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between the NEO PI-R and the Achievement Motives Scale (AMS)

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## Abstract

Theoretical and empirical relations between personality traits and motive dispositions were investigated by comparing scores on the NEO PI-R and the Achievement Motives Scale (AMS) among 315 undergraduate psychology students. The results showed that all of the NEO PI-R factors except agreeableness were significantly correlated with the motive for success (Ms) and the motive to avoid failure (Mf). A structural equation model (SEM) showed that Ms was predicted by extraversion, openness, conscientiousness, and neuroticism (negative relation), and Mf was predicted by neuroticism and openness (negative relation). Although both of the achievement motives were predicted by several personality factors, Ms was most strongly predicted by openness, and Mf was most strongly predicted by neuroticism. These findings extended previous research on the relationship between personality traits and achievement motives, and provided a basis for the discussion of motive dispositions in personality. The results also added to the construct validity of the AMS.

## Introduction

The five-factor model (FFM) includes motivational aspects of personality (McCrae & Costa, 1997), and previous research has shown a relationship between personality traits and motive dispositions (Piedmont, McCrae, & Costa, 1991). In particular, dispositional achievement motives are considered to be useful for research on job performance and academic achievement (Heggstad & Kanfer, 2000; Judge & Ilies, 2002). But the theoretical relationship between traits and motives has been debated (e.g. Pervin, 1994), and attempts to empirically relate personality with motivational variables have produced inconsistent results (Gellatly, 1996). Nevertheless, self-report measures of the achievement motives by means of the Achievement Motives Scale (AMS) (Nygård & Gjesme, 1973) have been utilized in several studies (Gjesme, 1983a; Gjesme, 1983b; Man, Nygård, & Gjesme, 1994; Martinsen, 1994; Halvari, 1997; Cock & Halvari, 1999; Halvari & Kjørmo, 1999; Tanaka & Yamauchi, 2001). This inventory measures the motive for success (Ms) and the motive to avoid failure (Mf) as expressions of latent personality dispositions in achievement motives. However, there has not been any previous attempt to actually explore the relationship between scores on the AMS and measures of personality. Finally, some previous studies have shown that several of the items in the AMS had to be omitted to produce the Ms and Mf factors (Hagtvet & Benson, 1997; Hagtvet & Zau, 2000). Hence, the purpose of the present study is to further examine the construct validity of the AMS by exploring factor structure and convergent/discriminant patterns of relations with personality traits. This study may also contribute to a theoretical discussion of the relationship between motive dispositions and personality.

Personality traits may be either descriptive summaries of attributes (e.g. Alston, 1975) or explanatory and internal causes of behavior (e.g. Hampshire, 1953; Eysenck, 1990). This distinction may be traced back to Allport (1937), who emphasized the difference between traits that initiate behavior (motives) and traits that are more stylistic or expressive in nature.

Furthermore, Stagner (1937) considered traits to be more descriptive than explanatory, and motives were necessary for the explanation of behavior. Similarly, Murray (1938) argued for a separation between motives and traits when he remarked that traits are enduring over time, and manifested in behaviour, whereas needs (motives) can be present within the organism without becoming manifest in behaviour.

Another problem has been that the excessive number of traits in research on personality has made it difficult to assimilate with motives (Judge & Ilies, 2002). However, in recent decades, the five factor model (FFM) of personality traits, as measured by means of the NEO PI-R (Costa & McCrae, 1992), has proven to be the most widely accepted structure of personality. This model has been replicated in many studies (Goldberg, 1990) across cultures and measures (John & Srivastava, 1999), and there is evidence of substantial heritability of these traits (Loehlin, 1992).

Mitchell & Daniels (2003) claimed that research on personality is now the fastest growing area in the motivation literature. After the influence of situational factors on motivation dominated the 1970s and early 1980s, there has been a renewed interest in stable motive disposition. Heggstad and Kanfer (2000) identified two main sources of this renewed interest: first, research on the underlying structure of personality has examined the effects of traits as predictors of academic achievement and job performance/motivation, in particular the positive motivational effect of conscientiousness and the negative effect of neuroticism. Second, goal theories of motivation assume that stable motive dispositions are rooted in personality and affect more proximal motivational processes through their influences on particular goals that individuals adopt in an achievement situation (e.g. Elliott & Church, 1997).

