Soc Indic Res
DOI 10.1007/s11205-008-9422-5

Affluence, Feelings of Stress, and Well-being

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Accepted: 24 November 2008

Abstract Data from the Gallup World Poll highlighted the differential relations between perceived stress, well-being, and wealth at the individual- versus nation-level. At the nation level, stress was a distinct concept from negative affect (NA). It correlated positively with well-being (positive affect, life satisfaction, and domain satisfaction) and wealth (as measured by income, gross domestic product, and modern conveniences). In contrast, NA correlated inversely with well-being and income. Although similar to NA at the individual level, stress showed weaker negative relations with well-being than NA did. In sum, nation-level stress and NA were related in the opposite direction to wealth (and poverty), well-being, and life expectancy. Furthermore, the concept of stress differed at the individual and nation levels. For the former, stress appeared to be purely a negative marker of affective well-being (albeit weaker than other discrete negative emotions); for the latter, it appeared to reflect lifestyle differences that were strongly associated with wealth, and with affective and cognitive well-being to a smaller degree.

Keywords Stress · Subjective well-being · Wealth · Income · Satisfaction

1 Introduction

Living in fast-paced contemporary societies, stress has become a prevalent malady that afflicts people of all ages and cultures. Although first defined by Selye (1976) as the

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Published online: 12 December 2008

non-specific response of the body to any demand placed upon it, the perception of stress has evolved, as its usage becomes increasingly ubiquitous. In today's society, complaints of stress often carry the connotation of being unable to cope with demands because of the lack of resources (e.g., time, money, or social support). This common usage is congruous with Lazarus and Folkman's (1984) framework, in which psychological stress refers to the negative cognitive and emotional states elicited when people realize that the demands placed on them by the environment exceed their ability to cope. Stress can be considered as a broad, general construct that subsumes various specific subtypes, like time stress (/pressure), feelings of stress (/perceived stress), and physiological stress. As people often use stress in the context of subjective experiences, the present research focuses specifically on perceived stress; i.e., people's feelings and self-perceived experience of stress.

Stress appears to be an aversive feeling state that can diminish one's well-being. But how exactly is stress related to subjective well-being (SWB)/happiness? To understand their links, consider how both can influence a person's quality of life. In Veenhoven's (2000) framework, quality of life is evaluated based on four qualities: (1) the livability of environment (commonly termed living conditions), which refers to ecological (e.g., clean air), social (e.g., freedom), economic (wealth and economic development of nation), and cultural (e.g., education) characteristics; (2) the life-ability of the person, which refers to physical and mental health, knowledge, and skills; (3) the utility of life, which refers to moral perfection (e.g., compassion); and (4) an appreciation of life, which refers to affective and cognitive appraisals, and are typically described by terms such as SWB, life satisfaction, and happiness.

The concept of quality of life has important implications for mental and physical health, and SWB is highly relevant for assessing it (Frisch 1998). Like SWB, stress closely relates to quality of life via the first, second, and last qualities—stress can stem from both objective conditions, and affective and cognitive appraisals. People who cannot fulfill their basic needs, or live in poor social and economic conditions, may experience feelings of stress as they struggle to improve the livability of their environment. Quality of life can also be compromised if people who frequently feel stress become more dissatisfied with their lives. Alternatively, those who are less happy about their overall life may also experience stress more easily and frequently. Stress can also adversely affect quality of life via its impact on people's physical and mental health. Chronic stress causes heart disease, and has been linked to diabetics, cancer, and other ailments (Miller and Blackwell 2006; Wargo 2007). In addition, the neurological changes wrought about by stress hormones also have debilitating effects on mental health, causing depression.

In this study on perceived stress, we focus on one of the characteristics outlined in the first quality of life—wealth—which is also an important factor influencing SWB. Income correlates with happiness, both across individuals and nations. Richer people and people living in wealthier nations report higher SWB than poorer people and people living in poorer nations (Diener et al. 1995; Diener and Biwas-Diener 2002; Howell and Howell 2008). In this paper, we explore the links between wealth and stress, to determine how good and bad economic conditions can both lead to feelings of stress (/perceived stress).

2 Stress and Wealth

The basic premise of theories of stress assumes a person experiences it when he is unable to cope with expectations, goals, or needs. The overwhelming demands can be generated by excessive positive or negative circumstances, not just impoverishment. Poor people who

do not have enough money for food, no doubt experience stress as they struggle to fulfill their basic needs for survival. On the other hand, rich people who have lots of material luxuries (such as houses, cars, and good food) have often complained about stress too. Why do the different circumstances both lead to stress? One possibility is that people who have lots of money and modern conveniences may be stressed by trying to maintain their lifestyle, not having enough time for social activities and relaxation, meeting family expectations, or trying to juggle many tasks simultaneously. In other words, dire economic straits, good economic conditions, time pressure, or goals can all lead to feelings of stress.

