Research Report

HAPPINESS IS A STOCHASTIC PHENOMENON

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Abstract—*Happiness, or subjective well-being, was measured on a birth-record-based sample of several thousand middle-aged twins using the Well-Being (WB) scale of the Multidimensional Personality Questionnaire. Neither socioeconomic status, educational attainment, family income, marital status, nor an indicant of religious commitment could account for more than about 3% of the variance in WB. From 44% to 52% of the variance in WB, however, is associated with genetic variation. Based on the retest of smaller samples of twins after intervals of 4.5 and 10 years, we estimate that the heritability of the stable component of subjective well-being approaches 80%.*

Happiness depends, as Nature shows, less on exterior things than most suppose.   —William Cowper

Are those people who go to work in suits happier and more fulfilled than those who go in overalls? Do people higher on the socioeconomic ladder enjoy life more than those lower down? Can money buy happiness? As a consequence of racism and relative poverty, are black Americans less contented on average than white Americans? Because men still hold the reins of power, are men happier than women? The survey in this journal by Myers and Diener (1995) indicated that the answer to these questions, surprisingly, is "no." These authors pointed out that people have a remarkable ability to adapt, both to bad fortune and to good, so that one's life circumstances, unless they are very bad indeed, do not seem to have lasting effects on one's mood.

Yet some people do seem to be happier on average than other people are. Although people adapt surprisingly quickly to both good news and bad, the set point around which happiness varies from time to time apparently differs from one person to another. Myers and Diener considered personal relationships, religious faith, and the "flow" of working toward achievable goals as possible determiners of individual differences in the happiness set point.

We had already collected demographic and questionnaire data on a large sample of adults, and it seemed appropriate to try to replicate and perhaps extend some of Myers and Diener's findings. The Minnesota Twin Registry (Lykken, Bouchard, McGue, & Tellegen, 1990) is a birth-record-based registry of middle-aged twins born in Minnesota from 1936 to 1955. We know how far these twins went in school, their approximate family income, their marital status, and their socioeconomic status (SES), based on their occupations. These twins provide an unusually representative sample of the white population (during the 20 birth years searched, fewer than 2% of Minnesota births were to African or Native Americans). Some of the twins

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did not reach the eighth grade, whereas others have doctorates; they live on farms, in small towns, in big cities, and in foreign lands; their socioeconomic levels are representative of Minnesota-born adults.

METHOD

A self-rating questionnaire was administered to 2,310 members of this twin registry. One of the questionnaire items read as follows:

Contentment: Taking the good with the bad, how happy and contented are you on the average now, compared with other people?

The twins were asked to make their ratings on a 5-point scale: 1 = *the lowest 5% of the population,* 2 = *the lower 30%,* 3 = *the middle 30%,* 4 = *the upper 30%,* and 5 = *the highest 5%.*

Figure 1 shows that these seem to be contented people by and large and that the women are at least as happy as the men. More than 86% of these twins rated themselves as among the upper 35% in overall contentment. Most people (at least people born in Minnesota) believe that they are above average on most positive traits, but this pleasant illusion is strongest for the trait of contentment. Only 42% of the twins in this sample rated themselves in the upper 35% on intelligence, for example. We interpret these ratings to mean that most people are in fact reasonably happy most of the time. One is tempted to speculate that natural selection tended to favor happy people because they were more likely to mate and raise children and thus to become our ancestors.

Figure 2 displays the mean contentment ratings for the twins in each of the seven categories of the Hollingshead and Redlich system for classifying socioeconomic status. There is remarkably little reduction in self-rated contentment as one moves from the highest, or professional, category (SES = 1) down even to unskilled labor (SES = 6) and unemployed (SES = 7). Both of these findings corroborate Myers and Diener. These results led us to examine a measure of happiness having better psychometric properties than this single rating item.

The Well-Being (WB) scale of the Multidimensional Personality Questionnaire (MPQ; Tellegen, 1982; Tellegen & Waller, 1994) appears to be a reliable and valid measure of the condition that its name denotes, the disposition to feel good about oneself and one's own corner of the world. The 30-day retest reliability of the WB scale is .90, and its alpha reliability is .92. We have MPQ scores, corrected for age and sex and expressed in *T*-score units ($M = 50$, $SD = 10$), on 5,945 twins in the Minnesota Twin Registry.

