



## CAUSES OF INCREASES IN ACHIEVEMENT MOTIVATION: IS THE PERSONALITY INFLUENCED BY PRENATAL ENVIRONMENT?

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**Summary**—A study of the birth records of 1921 entrepreneurs indicates that individuals born during World War II are more likely to succeed in the music industry than individuals born previously or afterwards. The close correspondence between the births of achievers and the events of war suggests that achievement motivation may be caused by a mother's anxiety during pregnancy. Medical evidence confirms the existence of a strong prenatal influence on individuals by anxiety.

Results from a clinical study of 58 junior college students are given indicating that the prenatal anxiety of mothers correlates positively with achievement motivation. Suggestions are made for confirming these findings through further investigation. © 1997 Elsevier Science Ltd. All rights reserved.

### INTRODUCTION

The achievement motive is important in the study of personality because it influences both academic and economic performance. As a result there has been considerable interest in defining the factors that influence achievement motivation in individuals and especially those that cause increases. Although some factors have yielded significant positive correlations in studies of individual differences, none can consistently account for high achievement motivation or the widely divergent backgrounds of those who are the actual achievers in society.

In contrast, studies of societies by McClelland (1961) provide consistent evidence of the factors that have caused increases in achievement motivation. Societies throughout history demonstrate increases of need for Achievement (*n Ach*) following periods of war; while ideological conversions cause slower, longer lasting increases. McClelland's results are confirmed in a more recent cross cultural study by Ray (1979). Using his own Achievement Orientation behavior inventory, a 14-question doorstep interview, Ray conducted a cross-cultural study of 100 South African (52 male/48 female), 95 Australian (52/43), 100 English (53/47), and 100 Scottish (52/48) White, urban Ss. He found that South Africans have significantly higher achievement motivations despite insignificant differences in age, sex, occupation, and education. This is a clear example of an ideological conversion acting to slowly increase the achievement motivation of a society. The ideology being defended by South African society is White supremacy, while its conversion may be seen in the ongoing social and political assimilation of Blacks. Finally, it should be noted that the same sociological events that cause increasing achievement motivation in society create environments of fear and anxiety in individuals. Anxiety is caused both by uncertainty over one's personal safety, and by disruption of the existing social order. Thus, studies of society show that anxiety is positively correlated with achievement motivation.

When we look at the relationship of anxiety with achievement motivation for individuals, the results are quite different. These studies report negative correlations of achievement motivation with anxiety irrespective of whether the anxiety is dispositional (Ray, 1990) or situational (Raphelson, 1957). They are also rather consistent, for a significant positive correlation has never been reported (Ray, 1990; Weinstein, 1969).

If the above findings are correct, the results seem paradoxical. How can achievement motivation increase in a society during times of war and ideological conversion when fear and anxiety are prevalent? Based on studies of individuals, it is precisely during these times that we would expect to see lower levels of achievement motivation.

The one overwhelming difference between studies of achievement motivation in societies and in

individuals is the time duration of the effect. Personality and individual difference measurements are related to single points in time. On the other hand, studies of societies by McClelland (1961) compare *n Ach* to economic, cultural, and commercial trends for time periods of one or more generations. These two types of study may not be contradictory if there are two aspects of the achievement motive, one that is constitutional and the other dynamic. Dynamic variations would then be superimposed on the more slowly changing constitutionally derived aspect. If in fact the achievement motive has a constitutional component then it may be observable in the physiology of individuals.

#### *Physiological correlates of achievement motivation*

McClelland (1961) argued that achievement motivation is instilled in children between the ages of 5 and 10 by affectionate mothers with high standards of excellence. However, studies show that achievement motivation is correlated with physiological properties of individuals. A study by Raphelson (1957) of 25 male *Ss* shows that the high *n Ach* subgroup ( $N = 8$ ) had a higher initial absolute skin conductance level than either the low or middle *n Ach* subgroups. During achievement tasks by 33 students mean muscle tension correlated positively and significantly with *n Ach* (Muecher & Heckhausen, 1962). Both studies used the methods of McClelland, Atkinson, Clark, and Lowell (1953) to score *n Ach* by eliciting imaginative responses from pictures. A medical study by Lacey, Kagan, Lacey, and Moss (1962, p. 192) concluded: "Involvement in motivationally relevant tasks—tasks that interest and engage the *Ss* because they correspond with his own achievement needs—is accompanied by high autonomic reactivity". If, as suggested by these studies, achievement motivation is closely tied to physiological indices it seems likely that it is already present at birth.