The overabundance of goods, choices, and activities not only contributes to stress by creating a sense of being pressed for time, but also produces stress and anxiety because of people's tendency to want to make the best choice. Hence, decisions become more difficult and effortful, and mistakes become more costly (Schwartz 2004). In addition, people often experience regret about the rejected options, and dissatisfaction with the chosen one, which is also detrimental to their well-being. Consequently, having too many choices due to a wealthy and modern lifestyle may actually increase feelings of stress and reduce well-being.

To clarify the links between stress and wealth, we examined how both favorable and adverse economic conditions can produce stress. The link between stress and low income has been consistently found in various studies. It is likely that unfavorable economic conditions contribute to stress because people in the low-income group are exposed to more chronic stressors and negative life events (Lantz et al. 2005). The greater exposure to physical (inferior housing, crowding, noise) and psychosocial (family turmoil, community violence) stressors for low-income children not only led to higher psychological distress, but also elevated psychophysiological stress (higher blood pressure and neuroendocrine hormones; Evans and English 2002). The underlying biological mechanism linking socioeconomic status (SES) and stress has been confirmed by Cohen et al. (2006), who found that lower SES was associated with higher levels of stress hormones. In addition, there were findings indicating that deterioration in people's financial situations led to greater psychological distress (Gorgievski-Duijvesteijn et al. 2005).

The reverse holds true as well however, as stress can stem from overly-positive economic conditions. Specifically, there is evidence that modern, affluent life is positively associated with time stress. With increasing income and abundance of goods, choices and activities increase too, but not time. This daily experience of hassles or feeling rushed, an important dimension of stress (Hinkle 1973), means that affluent working adults face a time stress problem—having too much to do and insufficient time to accomplish all the activities. This leads to their habitual complaining about time stress, termed "yuppie kvetching" by Hamermesh and Lee (2007). Consequently, more people in wealthy nations consider time prosperity as a dimension of well-being. In their study of 31 countries, Levine and Norenzayan (1999) found that the pace of life was faster in economically productive countries (e.g., those with high per capita GDP) than non-industrialized countries. Though a faster pace of life was associated with a higher standard of living, which led to higher SWB/happiness, it was also associated with negative consequences, such as time urgency and higher rates of coronary heart disease.

So although wealth is positively associated with happiness, an unfortunate consequence of greater wealth is increased time pressure. With wealth, people can afford modern conveniences, which contribute to time stress by adding to time crunch. With technological and economic progress, people consume more goods (e.g., watching TV, surfing the web), but have less time to enjoy each of these goods. This leads to the "multi-tasking" phenomenon and creates the experience of being pressed for time and feeling stressed (Garhammer 2002; Linder 1970; Gershuny and Sullivan 2001). Thus at the individual level

and nation level, higher wealth is accompanied by increased time stress. This explains how modernization leads to a faster pace of life, resulting in increased time pressure. In turn, increased time pressure may contribute to feelings of stress.

3 Time Stress and SWB

However, wealthy, modern societies also have resources that enable individuals to cope with time stress. These nations enjoy higher quality of life: good living conditions and healthcare, security, freedom, and equality (Heylighen and Bernheim 2000a, b), and these factors contribute to people's happiness and satisfaction with life, despite the associated time stress. The enhancing effects of wealth can negate the deleterious effects of time pressure, making it possible for increased time stress to be associated with higher SWB at nation-level. Indeed, Garhammer (2002) found this pattern in a cross-nation comparison.

The links between time stress and well-being at the individual-level however, are not as straightforward. If time stress leads to chronic stress, it reduces quality of life, and thus also diminishes well-being. Evidence that chronically stressed people feel less happy and experience health problems more frequently supports this postulation. For instance, individuals who felt more rushed and stressed scored lower on measures of SWB, such as life satisfaction and happiness (Robinson and Godbey 1998; Shields 1999). Roxburgh (2004) also found that time pressure was associated with distress for men and women, and was related to higher depression among employed women. However, income moderated the impact of time pressure on depression, illustrating that similar to the beneficial effects of nation-level wealth, abundant resources at the individual-level can also help cushion the time crunch problem. On the other hand, when time pressure serves as a precursor to arousal, motivating people to mobilize their resources and generating flow, it can enhance quality of life as it helps people succeed in challenging tasks and experience satisfaction (Csikszentmihalyi 1990). Thus, under the right conditions increased time stress may also be associated with increased individual-level SWB (Garhammer 2002).