Figure 3 shows the distribution of MPQ-WB scores for the 2,486 twins from whom we also had contentment ratings. For purposes of comparability with the ratings distribution, *T* scores for the WB distribution were divided into five intervals: <33,
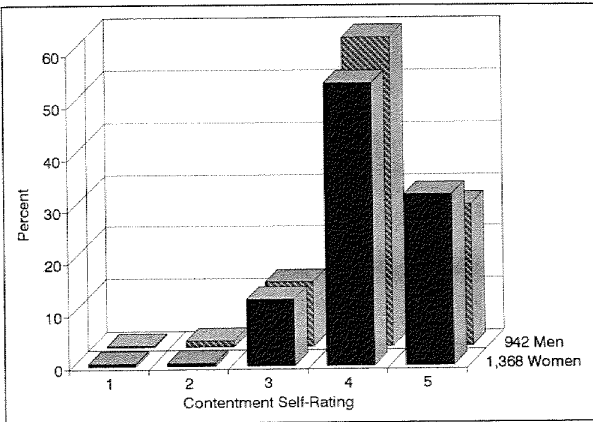
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Fig. 1. Contentment ratings by gender for 2,310 Minnesota-born twins. Ratings are on a self-report scale from 1 (*the lowest 5% of the population*) to 5 (*the highest 5%*).

33–45, 46–54, 55–67, and >67; if the WB distribution were normal, these categories would have frequencies of 5%, 30%, 30%, 30%, and 5%, respectively, the same percentages that were specified for ratings on the contentment scale. As can be seen in the figure, the WB distribution is reasonably symmetrical, unlike the contentment self-ratings, presumably because the sum of the responses to the WB items measures variations in happiness around a mean value that represents a generally positive (rather than a negative or neutral) state of mind.

Myers and Diener (1995) suggested that their definition of subjective well-being (SWB) includes both the "presence of positive affect" and the "absence of negative affect" (p. 11). There is indeed substantial evidence that positive and negative emotions do not behave as merely the opposite poles of the same continuum. Positive and negative affect (PA and NA) emerge reliably as two largely independent superordinate state
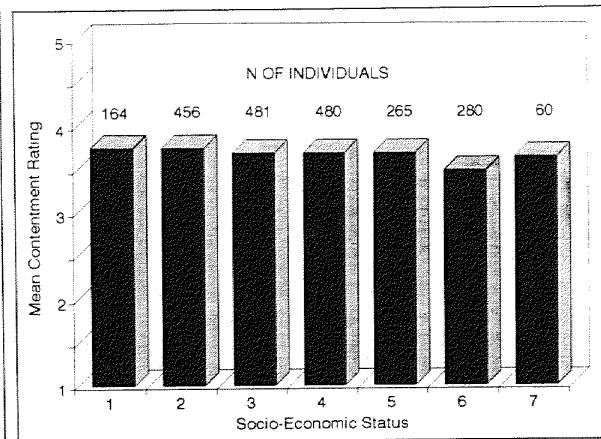

Fig. 2. Mean self-ratings for contentment of 2,186 middle-aged twins distributed among the seven categories of socioeconomic status from the professional class (1) to unskilled labor (6) and unemployed (7).
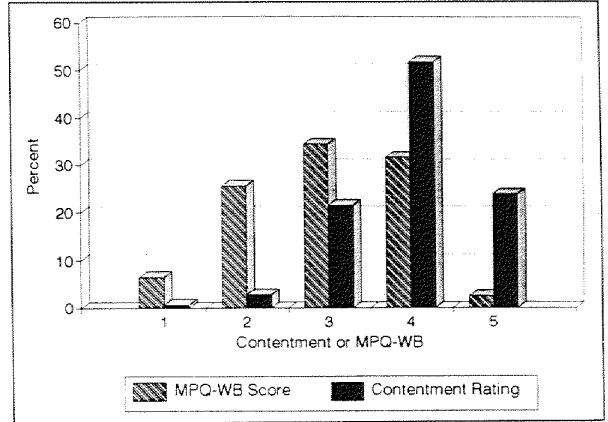

Fig. 3. Contentment self-ratings and Well-Being scores on the Multidimensional Personality Questionnaire (MPQ-WB) for 2,310 twins.

dimensions (e.g., Watson & Tellegen, 1985). The trait variables corresponding to these PA and NA state variables are the higher order Positive and Negative Emotionality (PE and NE) personality factors, both represented in the MPQ. In addition to the WB scale, which is a PE indicator, the MPQ includes a corresponding marker of NE, the Stress Reaction (SR) scale. WB and SR scores were correlated $-.45$ in the present sample of middle-aged twins. We estimated SWB simply as the difference between the two scores (i.e., SWB = WB − SR).

