and self-preoccupation. In: I. G. Sarason & C. D. Spielberger (Eds.): Stress and Anxiety. Vol. 2. Washington: Hemisphere 1975, 27-44.

Sarason, I. G.: Empirical Findings and Theoretical Problems in the Use of Anxiety Scales. Psychological Bulletin, 1960, 57, 403-415.

Schwarzer, C. & Schwarzer, R.: Achievement Anxiety with Respect to Reference Groups in School. Paper presented at the AERA conference in Los Angeles, 1981.

Schwarzer, R.: Bezugsgruppeneffekte in schulischen Umwelten. Zeitschrift für Empirische Pädagogik 1979, 3, 153-166 (a).

Schwarzer, R.: Stress, Angst und Hilflosigkeit. Stuttgart: Kohlhammer 1981.

Schwarzer, R.: Worry and emotionality as separate components in test Anxiety. International Review of Applied Psychology, 1982 (a).

Schwarzer, R.: Convergent and discriminant validation in personality assessment: techniques for distinguishing trait and method variance. Unpublished Paper. Aachen 1982 (b).

Schwarzer, R. & Jerusalem, M.: Selbstwertgefühl in schulischen Bezugsgruppen. In: W. Michaelis (Hg.) Bericht über den 32. Kongreß der Deutschen Gesellschaft für Psychologie. Göttingen: Hogrefe, 1981, 643-646.

Schwarzer, R. & Lange, B.: Zur subjektiven Lernumweltbelastung von Schülern. Unterrichtswissenschaft 1980, 8, 358-371

Spielberger, C. D., Gonzales, H. P., Taylor, C. J., Algaze, B. & Anton, W. D.: Examination Stress and Test Anxiety. In: C. D. Spielberger & I. G. Sarason (Eds.): Stress and Anxiety. Vol. 5 New York: Hemisphere/Wiley 1978, 167-191.

Spielberger, C. D.: Test Anxiety Inventory. Preliminary Professional Manual. Palo Alto: Consulting Psych. Press 1980.

Wine, J.: Test Anxiety and the direction of attention. Psychological Bulletin 1971, 76, 92-104.

Wine, J. D.: Cognitive-Attentional Theory of Test Anxiety. In: I. G. Sarason (Ed.): Test Anxiety. Hillsdale: Erlbaum 1980, 349-385.