4 The Present Research

Using the Gallup World Poll data, the present study sought to shed light on the concept of perceived stress. Instead of examining time stress as had been frequently done in previous studies, this study assessed respondents' feelings of stress directly. The first goal was to clarify the relations between perceived stress and its correlates; specifically we sought to determine the relations between perceived stress and economic indicators of material well-being. As discussed, time stress is associated with affluence, suggesting that perceived stress may also be associated with wealth, since time stress contributes to feelings of stress even though the two are distinct dimensions. In addition, dire poverty has also been linked to psychological and physiological stress (Evans and English 2002). Thus we predicted that perceived stress would relate positively to unmet basic needs, as well as to income and owning lots of modern conveniences. We also sought to determine the relations between perceived stress and various forms of SWB. We expected perceived stress to be associated with decreased individual-level well-being. However, because nation-level wealth is associated with both increased happiness and increased time stress (Hamermesh and Lee 2007), perceived stress should be positively associated with various measures of well-being at the nation-level.

The second goal was to investigate whether feelings of stress and negative affect (NA) are separable constructs. NA subsumes various unpleasant mood states (such as anger and nervousness), and reflects a general negative dimension. Its relation to stress has been highlighted in various studies. For instance, Dua (1993) showed that NA correlated positively with stress at the individual level. There is also evidence that self-reports of stress contain a significant NA component, and this may account for part of the correlation between stress and health complaints (Watson and Pennebaker 1989). For instance, current NA and perceived stress share a common underlying component in explaining susceptibility to the common cold (Cohen et al. 1993). Our large-scale study hence offers the opportunity to ascertain whether the feeling of stress is simply another facet of NA, or is a different, distinct construct. To address this issue more thoroughly, we assessed the extent to which stress reflects negative emotions, and examined whether the correlates of stress differ from those of discrete negative emotions.

Finally, another goal was to explore whether the correlates of stress differed at the individual level versus nation level. Most previous researchers have focused on individuals or conducted cross-nation comparisons, but have not concurrently examined both levels of analyses. The present study addressed this question because the correlates of stress could be very different at the two levels. At the individual level, affective or dispositional constructs (e.g., NA) could influence stress more strongly. At the nation level however, differences in lifestyles of various nations (e.g., prevalence of modern conveniences) might be more important as individual differences get averaged out.

This study extends earlier research in some important ways. First, a much broader sample of nations was included in this survey than in previous studies—nations comprising about 96% of the world's population were included, so it was the first representative world survey to examine how stress correlated with SWB and wealth across nations. Moreover, our sample of countries included a greater number of poor nations than was the case in previous surveys. The large and diverse sample of countries, and the large, representative sample of individuals surveyed in each nation should allow us to reach general conclusions about the correlates of stress. Second, unlike previous studies, our study emphasized the feeling of stress itself (i.e., respondents' self-reported perceived stress), not indicators of time stress. This adds to the existing findings because time pressure is only one of the many facets of stress, and does not completely define the broad concept of stress.

5 Method

5.1 Sample

The Gallup World Poll collected data from 138,666 people (aged 15 or older) in 132 countries from 2005 to 2006; the mean sample size of the national samples was 1,035 respondents. The final sample size consisted of a maximum of 125,077 respondents from 121 countries, for which stress data were available. The countries varied greatly in terms of economic development, political structure, and geographical location, permitting cross-nation comparisons of the relations between SWB, wealth variables, and stress. Sampling was conducted so as to represent the entire adult population of nations. In wealthy nations, this was achieved through telephone surveys based on random-digit dialing, and in poorer nations where telephones were less ubiquitous, this was accomplished by door-to-door interviews, with residences selected randomly within randomly-selected geographical sampling units.

5.2 Measures

5.2.1 Individual Level

5.2.1.1 Stress Respondents were asked to indicate whether they experienced stress a lot in the previous day (1 = yes, 0 = no).

5.2.1.2 SWB variables SWB comprises both affective and cognitive components (Diener 1984, 2000), and four measures—global evaluation of current life (Ladder), satisfaction with important life domains (Domain), positive affect (PA), and negative affect (NA)—were selected to reflect the various forms of well-being. The life satisfaction item asked respondents to rate their current life on a ladder scale, ranging from 0 (worst possible life) to 10 (best possible life; Cantril 1965). Respondents also indicated whether they were satisfied with the following life domains—standard of living, job, health, and city (1 = satisfied, 0 = dissatisfied). We computed an overall measure of domain satisfaction by averaging the number of satisfied responses to the four domains. PA and NA assessed the experience of positive and negative emotions. Respondents reported whether they experienced these feelings a lot in the previous day (1 = yes, 0 = no). A PA score was obtained by averaging the number of yes responses to "enjoyment", "love", and "smile or laugh a lot". Likewise, a NA score was obtained by averaging the number of yes responses to "worry", "sadness", "depression", and "anger".