Because the predictors, years of education, SES, marital status, and current family income, were measured categorically, we computed eta coefficients, separately for men and women, and the proportion of the total variance in WB and in SWB accounted for by each of the predictors. In the case of married people, SES was defined as the status associated with either the subject's occupation or the subject's spouse's occupation, whichever was higher. To estimate the influence of religious commitment on happiness, we computed the correlation between WB and the Traditionalism scale of the MPQ. Finally, we estimated the heritability of WB on a large sample of middle-aged twins and the heritability of the stable component of happiness on a sample of twins who had been tested at about age 20 and then tested again some 10 years later.

RESULTS

Demographic Status

Educational attainment accounted for less than 2% of the variance in WB for women, and less than 1% of the variance for men. For both men and women, SES accounted for less than 2% of the variance in general well-being. The data for income mirror those for SES: Income category accounted for less than 2% of the variance in feelings of well-being.

Even if one cannot predict happiness from the components of worldly success, such as education, income, or SES, maybe marital status has a stronger impact. Myers and Diener (1995, p.

15) cited meta-analyses indicating that there is a "happiness gap" between the married and the never-married, and we found one also, but it was trivial. The mean T score on WB for 3,571 married (and never divorced) twins was 50.1 (±0.16), and the mean for 337 never-married twins was 48.3 (±0.61). Less than 1% of the variance in WB was associated with marital status for men or women.

When these computations were repeated for our SWB estimate in place of WB, the relationships with the demographic variables were slightly stronger. Educational attainment and SES accounted for about 3% of the variance in SWB, and income for about 2%, but marital status still accounted for less than 1% of the variance. Thus, it appears that positive mood states are not much more frequent or intense for people with high social status or wealth and that people at the lower end of the social ladder are only slightly more vulnerable to negative mood states.

Traditional Values

The Traditionalism scale of the MPQ is moderately correlated (.49 $\pm$ .015) with religious commitment as measured by Waller, Kojetin, Lykken, Tellegen, and Bouchard (1990) but very weakly correlated (.05 $\pm$ .016) with scores on WB. Figure 4 shows that, whereas mean WB scores increase consistently, while SR scores decrease, from the lowest to the highest self-rating on contentment, contented people score no higher on Traditionalism than discontented people. Although these results do not refute the findings cited by Myers and Diener, they at least suggest that individual differences in religiousness cannot account for much of the variance in happiness. The same human adaptability that Myers and Diener invoked to explain why status and income do not determine happiness must apply here as well; religious conversion or being "born again" is said to be a joyful experience, but its effect on mood may not be more lasting than being promoted or winning the lottery.
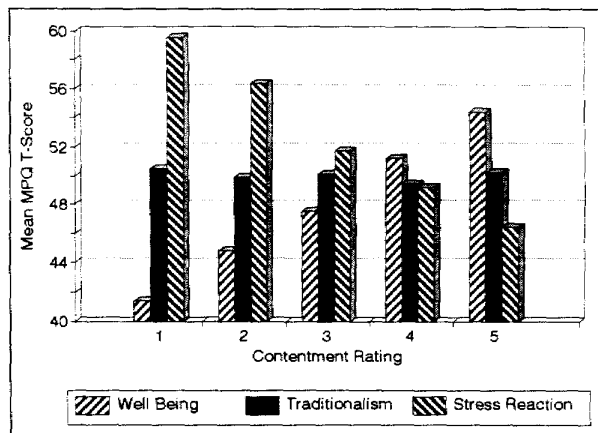

Fig. 4. Mean Well-Being, Stress Reaction, and Traditionalism scores on the Multidimensional Personality Questionnaire (MPQ) plotted against self-rated contentment. The MPQ scores have been converted into T-score form with mean = 50 and SD = 10.

The Heritability of Happiness

The MPQ was administered twice to a sample of younger twins who averaged 20 years of age at the first testing and 30 years at the second (McGue, Bacon, & Lykken, 1993). This sample included 79 monozygotic (MZ) twin pairs and 48 dizygotic (DZ) twin pairs, 254 individuals altogether. Scale scores were corrected for quadratic regression on age, separately for men and women. The retest correlation for the WB scale was .50, indicating, as one would expect, that there is considerable fluctuation in one's sense of well-being, especially perhaps during the important transitional period from age 20 to 30. These variations in subjective well-being no doubt are determined by the individual vicissitudes of life but not, apparently, by one's SES, income, educational achievement, marital status, or religious commitment (although it seems likely that marked and sudden changes in any of these would produce at least transitory changes in feelings of well-being).