#### *Variations in the achievement motivation of society*

We now appear to be repeating the historical pattern of past societies as documented by McClelland (1961). All the major participating nations of World War II are experiencing the same postwar economic trends. Gradual increases of industrial production for more than a generation have now been replaced by stagnation in the nineties. Industry is characterized by downsizing rather than the introduction of new markets and goods, methods of production, organization, and sources of raw materials (see Schumpeter, 1934). The aggressiveness characterized by a high motive to achieve is being displaced by cost consciousness and retrenchment in the business community.

Compare the economic trends of today with those during the period following the Civil War. The scoring of achievement imagery in children's readers by de Charms and Moeller (McClelland, 1961, p. 150) shows a clearly defined maximum of *n Ach* in 1890. The peak occurs approximately one generation after the onset of war activity and is comparable to the expansion that followed World War II. It suggests that a study of post World War II readers would yield a similar result peaking in about 1970. However, because the *n Ach* of a society may only be measured infrequently, this type of study cannot be used to determine the precise time relative to war events that the increase originated.

## STUDY I

A cultural explosion occurred in the 1960s which may serve to locate more precisely the origin of society's increased motive to achieve following World War II. Called the 'British invasion' it refers to an influx of mostly rock music from England by groups such as the Beatles and Rolling Stones. The class of individuals responsible for this music are musicians and other artists who entered the recording industry as individuals or small groups of individuals. They possess characteristics of the entrepreneur since many of them have created artifacts of considerable monetary and cultural value. As entrepreneurs they stimulated the recording industry by creating new forms of music and thus were participating forces in economic development.

The personality of musician entrepreneurs has many of the qualities that occur in individuals with a high motive to achieve. We know they have a high resistance to conformity (McClelland *et al.*, 1953, p. 286) because they dressed differently and often acted independently. They avoided traditional music in order to chart new paths in musical style; hence they behaved restlessly

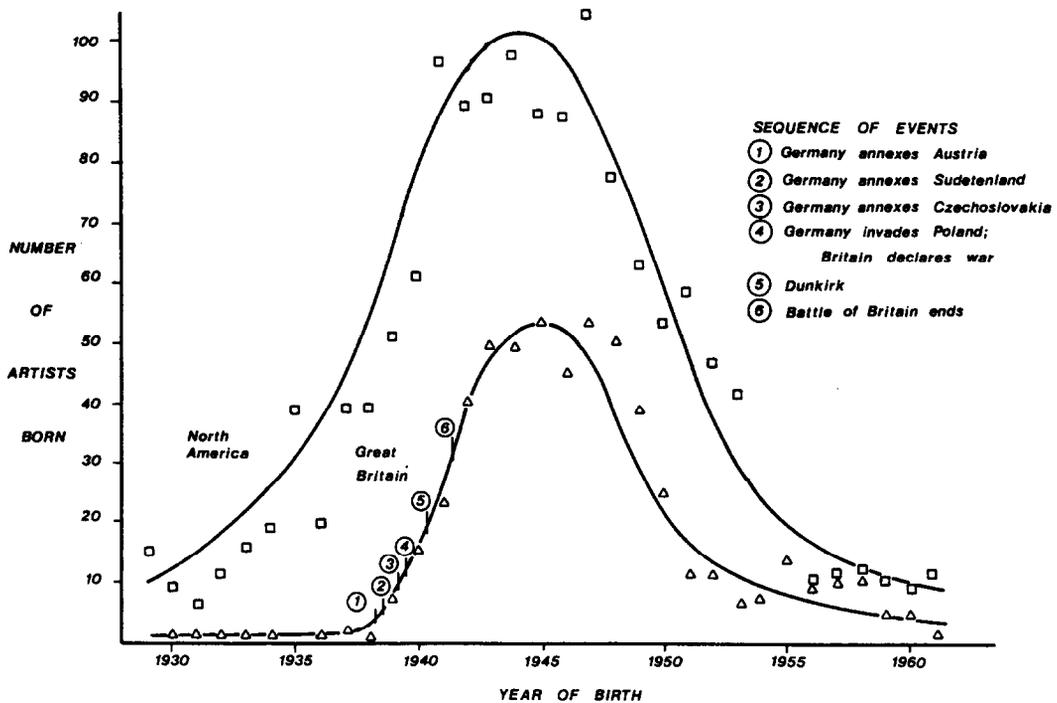


Fig. 1. The number of musicians, writers, and producers born during a 30-year period for two distinct cultures, Great Britain and North America.