5.2.1.3 Economic predictors Three economic indicators were selected to measure wealth/material well-being. Annual household income was used as an indicator of personal income. Because of the diminishing marginal utility of money, the logarithm of reported income was used. A measure that assessed the possession of modern household conveniences was also derived. Respondents indicated whether their home had running water, a telephone, electricity, a television, a computer, and access to internet (1 = yes, 0 = no). The number of yes responses was averaged to give an overall score for modern conveniences. The lack of material well-being was measured by unmet basic needs. Respondents reported if there were times in the past year when they did not have enough money for food or shelter (1 = yes, 0 = no), and a score was obtained by averaging the yes responses to the two items.

5.2.2 Nation Level

5.2.2.1 Stress For each nation, the percentage of the population who gave a yes response to stress was calculated.

5.2.2.2 SWB variables For each nation, the percentages of the population who gave yes responses to each of the three positive emotions (PA) were computed, and then averaged to yield the average percent of the population in each nation who experienced PA. NA and domain satisfaction were calculated similarly. Mean Ladder for each nation was computed by averaging the current Ladder of all respondents within the same nation.

5.2.2.3 Economic predictors The wealth of a nation was assessed by two measures, one from the survey itself, and another from an independent source. The nation's average household income was computed by averaging the household income of all respondents within the same nation. The per capita GDP (Purchasing Power Parity) data of each nation

was obtained from the World Bank (World Development Indicators, 2005) in constant 2000 international dollars. For both measures, the logarithm was taken. Two other nation-level material well-being indicators were calculated: (1) the percentage of people in a nation who possessed modern conveniences; and (2) the percentage of people in a nation who could not meet their basic needs. The former was obtained by calculating the percentage for each convenience, then averaging the six items; and similarly for the latter. Life expectancy at birth (2004) was also selected as an objective measure of material and physical well-being. This is because life expectancy indicates the standard of living in a nation as it depends on factors such as quality and availability of healthcare services, sanitary systems, and living conditions.

5.3 Data Analysis

Correlational analyses were first performed at the individual- and nation-level to determine the associations between stress and various forms of well-being and economic predictors, and to establish whether stress could be distinguished from NA. The individual discrete negative emotions were also included, to determine whether stress was like other negative emotions, or was a distinct concept.

Mixed models were also used to analyze the data (Raudenbush and Bryk 2002) to simultaneously examine the predictors of stress at the individual and nation level. As stress was much more closely related to affective experiences than to global life evaluations or domain satisfaction, the model included only PA and NA. Two economic indicators representing the abundance or lack of material well-being (conveniences and unmet basic needs) were also included. A model that used income (instead of conveniences) as a measure of material well-being produced similar results. Thus we illustrated only one of the models below and reported results for that. Because stress was measured with a dichotomous response, a nonlinear approach (hierarchical generalized linear modeling; HGLM) was adopted. The Bernoulli HGLM predicts the log-odds η_{ij} for a dichotomous outcome variable. The probability that person i in country j will feel stress is p, where $p = \exp(\eta_{ij})/[1 + \exp(\eta_{ij})]$.

$$\text{Level 1: } \eta_{ij} = \beta_{0j} + \beta_{1j}(\text{PA}) + \beta_{2j}(\text{NA}) + \beta_{3j}(\text{conveniences}) + \beta_{4j}(\text{unmet basic needs})$$

$$\text{Level 2: } \beta_{0j} = \gamma_{00} + \gamma_{01}(\text{PA}) + \gamma_{02}(\text{NA}) + \gamma_{03}(\text{conveniences}) + \gamma_{04}(\text{unmet basic needs}) + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + u_{1j}; \quad \beta_{2j} = \gamma_{20} + u_{2j}; \quad \beta_{3j} = \gamma_{30} + u_{3j}; \quad \beta_{4j} = \gamma_{40} + u_{4j}$$

At level 1 (person-level), the log-odds (η_{ij}) that person i in nation j will feel stress is predicted from the SWB and economic variables (e.g., β_{1j}, where β_{1j} represents the association between person-level PA and stress). Each predictor is centered on each nation's mean for that variable, so that the intercept (β_{0j}) represents the average log-odds that people in nation j will experience stress.

At level 2 (nation-level), β_{0j} is expressed as a function of the between-nation intercept (γ_{00}) and the between-nation predictors. The person-level slopes are each expressed as a function of the mean slope for that variable (e.g., γ_{10}) and a between-nation error term. For example, β_{1j} is a function of the mean PA–stress slope, and u_{1j} represents the unique effect of nation j on the PA–stress slope. Each nation-level predictor is centered on its grand-mean (the average of all nations), so the intercept, γ_{00}, is the average (across all countries) log-odds of experiencing stress.