The achievement motive (McClelland, Atkinson, Clark and Lowell, 1953; Atkinson & Feather; 1966; Nygård, 1977; Raynor, 1981; Gjesme, 1983a; Heckhausen, 1986) is an

important description of individual motive dispositions with a foundation in personality. This construct is based upon the theory of need for achievement, which has two critical components: (1) A set of internalized standards that represent personal achievement or fulfillment, and (2) A theoretical energizing or motivational condition that impels the person toward attempts to meet these standards (McClelland, 1987).

Two independent, learned achievement motives have been posited, both referring to the latent capacity to anticipate affect in situations where performance is evaluated either by the agent or an observing part (Christophersen & Rand, 1982). The anticipation of positive affect related to the motive for success (Ms) is likely to motivate the individual to engage in the situation, while the anticipation of negative affect in the motive to avoid failure (Mf) is assumed to result in resistance towards engaging in the situation. The Ms mainly describes the anticipation of pleasure, like pride, in obtaining a goal, while the Mf mainly describes anticipation of unpleasantness or fear if a goal is not obtained. The latter motive has also been seen as related to test anxiety (Hagtvet & Renmin, 1992). The general implication of these motivational orientations for learning and problem solving is that Ms facilitates while Mf hampers acquisition of knowledge. Similarly, Elliot and Church (1997) viewed achievement goals as cognitive-dynamic manifestations of two underlying competence-relevant motives: the need for achievement and the need to avoid failure, and Atkinson, 1957 considered achievement motivation and fear of failure as the generalized desire to succeed and the generalized desire to avoid failure.

### *Measurement of Achievement Motivation*

Measurement of the achievement motive was originally based upon content analyses of TAT stories (cf. McClelland et al., 1953). This projective measure has been criticized for lack of validity and reliability (Entwisle, 1972), and it is rather time consuming and

complicated to administer. However, early attempts to construct a questionnaire measure were not promising, and McClelland (1958) and Atkinson & Feather (1966) concluded that objective motive scales did not work. Gjesme and Nygård (1970) pointed out that this conclusion was based upon research using instruments such as the Edwards Personal Preference Schedule (Edwards, 1959) and the Achievement Risk Preference Scale (Atkinson & O'Connor, 1966) in which the items were formulated in terms of two different statements, between which the subject had to choose. Hence, these inventories presupposed dependency between the motives, such that one motive is weak when the other is strong (cf. McClelland & Liberman, 1949). However, it is not obvious either on theoretical or empirical grounds that Ms is the direct opposite of Mf. Hence, a subsequent development of a measurement of the achievement motive presupposed independency between Ms and Mf to be meaningful (e.g. Atkinson, 1964; Kuhl, 1978), and it became common to measure these two motives by means of different instruments.

Gjesme & Nygard (1970) considered the possibility of constructing a questionnaire for measuring both aspects of the achievement motive, and the Achievement Motive Scale - AMS (Man, Nygård & Gjesme, 1994) was subsequently developed. In contrast to promising results obtained by external reference studies (Rand, 1991), Hagtvet & Benson (1997) failed to obtain the expected factor structure of the Mf scale, and Hagtvet & Zou (2000) had to delete 13 of the 30 items in the AMS in order to obtain a satisfactory factor structure. However, this is in accordance with previous research which showed a lack of simple structure when analyzing all 30 items (Bø & Rand, 1979; Bø, Christophersen, & Rand, 1980; Christophersen & Rand, 1982). Hence, there is a need to further investigate the factor structure of the AMS.

#### *The Five-factor Model and the Achievement Motives*

The relationship between achievement motives and the five-factor model may be investigated by exploring the role of emotions. In fact, affective dispositions are considered to

be an important approach to the study of basic dimensions of personality. The primary focus has been positive and negative emotionality/temperament (Tellegen, 1985; Watson & Clark, 1993; Clark & Watson, 1999).

Even though emotions are not identical to motives, they are an important part of the motivational systems, because they indicate the presence of natural incentives. Emotions also accompany motives, amplify their effect on behavior, and intensify reactions subsequent to success or failure in satisfying a motive (McClelland, 1987). Finally, an incentive mechanism associated with motives is based on emotional arousal. The Ms includes the anticipation of positive affect, which is also one of the indicators of extraversion (Watson & Clark, 1997). The Ms should also be related to openness, in particular because this factor comprises openness to feelings and activities. Because the Ms is supposed to result in more engagement in achievement tasks, it should also be associated with conscientiousness. Conversely, the Mf, which is associated with negative affect, should be positively related to neuroticism due to the negative affect associated with the content of this factor (anxiety, angry hostility, depression, self-consciousness, impulsivity, and vulnerability to stress). The Mf may also be negatively related to extraversion, openness, and conscientiousness, because these factors represent approach rather than avoidance motivation.