(McClelland, 1961, p. 313). They demonstrated competitiveness (McClelland, 1961, p. 322) by achieving recognition in a field saturated by aspiring stars. Indeed they were only able to compete with their contemporaries and succeed by demonstrating a relatively high standard of excellence, strong self-motivation, and an energetic outlook; all of which are properties of high achievement motivation.

### Method

The writers, musicians, and producers who are entrepreneurial achievers in the music recording industry were identified through the use of standard catalogues by Pareles and Romanowski (1983) and by Stambler (1989). They reveal that the artists are of extremely diverse background with respect to socio-economic level, race, and gender. The compilations are based on commercial success, either of the artists themselves or of a particular piece of his or her music. Although their relative success varies widely (a few of the musicians had only one 'hit' record); the artists are not being compared to entrepreneurs in general nor to all classes of musicians, but only to those who entered the music industry as entrepreneurs. The catalogues contain personal information that will allow us to locate births chronologically and geographically relative to war activity. All individuals used in this study ( $N = 1921$ ) were born within continental North America or Great Britain and had their birthdates listed. Conflicts in date or location were resolved by using data from Pareles and Romanowski (1983) because its listings are generally more complete.

### Results

In Figure 1 we can see the relationship of the annual number of births of the writers, musicians, and producers of hit records over a 30-year period in both Great Britain ( $N = 519$ ) and North America ( $N = 1402$ ). The similarity in shape of the two curves despite cultural and geographic differences, and the non-random nature of the data suggest that births are related to a common factor. The data in Figure 1 show that potential entrepreneurial artists born during the 1940s have an advantage over those born earlier or later.

The more sharply defined shape of the British data suggests further that the effect was more focused there, as indeed it should be if it was caused by war. The increase of births in Great Britain

begins a short time before the initiation of war activity and coincides very closely with the increase of German aggression. Because of the clear intent yet uncertain outcome of the hostilities this was also the period of greatest anxiety. The location of the peaks indicates that the effect reached a climax at the same time on both continents, the end of World War II hostilities in Europe on May 8, 1945. After peaking, a falling off of the curve is evident during the time period that war-related reconstruction activity and uncertainty due to relocation are decreasing. A subsequent randomness in the data points may be interpreted as the complete absence of systematic anxiety due to war.

When birth places of the 205 British artists born from 1940–1945 are analyzed, only 6 of 161 listed were from areas that could not have observed the aggression of German aircraft. The majority were born in cities that had been bombed. This occurred despite a lower birth rate during the war and the common practice of relocating civilians in metropolitan areas to locations not threatened by bombing. Thus the evidence indicates that personal experience of war activity by mothers is a strong circumstantial factor in this class of entrepreneurs.

The personal anxiety of mothers due to war experience may be the specific factor that causes increased achievement motivation in children. Infants are not influenced by the anxiety of war since they have not yet developed either emotions or reason. Unborn children, on the other hand, may be influenced by the emotional trauma of their mothers because they are still an integral part of their mother's body. Fear and anxiety are powerful motivators and may have acted as stimulants for the very difficult task of pregnancy.

#### *Medical evidence*

Medical research provides additional information suggesting that anxiety causes constitutional changes in the unborn. It has long been known that emotional stress in the mother causes great increases in the motor activity of the fetus. Sontag (1966) recorded several specific examples of this due in one case to the accidental death of the spouse and in another to threats of death by the spouse. In each case the activity level of the fetus increased by a factor of more than 10 from measurements taken during previous weeks. Eight such dramatic occurrences were collected over a period of 10 years showing the same effect in response to 'grief, fear, and anxiety'. These incidents together with longitudinal studies of the physiological correlates of children and adults caused Sontag (1966) to state, "This suggestion that there may be a physiological component of personality or behavior brings to the fore the question of whether this constitutional gene-determined characteristic is really gene-determined or whether it is the result of differences in fetal environment". The 10-fold increase in prenatal activity suggests that individuals are more sensitive to a mother's influence before birth than after. Therefore the potential for changing the personality constitutionally is also greater at this point of growth and development.

More recently, confirmation of this effect has been obtained using ultrasound to directly observe the motor activity of fetuses ( $N = 30$ ) of gestational age 18–20 weeks (Rossi, Avveduti, Rizzo, & Lorusso, 1989). Anxiety was induced naturally in the test group of 15 women by anticipation of the amniocentesis technique and was confirmed to be significantly higher than the control group by the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970). Fetal motility was then assessed through use of routine ultrasound examination by measuring the duration of movements during a 10-minute observation period. Combined repetitive movements by fetuses in the test group lasted significantly longer than in the control group. This study confirms that maternal anxiety and fetal activity level are positively correlated.