At the nation level, γ_{01} represents the effect of the nation-level predictor, PA, on β_{0j} in nation j. Likewise, each of the other coefficients (γ_{02}, γ_{03}, γ_{04}), represents the nation-level effect of that respective predictor. At the individual level, γ_{10}, is the average effect of the person-level predictor, PA, across all nations. Similarly, the other coefficients (γ_{20}, γ_{30}, γ_{40}) represent the person-level effects. The error terms represent the variance in the intercept (u_{0j}) and slopes (u_{1j} to u_{4j}) that remain unaccounted for by nation-level predictors.

6 Results

6.1 Correlates of Stress

Across individuals, various forms of well-being (PA, Ladder, and Domain) were related to decreased stress, and NA was related to increased stress (Table 1). Wealth (income and conveniences) and poverty (unmet basic needs) both showed small positive associations with stress. In contrast, the patterns for NA were different as wealth showed small negative associations with NA. But similar to stress, NA showed a positive association with unmet basic needs and negative associations with well-being (PA, Ladder, and Domain), although the magnitudes of the correlations were stronger than those of stress. Statistical tests using Steiger's *Z*-statistic (Steiger 1980) confirmed that the correlations for stress were significantly different from those for NA (see Table 1 for the *Z*-values).

Table 1 Correlations between stress, SWB and wealth variables

	Stress	NA	*Z*	Sadness	Anger	Worry	Depression
Individual-level							
PA	−.18***	−.34***	56.98***	−.28***	−.20***	−.23***	−.27***
NA	.46***	1.00	–	.77***	.66***	.75***	.69***
Stress	1.00	.46***	–	.34***	.29***	.36***	.35***
Ladder	−.07***	−.19***	41.28***	−.16***	−.09***	−.12***	−.17***
Domain	−.13***	−.28***	52.48***	−.23***	−.14***	−.20***	−.22***
Log income	.08***	−.09***	57.84***	−.09***	−.05***	−.02***	−.09***
Conveniences	.07***	−.03***	34.04***	−.05***	.001	.003	−.06***
Unmet basic needs	.09***	.19***	−34.46***	.16***	.10***	.14***	.15***
Nation-level							
PA	.22*	−.33***	5.51***	−.27**	−.42***	−.04	−.39***
NA	.41***	1.00	–	.89***	.75***	.78***	.71***
Stress	1.00	.41***	–	.33***	.30***	.29***	.39***
Ladder	.20*	−.29***	4.90***	−.29***	−.25**	−.05	−.40***
Domain	.21*	−.32***	5.31***	−.34***	−.28**	−.09	−.35***
Log income	.48***	−.23*	7.19***	−.30**	−.28**	.06	−.30***
Conveniences	.36***	−.02	3.88***	−.08	.04	.11	−.17
Unmet basic needs	−.13	.27**	−4.01***	.37***	.18*	.06	.30***
Log GDP (2005)	.33***	−.13	4.63***	−.13	−.10	.06	−.30***
Life expectancy (2004)	.36***	−.05	4.17***	−.04	−.04	.08	−.21*

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

At the nation level, various forms of SWB (PA, NA, Ladder, and Domain) and wealth (income, GDP, conveniences, and life expectancy) correlated positively with stress, whereas poverty (unmet basic needs) showed a non-significant, inverse relation. In contrast, well-being (PA, Ladder, Domain) and income were related to decreased NA, whereas unmet basic needs was related to increased NA. The other wealth indicators (conveniences, GDP and life expectancy) showed no significant relations with NA (see Table 1). Statistical tests (Steiger's *Z*) of the correlations for stress and NA again confirmed that they were significantly different. These differences were either in the strength or direction of associations. In addition, at the nation and individual levels, the four individual negative emotions showed similar correlational trends as NA. Conversely, they showed different trends from stress at the nation level (though at the individual level, they showed similar associations with SWB variables as stress did), supporting the postulation that stress is unlike other discrete negative emotions.

For a clearer illustration of how perceived stress was related to both wealth and poverty, we compared the means and correlations for rich and poor people (those whose household incomes fell within the top and bottom thirds of the distribution, respectively). Expectedly, having more unmet basic needs led to greater stress for both groups (see Table 2). Moreover, rich people (.31) were more likely to feel stress compared to poor people (.24), $\chi^2 = 339.82$, $p < .001$. Importantly, we found that possession of more modern conveniences was associated with increased stress for rich people despite their higher SWB, whereas no such relation was found amongst the poor. This supports our proposition that although wealth is associated with higher SWB, it is also related to higher perceived stress due to a hectic, modern lifestyle. The nation-level descriptives comparing the rich and poor nations (those with average household incomes within the top and bottom thirds of the distribution, respectively) yielded a similar pattern.