In sum, both achievement motives and personality traits refer to relatively stable aspects of individual variance, and they are both linked to aspects of emotions and affective arousal. Whereas the present research design prevents experimental control of the causal relationship between personality and motives, there are theoretical reasons to assume the FFM of personality as a predictor of the achievement motives. For example, most trait theorists have argued in favor of the strong heritability of most personality traits (e.g. Loehlin, 1992). While the achievement motives are considered to be stable, they are shaped by individual differences in experience with success and failure in achievement situations (Christophersen



& Rand, 1982). Finally, it is theoretically interesting to investigate how combinations of personality traits predict the achievement motives, as personality also may be considered as an antecedent of these motive dispositions (cf. Elliot & Church, 1997).

Previous research has shown that the five-factor model domain scores correlate meaningfully with scores on inventories measuring individual differences associated with motives, as in Murray's (1938) Adjective Check List, where achievement is associated with extraversion and conscientiousness (Shock, Greulich, Andres, Arenberg, Costa, Lakatta, & Tobin, 1984; Piedmont, 1998). Craig, Loheidi, Rudolph, Leifer, and Rubin (1998) found that achievement was correlated with conscientiousness, but not with extraversion in a study of 147 graduate psychology students. In a comparison between the five-factor model and achievement motivation, using the Presantie-Motivation-Test in a sample of 900 university students, Busato, Prins, Elshout, & Hamaker (2000) found that the achievement motives were significantly correlated with conscientiousness ( $r = .57$ ), extraversion ( $r = .22$ ), openness ( $r = .14$ ) and agreeableness ( $r = .13$ ). However, some of these correlations are no higher than what has been labeled as the crud factor, which is the tendency to interpret significant, but trivial, relations which emerge due to a large sample size (Meel, 1990).

Finally, a meta-analytic study by Judge and Ilies (2002) of the relationship between diverse performance motives (goal-setting, expectancy, and self-efficacy motivation) and personality traits indicated that neuroticism and conscientiousness were the strongest and most consistent correlates of performance motivation, whereas the other three factors in the FFM appear to be of lesser significance and/or virtually unstudied. The traits in the FFM had an average multiple correlation of .49 with the motivational variables. (Judge & Ilies, 2002).

With reference to the above theoretical considerations and previous research findings, it is expected that the results in the current study will support the following hypotheses:

1. It is possible to produce a factor structure of items measuring the achievement motives by omitting some of the items in the AMS.
2. The Ms will be positively related to extraversion, openness and conscientiousness, and negatively related to neuroticism
3. The Mf is expected to be positively related to neuroticism, and negatively related to extraversion, openness, and conscientiousness.

## Method

### *Subjects*

A total of 315 undergraduate students participated. Of the total, 151 were undergraduate psychology students, including 33 male and 116 female students (2 did not identify sex). Their age ranged between 18 and 44 years (mean age = 21.4). The other part of the sample consisted of 164 students taking an introductory course in philosophy and logic, including 56 male and 105 female students (3 did not identify sex). The age ranged between 18 and 32 (mean age = 20.2).

### *Measures*

*Personality.* The revised NEO Personality Inventory (Costa & McCrae, 1992) is a 240 item inventory measuring the five major personality dimensions of neuroticism (anxiety, angry hostility, depression, self-consciousness, impulsivity, vulnerability to stress), extraversion (warmth, gregariousness, assertiveness, activity, excitement seeking, positive emotions), openness (fantasy, aesthetics, feelings, activity, ideas, values), agreeableness (trust, straightforwardness, altruism, compliance, modesty, tender-mindedness) and conscientiousness (competence, order, dutifulness, achievement, self-discipline, deliberation)

by means of statements. Studies have shown that internal consistency estimates for the five domains of the NEO PI-R have ranged from 0.86 to 0.95, and it has been shown to have good content, criterion-related, and construct validity (Costa, 1996). The present Norwegian version of this inventory has replicated the factor structure and it has shown good internal consistency (alpha) as compared to international research (Martinsen, Nordvik, & Østbø, 2003). The participants indicate their relative agreement with statements by setting a mark along a 5-point scale with anchors of 1: strongly disagree and 5: strongly agree. A principal component analysis (varimax rotation) of data in the present study produced the expected five factor solution (eigenvalue > 1) accounting for 58.3 % of the variance.