#### *Statistical evidence from societies*

The study by Ray (1979) cited in the introduction indicates that South Africans have significantly stronger achievement motives than *Ss* tested in three similar cultures. Due to inter-racial tensions a higher anxiety level existed in South Africa at the time the *Ss* were born than in the other cultures. The evidence suggests therefore that the long-term influence of mild anxiety on individuals is positive.

In a recent study (Lie, Wilcox & Skjaerven; 1994) of 9192 Norwegian women who delivered first-born infants with birth defects it was shown that risk of a birth defect in a second child is significantly reduced if the mother moves to a new municipality. The effect is shown to be environmental rather than genetic, yet no physical differences in the cities could be found nor are suggestions made as to

possible causes of the phenomenon. However, as anyone who has moved to a new city can attest, anxiety is a persistent factor of such a life change. Again we note the presence of a long-term positive influence for low levels of situational anxiety.

## STUDY II

The hypothesis formulated from Study I together with medical evidence states that a mother's anxiety affects the development of the fetus constitutionally. These changes are subsequently manifested in the adult personality as an increased motive to achieve. Evidence supporting this hypothesis has been given for societies subjected to systematic anxiety in the form of war and racial tension. Since anxiety influences the population uniformly in these types of study, achievement motivation is the only variable that must be measured as an individual difference. However, the anxiety present in most industrialized societies is random in nature. It would be useful therefore, to assess both prenatal environment and achievement motivation as individual difference measures and then to compare them.

Although anxiety will be of primary concern in such a study, self-esteem is an important modifier that affects how an individual perceives anxiety and whether or not they react positively to it. In a study of 117 pregnant women depression and low self-esteem caused by another's anxiety were found to be negative influences, which produce infant condition complications (Norbeck & Tilden, 1983). Individuals in a society at war experience generally high levels of self-esteem. This is due to the existence of a common goal, victory. However during times of peace, when personal security is high, self-esteem varies randomly within society. Whereas the negative influence of anxiety may be neglected in studies of the effect of systematic anxiety in populations, it must be controlled for in individual difference studies.

Because mothers often remember the nature of each of their pregnancies, the emotional state for a given pregnancy may be estimated despite the lengthy delay in testing that is necessary. The mother's emotional state during pregnancy must then be compared to the achievement motivation of the *S*. Error other than that due to measurement may be caused by genetic effects or postnatal environment. Individual differences in genetic make-up cannot be controlled for. The effect of postnatal environment is believed to be less than that of prenatal environment due to a lessened susceptibility of individuals to the environment with age, and therefore it will be neglected.

### *Method*

A comparison test was needed that could be quickly completed and be as non-intrusive as possible. After a preliminary study it was decided that a take-home questionnaire test would best fulfil these requirements. A test was designed and passed out to approximately 80 first year psychology students on the Friday before their final exam. The course instructor instructed the students to fill it out as honestly as possible. One point would be added to the students' test score on the following Monday as an incentive for its completion and return. It consisted of two questions to be posed by subjects to their mothers as follows:

What level of stress or anxiety did your mother experience while she was pregnant with you?  
What was your mother's self-esteem during the same 9-month period? Was she feeling good about herself and the future?

The mothers were asked to estimate their anxiety and self-esteem levels during pregnancy by using a 0 (lowest) to 4 (highest) scale. This scoring system was used at the suggestion of Mr Filsinger, the course instructor. It estimates a variable as either above average (score 3 or 4) or not above average (score 0, 1, or 2) without explicitly stating so and without confusing the individual being tested by using too many scoring possibilities. Also included on the same sheet of paper was a behavior inventory to be answered by the student, whose purpose is the measurement of achievement motivation (Ray, 1979). It consisted of 14 questions to be answered "yes", "no" or "?" with a maximum score of 42. If the wording of a question was unclear, the student was instructed to enter a "?" response. An expression that was frequently misunderstood was "getting on in life", which

Table 1

	<i>N</i>	Avg. score	SD
All students	58	34.24	4.69
Anxiety 3 to 4 (male)	12	35.67 <i>P</i> < 0.10	2.82
Anxiety 3 to 4 (female)	16	35.44	4.53
Anxiety 0 to 2 (male)	7	32.85	5.51
Anxiety 0 to 2 (female)	13	33.85	4.99
Anxiety 3 to 4 (total)	28	35.54 <i>P</i> < 0.05	3.6
Anxiety 0 to 2 (total)	20	33.50	5.46
Self-esteem of 3 to 4	26	34.42	4.6
Self-esteem of 0 to 2	22	35.0	4.2
Could not locate mother or did not know	10	32.1	5.61

would perhaps have been better understood by students in the U.S. if it were worded "getting ahead in life". No attempt was made to assess genetic or postnatal environmental influence.