Table 2 Means and correlations for rich versus poor people, and rich versus poor nations

	M	SD	Stress	*M*	SD	Stress
Individual-level	Rich people			Poor people		
Stress	.31	.46	1.00	.24	.43	1.00
Conveniences	.85	.23	.09***	.31	.28	.007
Unmet basic needs	.10	.26	.08***	.45	.40	.13***
PA	.78	.32	−.19***	.62	.37	−.18***
NA	.19	.26	.43***	.25	.31	.49***
Ladder	6.62	1.92	−.09***	4.26	2.01	−.09***
Domain	.83	.25	−.14***	.61	.32	−.15***
Nation-level	Rich nations			Poor nations		
Stress	32.3%	8.6%	1.00	20.9%	9.1%	1.00
Conveniences	91.0%	15.1%	.19	34.1%	24.3%	−.01
Unmet basic needs	10.0%	6.6%	.20	39.2%	11.0%	.08
PA	76.8%	6.8%	−.14	62.8%	10.8%	.25
NA	20.0%	4.9%	.48**	24.1%	6.7%	.51**
Ladder	6.71	.76	−.21	4.46	.78	.04
Domain	84.4%	6.4%	−.17	63.4%	9.6%	.21

** $p < .01$; *** $p < .001$

To yet further investigate the links between stress and wealth, we examined the correlations for different age groups. Older people tend to be under less time pressure as most of them are retired and have fewer family demands (e.g., taking care of children). These potential differences in pace of life across age groups may yield differences in the correlations between perceived stress and wealth. Confirming this, we found that more people who were 60 and under experienced stress, relative to those over 60 (28.9 vs. 21.9%, $\chi^2 = 430.87$, $p < .001$). Furthermore, stress correlated positively with income and conveniences at the individual level for those under 60, but inversely for those over 60. In other words, having more money and modern conveniences benefited older people (e.g., retirees), and was associated with less stress, whereas affluence was associated with higher stress for younger people (e.g., working adults). Again, this is consistent with our explanation that wealth is associated with increased perceived stress because of the corresponding hectic, modern lifestyle. One possible explanation for the pattern of results across different age groups is that high-income working adults may feel more stress as they work hard and seek to earn more money but have little time to enjoy their fruits of labor, whereas those who are retired feel less stress if they have more money and conveniences as they have more time to enjoy their higher standard of living.

6.2 HGLM

The results of the HGLM analysis are presented in Table 3. As shown by the significant positive coefficients, γ_{01} and γ_{02}, nation-level PA and NA were associated with higher log-odds of feeling stress. The PA coefficient of .03 means that for a person living in a "happy nation" (with PA 1 unit above the grand-mean), the log-odds of experiencing stress increases by .03, as compared to someone living in an "average PA nation". Nation-level wealth (conveniences) was also associated with higher log-odds of feeling stress. At the person-level, NA, conveniences, and unmet basic needs were associated with higher log-odds (as shown by their positive coefficients, γ_{20}, γ_{30}, γ_{40}). Conversely, PA (γ_{10}) was

Table 3 Hierarchical linear modeling: predicting stress from SWB and wealth variables

Fixed effects	Coefficient	SE	*T*-ratio
Nation effects			
For intercept, β_0			
Intercept2, γ_{00}	−1.10***	.04	−25.60
PA, γ_{01}	.03***	.004	6.46
NA, γ_{02}	.05***	.007	6.90
Conveniences, γ_{03}	.01***	.003	4.28
Unmet basic needs, γ_{04}	.006	.005	1.37
Individual effects			
For PA, β_1			
Intercept2, γ_{10}	−.51***	.03	−15.23
For NA, β_2			
Intercept2, γ_{20}	3.22***	.08	42.61
For conveniences, β_3			
Intercept2, γ_{30}	.55***	.07	8.21
For unmet basic needs, β_4			
Intercept2, γ_{40}	.22***	.03	8.24

*** $p < .001$

associated with lower log-odds. This means that the log-odds of experiencing stress decreases by .51 for a person who is high in PA (1 unit above the nation-mean), as compared to the "average PA" person in the same nation. The findings highlighted that higher NA and wealth at both nation-level and individual-level predicted higher probability of feeling stress. In contrast, individual-level PA had an opposite effect from that of nation-level PA.

To illustrate: holding all other predictors constant, a person who has high material well-being (e.g., possessing one SD more conveniences than the nation-mean) living in an "unhappy country" (where the percentage of people who experience NA is 1 SD higher than the grand-mean) has a .36 probability of feeling stress [$\beta_{0j} = \gamma_{00} + \gamma_{02}$ (NA) = $-1.10 + .05(6.40) = -.78$; $\beta_{3j} = \gamma_{30} = .55$; $\eta_{ij} = \beta_{0j} + \beta_{3j}$ (conveniences) = $-.78 + .55(.35) = -.59$; $p = .36$], whereas a person with average material well-being living in the "average-NA nation" has a .25 probability of feeling stress ($\beta_{0j} = \gamma_{00} = -1.10$; $\eta_{ij} = \beta_{0j} = -1.10$; $p = .25$).