*The achievement motives.* The Achievement Motivation Scale (AMS) (Nygård & Gjesme, 1973) consists of 30 items which indicate perceived affect in achievement situations. Two factors are generally extracted from the items, reflecting the motive for success (Ms), e.g. "I feel pleasure when working on tasks that are somewhat difficult for me" and the motive to avoid failure (Mf), e.g. "I dislike working with tasks when I am not sure about the outcome". As the AMS has shown inconsistent factor loadings in previous research (Hagtvet & Benson, 1997; Hagtvet & Zou, 2000), an EFA was performed in order to further investigate the psychometric properties of this scale, as described in the results section below.

## Results

### *Factor analysis of the AMS*

A principal component analysis (oblique rotation) of the 30 AMS items indicated that 12 of the items, which had weak or inappropriate factor loadings, should be excluded in order to produce a satisfactory factor solution. Kaiser's eigenvalue > 1 criterion produced a 4-factor solution for the remaining 18 items. However, this criterion may produce consistent inaccuracy, especially overestimation of the number of factors, while the visual scree test

performs reasonably well in most cases (Nasser, 1997). Hence, theoretical assumptions and visual inspection of the scree plot (Figure 1) indicated a 2-factor solution, which accounted for 48.69% of the variance (Table 1).

The remaining items (Ms: 4, 5, 6, 7, 8, 10, 12, 14, 15; Mf: 18, 19, 21, 22, 24, 25, 26, 28, 30) showed some overlap with the remaining items in Hagtvet and Zou's (2000) study (Ms: 1, 2, 4, 6, 9, 12, 13, 14, 15; Mf: 17, 18, 19, 21, 22, 24, 25, 30). Finally, 6 items were retained in Hagtvet and Benson's (1997) factor analysis of the Mf (item 19, 21, 22, 24, 25, and 30). Hence, the present factor analysis is somewhat comparable to results from previous research, particularly with respect to the Ms.

[Figure 1 about here]

[Table 1 about here]

#### *Descriptive statistics and correlations*

Correlation analysis and descriptive statistics of the NEO PI-R and AMS variables are displayed in Table 2. The skewness and kurtosis values indicated normal distributions for all scales, except for agreeableness, which had a high kurtosis value. The descriptive values of the Ms and the Mf were based upon the modified AMS-scale, as shown in Table 2. The correlation analysis showed that Ms and Mf were negatively correlated ( $r = -.29, p < .01$ ), indicating a relatively high degree of independence between Ms and Mf. As regards the relationship between the NEO PI-R and the AMS, Ms was positively correlated both with extraversion ( $r = .33, p < .01$ ), openness ( $r = .39, p < .01$ ) and conscientiousness ( $r = .33, p < .01$ ), but had also a minor negative correlation with neuroticism ( $r = -.16, p < .01$ ). The Mf was most strongly correlated with neuroticism ( $r = .56, p < .01$ ), but this factor also had minor significant negative correlations with extraversion, openness and conscientiousness. As predicted, agreeableness was not correlated significantly either with the Ms or the Mf.

[Table 2 about here]

*Structural equation modeling*

A structural equation model (path analysis) was developed by means of the AMOS (Arbuckle, 1999) in order to investigate the relative contribution of each personality factor as predictor of the Ms and the Mf scales (Figure 2). This combination of developing a measurement model for the instrument (as described above) in combination with a subsequent SEM is in basic accordance with recommendations by Jöreskog (1993). This model showed good fit to the data ( $\chi^2 = 1.57$ ,  $df = 2$ ,  $p < .46$ ,  $\chi^2/df$  ratio = .78, RMSEA = .00, and CFI = 1.00) according to recommended cut-off values for these fit indexes (Browne & Cudeck, 1993; Hu & Bentler, 1995; Byrne, 2001).