For these younger twins who were retested after 10 years, we correlated Twin A's score on WB at Time 1 with Twin B's score at Time 2 (and, similarly, Twin B's score at Time 1 with Twin A's score at Time 2). For the 48 DZ pairs, this cross-twin, cross-time correlation for WB was essentially zero (.07); for the 79 MZ pairs, it equaled .40, or 80% of the retest correlation of .50. This disattenuated MZ correlation suggests that the stable component of well-being (i.e., trait happiness) is largely determined genetically. The negligible DZ correlation suggests that this stable and heritable component of happiness is an emergenic trait (Lykken, 1982; Lykken, Bouchard, McGue, & Tellegen, 1992), that is, a trait that is determined by a configural rather than an additive function of components. Emergenic traits, although determined in part genetically, do not tend to run in families, as do traits that are polygenic-additive.

A similar result was reported in an earlier study of 217 MZ and 114 DZ pairs of middle-aged Minnesota Registry twins, plus 44 MZ and 27 DZ pairs who were separated in infancy and reared apart (Tellegen et al., 1988). The best estimate of the heritability of WB in that study was .48 ($\pm$.08) and, as we found in the present study, a model involving only additive genetic effects did not fit the data. We assume that the 10-year retest reliability of WB for these older twins would be higher than the .50 reported for the age span from 20 to 30 years. Twenty-six pairs of the middle-aged twins reared apart were in fact retested on the MPQ by mail about 4.5 years after their first testing; the retest stability of WB for these 52 individuals was .67. If the long-term (e.g., 10 year) stability of WB is, say, .60 for middle-aged persons, then the 1988 data indicate that the heritability of the stable component of well-being is about .80 (.48/.60). Unshared environmental effects must then account for the remaining 20% of the variance in the stable component of happiness.

We now have MPQ results from both members of 1,380 pairs of middle-aged Minnesota Twin Registry twins (reared together and represented as MZT or DZT twins) and from a somewhat augmented sample of twins reared apart (MZA or DZA twins). The intraclass correlations for the WB scale on these larger samples are given in Table 1. Because the DZ values are so small, and the MZT correlations are not larger than the MZA values, we can conclude that the effects of shared home environment on SWB were negligible after the twins reached middle

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Table 1. *Intraclass correlations on the Well-Being scale of the Multidimensional Personality Questionnaire for middle-aged twins reared together and reared apart*

Type of twin pair	Number of pairs	Intraclass R
Twins reared together:		
Monozygotic	647	.44 ($\pm$.03)
Dizygotic	733	.08 ($\pm$.04)
Twins reared apart:[a]		
Monozygotic	75	.52 ($\pm$.10)
Dizygotic	36	$-$.02 ($\pm$.17)

[a]We are indebted to T.J. Bouchard, Jr., for providing these data from the Minnesota Study of Twins Reared Apart.

age. This conclusion means that the variance in adult happiness is determined about equally by genetic factors and by the effects of experiences unique to each individual.

No one doubts that making the team, being promoted at work, or winning the lottery tends to bring about an increment in happiness, just as flunking out, being laid off, or a disastrous investment would be likely to diminish one's feelings of well-being. As Myers and Diener (1995) suggested, however, the effects of these events appear to be transitory fluctuations about a stable temperamental set point or trait that is characteristic of the individual. Middle-aged people whose life circumstances have stabilized seem to be equally contented regardless of their social status or their income. The reported well-being of one's identical twin, either now or 10 years earlier, is a far better predictor of one's self-rated happiness than is one's own educational achievement, income, or status.

Is It "Happy Is as Happy Does" or the Other Way Around?

Myers and Diener suggested that people who enjoy close personal relationships, who become absorbed in their work, and who set themselves achievable goals and move toward them with determination are happier on the whole than people who do not. We agree, but we question the direction of the causal arrow. We know that when people with bipolar mood disorder are depressed, they tend to avoid intimate encounters or new experiences and tend to brood upon depressing thoughts rather than concentrating on their work. Then, when their mood swings toward elation, these same people tend to do the things that happy people do. There is undoubtedly a James-Lange feedback effect: Dysfunctional behavior exacerbates depression, whereas the things happy people do enhance their happiness. We argue, however, that the impetus is greater from mood to behavior than in the reverse direction. It may be that trying to be happier is as futile as trying to be taller and therefore is counterproductive.

CONCLUSIONS

If the transitory variations of well-being are largely due to fortune's favors, whereas the midpoint of these variations is determined by the great genetic lottery that occurs at conception, then we are led to conclude that individual differences in human happiness—how one feels at the moment and also how happy one feels on average over time—are primarily a matter of chance.

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