7 Discussion

The study highlighted three key findings on self-reported feelings of stress. First and foremost, nation-level stress and NA were related in the opposite direction to several important variables—wealth and poverty (income, conveniences, GDP, unmet basic needs), well-being (PA, Ladder, Domain), and life expectancy. At the nation level, well-being and economic indicators correlated positively with stress but negatively with NA. In addition, lack of material well-being (unmet basic needs) was related to increased NA, but showed no significant relationship with stress. Though stress was more similar to NA (and discrete negative emotions) at the individual level, differences were still found. Wealth (income and conveniences) was negatively related to NA but positively related to stress.

The different associations that stress and NA showed with economic indicators (at both individual and nation levels) substantiate the conclusion that stress measures a different concept from NA. Unlike NA, stress did not simply represent a negative affective state elicited by adverse economic circumstances. Instead, stress was positively associated with both favorable and unfavorable conditions. The stress versus NA distinction underlines another distinction that should be made—stressful conditions versus feelings of stress. Stressful conditions (such as low income, government corruption, high crime rates, and unmet basic needs) were associated with higher NA and lower life satisfaction, but not necessarily with stress. Conversely, feeling stressed was not related to bad societal conditions (e.g., lower life expectancy) but was instead related to affluence. Thus, feelings of stress were more due to a fast life and were not only related to negative affective states, but also to economic development.

The second key finding is that comparisons of individual versus nation level findings revealed that the correlates of stress differed at these levels. Stress reflected more of a negative affective state at the individual level, showing strong correlations with affective experiences and weak correlations with wealth. Conversely, at the nation level, the associations with wealth and material well-being were stronger than those with affective experiences, suggesting that lifestyle factors played a more important role.

Finally, our findings clarified how perceived stress was differentially related to components of well-being and wealth at the nation- and individual-levels. Consistent with previous research showing that increased time stress is associated with increased SWB/happiness across nations, whereas individuals who experience more time stress feel less

happy (Garhammer 2002; Robinson and Godbey 1998; Shields 1999), we obtained the same patterns for perceived stress. These associations likely arose because of the common underlying factors between these variables (e.g., nations with higher time stress and SWB also had greater wealth), and not because of direct causal influences. In nations with higher affluence and modern amenities, people are more likely to experience feelings of stress due to hectic lifestyles, but at the same time, living conditions are better and healthcare standards are higher. This possibly explains why people in these nations have higher SWB and life expectancy despite the perceived stress. The HGLM analyses further clarified this; the effects of individual-level and nation-level PA on the probability of feeling stress were in the opposite direction. Specifically, a happy person was less likely to experience stress, but the reverse was true for a person living in a happy nation.

With economic development, people earn higher incomes, purchase more material goods, and have more activity options. Material affluence however, can lead to the "hedonic treadmill" phenomenon as people adapt to having more consumer goods and higher material standards, creating a need to perceptually increase what they have (Schwartz 2004). Furthermore, attaining a higher material standard of living comes with a cost—people in modern-day societies now spend a large portion of their time at work, leaving little time for other activities. Though having more money opens up more possibilities (e.g., shopping, watching television, playing golf), attempting to pack in more activities within a fixed, limited amount of time would only create pressure and contribute to feelings of stress. In short, affluence leads to time stress, which leads to perceived stress.

7.1 Stress and SWB

Though complaining about stress may appear to be primarily a habit of the higher-income groups, leading to the perception that it is "yuppie kvetching" (Hamermesh and Lee 2007), and hence neither as real nor as pressing as problems of poverty, there is no denying that perceived stress and time pressure are pervasive social issues, at least among the affluent. The concept of mental well-being has consequently garnered more attention from researchers and policymakers, especially in affluent nations. In addition, given findings that happiness leads to success in various important life domains such as marriage, income, work performance, and health (Lyubomirsky et al. 2005), it is natural that there is growing interest in learning more about the causes of happiness (or SWB), and how to enhance one's happiness (Lyubomirsky et al. 2005).

It is thus important that we investigate how stress influences the quality of our lives, and not simply dismiss it as "a frivolous complaint of the rich". In a way, stress acts like a gauge, signaling that certain levels of living conditions have been achieved. Though stress usually decreases the subjective component of quality of life (e.g., life satisfaction and happiness), it can increase quality of life when associated with arousal, which helps one succeed in challenging tasks. This positive characteristic of stress resonates with the engagement orientation to happiness described by Peterson et al. (2005). Akin to being in the flow state (Csikszentmihalyi 1990), pursuing happiness via engagement was related to higher life satisfaction. This suggests that occasionally certain amounts of stress may be good if it motivates people to seek out challenges and helps them get into the flow, engendering goal achievement, and thereby increasing satisfaction and happiness.