[Figure 2 about here]

All of the included personality factors predicted a total of 35.5% of the variance in Ms, but openness was the strongest predictor. Neuroticism and openness (negative relation) predicted a total of 39.2 % of the variance in Mf. Agreeableness was not included in this analysis, because there was no theoretical reason to do so. Also, the lack of correlations between agreeableness and Ms/Mf also implies that the presence of any such relation in a multivariate analysis would indicate a suppressor effect (cf. Tabachnick & Fidell, 2007).

## Discussion

The present study investigated the relation between personality factors and achievement motives due to the theoretical and presumably empirical similarities between these constructs, and the lack of previous studies on the relationship between the NEO PI-R and the AMS. An additional purpose was to further investigate the factor structure of the AMS.

The exploratory factor analysis supported the hypothesized assumption that it was possible to reproduce the two factors of Ms and Mf by omitting some of the items. More

specifically, 12 of the items did not fit appropriately on the two theoretically defined factors. Hence, these items may be regarded as superfluous or in need of a revision, in particular since this omission of items is comparable to previous findings (Hagtvet & Benson, 1997; Hagtvet, & Zou, 2000).

As regards the hypothesized relationship between personality traits and achievement motives, the SEM showed that a substantial amount of Ms and Mf was accounted for by the NEO PI-R domains. Hence, if we assume a theoretical causality between personality and motives, the Ms was predicted by a low level of neuroticism, in combination with a high level of extraversion, openness and conscientiousness. The Mf was mainly predicted by neuroticism, but also by openness (inverse prediction). Hence, several personality factors seem to be of relevance as predictors of these achievement motives.

These findings clearly add to the construct validity of the AMS, because they show appropriate convergent and divergent patterns of relations with domain scores on the NEO PI-R. But whereas the strong relationship between neuroticism and Mf was expected, it was somewhat surprising that Ms was more strongly predicted by openness than by conscientiousness. However, McCrae and Costa (1997) argued that open people are characterized 'both by a particular permeable structure of consciousness and by an active motivation to seek out the unfamiliar' (p. 839), and that this structure is a result of the motivation: An open structure would not provide any clear advantage in the absence of a need for new experience, rather 'it would expose the individual to distracting thoughts, troubling impulses, and cognitive inconsistencies' (p. 840). This shows how motivation in general may be an important aspect of openness, and the present research suggests that the achievement motive may be of particular relevance for this personality trait. Furthermore, Ms is an operationalization of a motive that should predict resultant achievement motivation, and according to McClelland and Koestner (1992), people scoring high on achievement

motivation may be able to sustain the emotion of interest, because they show more persistence when chances for success at a task are reasonable. Nevertheless, the importance of openness as a motivating factor as observed in the present study is interesting to compare with previous research, in which the relationship between openness and motivation is in fact less focused upon (Judge & Ilies, 2002).

Although SEM is also referred to as causal modeling it must be guided by the use of theory (cf. Pearl, 2000; Tabachnick & Fidell, 2007), especially considering the lack of experimental control in the present research. Nevertheless, it may be concluded that the NEO PI-R and the AMS are obviously related. But it is still necessary to measure motive dispositions beyond what is measured by the NEO PI-R, because a considerable amount of the variance in the achievement motives remains unexplained by personality. However, the present study is limited by the lack of any external criterion variable. Hence, the value of the NEO PI-R and the AMS as independent measures of individual differences should also be investigated by testing their predictive validity in achievement settings in future research. Of particular relevance is the hierarchical model developed by Elliot & Church (1997), which shows how latent motive dispositions have an indirect effect on intrinsic motivation and academic achievement via goal orientations. This model may be further developed by including personality traits in order to investigate the role of achievement motives as mediators between personality traits and goal orientation/academic achievement.

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Table 1

Principal component analysis (oblique rotation) of AMS.

AMS	Ms	Mf	comm.
4	.62		.40
5	.70		.49
6	.64		.45
7	.50		.28
8	.69		.48
10	.71		.54
12	.52		.35
14	.78		.61
15	.66		.44
18		.63	.43
19		.66	.44
21		.72	.52
22		.76	.58
24		.69	.48
25		.74	.61
26		.74	.55
28		.76	.58
30		.74	.56

*Note.* Factor loadings < 0.4 deleted

Table 2

Correlation matrix and descriptive statistics of NEO PI-R factors, Ms and Mf, including alpha, mean, st.dev., skewness and kurtosis.