### Results

Completed questionnaires were received from 58 students, 36 female and 22 male. As may be seen in Table 1, a significant positive correlation exists between anxiety during pregnancy and achievement motivation. Of equal interest is that the standard deviation of the high prenatal anxiety subgroups is in every case lower than that of the low prenatal anxiety subgroups. This is an expected result since Study I showed that the higher the level of anxiety, the less randomness that will be present in the data. Self-esteem did not appear to have an affect on achievement motivation. Perhaps this can be attributed to the presence of a strong social support net during the 1970s. Together with family support, it may act to soften the effect of a low self-esteem due to personal experience.

## DISCUSSION

Much evidence exists suggesting that the achievement motive has two independent components; one that is constitutionally derived and another that is dynamic, or learned (Deci & Ryan, 1985). The constitutional factor as an individual difference is thought to be more reliably measured by means of fantasy methods than by behavior inventories (Koestner & McClelland, 1990). However, behavior inventories have also been used successfully to compare groups of individuals (Ray, 1979). Because the secondary, or dynamic factor is superimposed upon the primary aspect it accounts for temporary increases that may be obtained when achievement motivation is taught or under the influence of a new culture (see Krau, 1985).

Statistical tests may be used to confirm whether social unrest leads to long-term increases of achievement motivation. As in the study of South Africa by Ray (1979) the achievement motivation of a society that has been subjected to widespread or systematic anxiety may be compared to a second, culturally similar society that was socially secure during the same time span. Israel and Northern Ireland would be appropriate societies for this type of analysis.

Another possible test is the longitudinal study of a society that has undergone a short period of intense stress in the past such as in Vietnam, Cambodia, or Chile. Achievers are first identified either by actual achievement or by a validated behavior inventory. The time related differences in anxiety of the society are then compared to the birth data of achievers by constructing a curve similar to those in figure one. The more intense the period of stress, the less randomness should be observed in the data points.

Many questions exist in psychology concerning how genetic and environmental influence combine in the development of the personality (Eaves, Eysenck, & Martin, 1989). However, research has not been directed towards prenatal environment in efforts to solve them. The influence of genetics in the study of personality development can be reduced by studying siblings. The prenatal environmental influence of siblings may then be estimated by using a questionnaire test that is more comprehensive than that of Study II or an interview, in order to compare it to achievement motivation. The use of this method of investigation would reveal that the current American president Bill Clinton, who has a stronger motive to achieve than his step-brother, suffered extreme prenatal emotional trauma due to the accidental death of his father. Other sources of anxiety in mothers, which would be

revealed by an interview, may arise from peer pressure, a life change, material loss, or a specific event such as the stock market crash of 1929.

## CONCLUSION

Much has been written about the rise and fall of past civilizations. However, the only attempt that has been made to relate these events to studies of individual differences is in McClelland's seminal work *The achieving society*. His findings suggest that the stability lost by society during times of war and ideological conversion is recovered in the next generation of individuals in the form of a higher motive to achieve, increased economic development, and a restoration of social order. The arguments presented here are an attempt to extend McClelland's theories by describing the causative mechanism in individuals that leads to these changes.

The existence of this mechanism may be confirmed if achievers can be related through prenatal environment. Mothers of achievers are known to be highly nurturing and to have high standards of excellence (McClelland, 1961). Because nurturance is related to emotionality it is equivalent to say that mothers who are strongly emotional and maintain high standards of excellence are the ones most likely to have children with high motives to achieve. Of the individuals who are identified in this manner as probable mothers of achievers, those who experience anxiety during pregnancy are predicted to be the actual mothers of achievers. Anxiety tends to stimulate individuals to higher than normal levels of performance although they may not be conscious of it. Because anxiety is common to all humans the effect should be present in all races and cultures.

Perhaps the most widely discussed question in the science of psychology is how much of the personality is developed by nature and how much by nurture. If this interpretation of McClelland's theory proves correct, a significant (significant in the sense that it is detectable) portion of the individual's personality is attributable to neither one of these sources.

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