As a preliminary test of the idea that the good component of stress stems from the energy and arousal (/activation) that accompanies it, we derived a measure of activation by taking the difference between stress and depression. Thus, people who were stressed but not depressed would be aroused/activated, whereas those who were depressed but not

stressed would be negatively activated (e.g., lethargic), and those who experienced both states or neither state, would not be activated. Indeed, we found that activation was related to increased satisfaction (Ladder and Domain) and PA, as well as greater wealth (higher income and possession of more conveniences). The results promise potential for further investigation; however, we should reiterate that arousal is conceptualized as a component of good stress, not as the entire stress construct, especially since stress showed different correlations from anger, an activated negative emotion.

Cross-cultural research has revealed that most people report a positive level of SWB, although there are national differences in SWB (Diener and Diener 1996; Diener et al. 1995, 2008). Objective conditions such as income, equality, and education can account for a substantial amount of variation in SWB across nations (Veenhoven 1995). However, income correlates with SWB beyond fulfillment of basic needs (Diener et al. 1995), suggesting that wealth also contributes to SWB in other ways (e.g., enabling people to achieve their goals). The evaluation theory proposed by Diener and Lucas (2000) to determine the societal characteristics that enhance SWB posits that SWB depends on people's evaluations of self-relevant information, which is influenced by their needs, goals, and culture. Like SWB, stress at the national level is influenced by similar factors. Nations with high proportions of stressed people not only have high income and more people who own modern conveniences, but also have high satisfaction and longevity.

7.2 Strengths and Limitations

A strength of the present study is that it is based on the first truly representative survey of humanity, and includes all of the largest nations of the world, as well as many of the poorest nations. Thus, the conclusions about national differences are based on a much larger range of societies than was true in former surveys.

However, a limitation is the dichotomous nature of the items from the survey, raising concerns about the adequacy of the measurement strategy, especially for stress. It leaves open the possibility that different conclusions would have emerged had a more extensive measure of stress been used. Admittedly, a single, dichotomous stress item cannot capture the intensity and various types of stress. The measure reflects primarily people's perceptions and self-labeling of stress and does not fully capture stress as a complex, multidimensional construct. However, the present emphasis is on respondents' subjective experience of stress, not on teasing out the various dimensions of stress. As such, the current measure did reveal readily interpretable results that shed light on the nature of "feelings of stress" as perceived by lay persons. In addition, the analyses were aggregated across a large number of respondents, ensuring that individual unreliability was not a problem. Furthermore, reports of stress showed substantial correlations at the nation level with objective measures obtained from other sources (GDP and life expectancy), so it was very unlikely that the reports of stress reflected merely a response bias or other artifact. Finally, the pattern of findings is not only easy to comprehend, but is also consistent with past findings that used more intensive measures of stress. And as the survey was administered in many nations across the world, using dichotomous items has the advantage in that responses are less likely to be influenced by number use response sets across nations.

Another measurement limitation is that the affect measures focused on feelings experienced in a single day ("the previous day"). This generates the concern that transitory emotions are more variable and susceptible to daily influences, and anchoring affect reports on a single day may introduce more random error into the measures. However, the merit of assessing emotions in reference to the previous day is that it reduces the extent of bias in

recalling past experiences. In addition, the emotions are more likely to be anchored in real experience than are reports of long-time periods or reports of "in general" (Robinson and Clore 2002).

Finally, although translation and interpretation could be a concern in a multi-nation study such as this; in fact, differences in translation and interpretation would weaken the results, not strengthen them. Thus, the distinct results we obtained cannot be convincingly attributed to this issue. Indeed, the systematic patterns we found strongly suggest some common meaning to the term "stress" across the many cultures and languages used in the survey.

7.3 Concluding Remarks

Our conclusions serve as a reminder that in addressing the pervasive social issue of stress, the main concern should not be to eliminate causes of stress just because it has harmful effects. Chronic stress is detrimental to physical and mental health and weakens the immunity (Wargo 2007). But we need to recognize that stress can stem from both positive and negative conditions, and can have positive effects as well. For instance, a certain amount of time pressure is good as it increases productivity and helps people face challenges.

In line with the new direction advocated—that positive psychology should focus on understanding and cultivating factors that help individuals and societies to flourish (Seligman and Csikszentmihalyi 2000)—it would be important to explore how to maximize positive stress for its benefits (e.g., improving work performance), without increasing chronic stress. A future direction for stress research would be to try to gain further insights into the underlying factors that can explain the links between stress and happiness, so as to explore how stress can be beneficial. For example, by manipulating stress, experimental studies can help identify the conditions whereby stress enhances performance, and examine how the boost in short-term happiness resulting from the successful outcomes may in turn influence perceived stress.

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