	E	O	A	C	Ms	Mf	alpha	mean (st.dev.)	skew.	kurtosis
N	-.28**	.07	-.11	-.30**	-.16**	.56**	.80	94.77 (21.29)	.36	-.18
E		.41**	.13*	.17**	.33**	-.30**	.66	122.69 (16.60)	-.20	-.18
O			.12*	.02	.39**	-.21**	.77	123.53 (19.05)	-.06	-.18
A				.11	.01	-.02	.68	117.90 (14.51)	-.64	2.44
C					.33**	-.13*	.78	105.87 (17.86)	.13	-.01
Ms						-.29**	.83	54.79 (6.13)	-.10	-.58
Mf						1.00	.88	30.20 (8.39)	.39	-.08

Note: \*\*p < .01, \*p < .05



Figure 1

Scree plot of factors of the achievement motives scale (AMS).

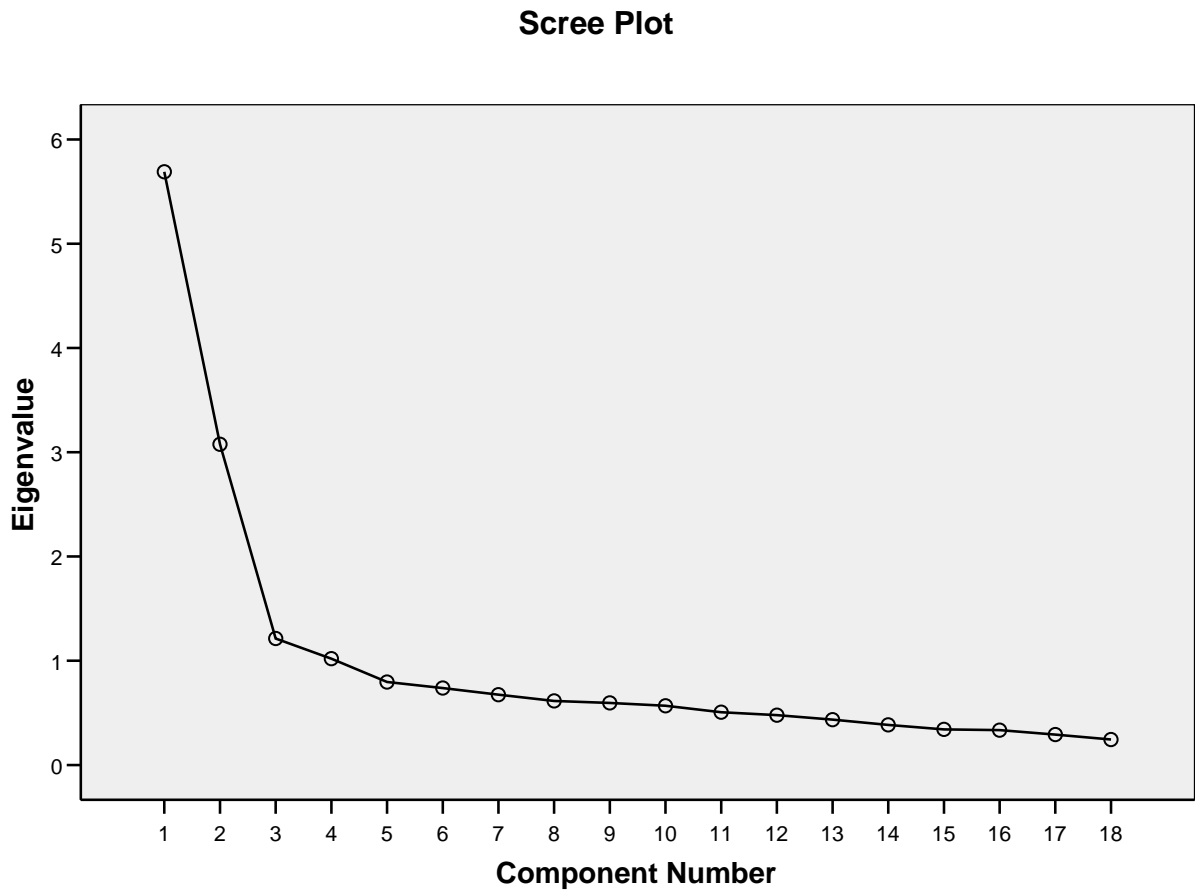


Figure 2

Structural equation model (path analysis) of personality factors and achievement motives.

