

Original Article

Evolutionary Lifestyle and Mental Health

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Abstract: Some have suggested that psychological distress may be lower if individuals adopt a lifestyle more similar to our evolutionary past. In this study, we assessed relationships between distress and six lifestyle elements (sleep, omega-3 consumption, exercise, rumination, sunlight exposure, and socialization). A large sample ($N = 495$) of college undergraduates reported levels of each lifestyle element and their distress on the Beck Depression Inventory and Hopkins Symptom Checklist. Analysis revealed a positive relationship for rumination and a curvilinear relationship for sleep. In contrast, none of the other elements correlated reliably with distress. The findings raise the possibility that relationships between these lifestyle elements and distress may not be critical for the range of exposure typically experienced in a normal, nonclinical population.

Keywords: mental health, evolutionary psychology, health behavior, treatment, lifestyle.

Introduction

Modern life differs in a number of respects from the physical and social environment likely experienced by our Paleolithic ancestors. These differences between the current environment and that of the past could affect our psychological well-being (e.g., see Buss, 2000; Cosmides and Tooby, 1999; Eaton, Konner, and Shostak, 1988). Such differences include efficient means of transportation, machinery that can replace physical labor, a constant progression of technologies to improve communications, and numerous other resources that afford a greater level of convenience and efficiency than found in the premodern world. However, these societal and technological advances have concurrently deprived modern man of exposure to various factors that were present in the evolutionary past. Many of these factors may have served as natural facilitators of mental health.

For example, in the premodern environment early man would have likely had a sleep pattern more attuned to natural circadian rhythms not influenced by artificial light (e.g., Bower, 1999), foods with higher levels of omega-3 fatty acids (e.g., Eaton, Eaton, Sinclair, Cordain, and Mann, 1998; Eaton and Konner, 1985), higher levels of physical activity (e.g., Cordain, Gotshall, Eaton, and Eaton, 1998), less ruminative thought processes (e.g., Hollan, 1992; Schieffelin, 1985), more time exposed to sunlight (e.g.,

Deacon, 1999) and fewer periods of social isolation (e.g., Gat, 1999). Research, in fact, has established that all these factors are related to mental health (e.g., for sleep, see Cukrowicz et al., 2006; Fava, 2004; for intake of omega-3, see Hibbeln and Salem, 1995; Keller, 2002; for physical activity, see Doyne et al, 1987; Dunn, Trivedi, Kampert, Clark, and Chambliss, 2005; Freemont and Craighead, 1987; for rumination, see Beck, Rush, Shaw, and Emery, 1979; Teasdale, 1983; for light exposure, see Golden et al., 2005; Kripke, 1998; for socialization, see Cohen, 2004).

Such evidence suggests that mental health could be impaired when levels in modern life of these six elements—sleep, omega-3, exercise, rumination, sunlight, and socialization—differ from that found in the evolutionary past. Recently, Ilardi and colleagues (Ilardi, Karwoski, Lehman, Stites, and Steidtmann, 2007) have argued that a modern lifestyle no longer provides adequate amounts of these factors and proposed a novel treatment for individuals suffering from depression. The therapy prompts individuals to make lifestyle changes by adjusting the six factors in their lives, and preliminary evidence suggests the success of this approach (Ilardi et al., 2007; Karwoski, 2006).

Although research has linked each of the six individual lifestyle elements with mental health, their relationship with mental health has not yet been evaluated simultaneously for the same individuals. The aim of the present research was to assess claims about these elements by examining whether their levels are related to mental health in the general population. Further, by including multiple elements, the research allowed an assessment of the possible combined effect of the elements. In the study, a large sample of college undergraduates were asked to report levels of the lifestyle elements as well as perceived psychological distress. We then evaluated whether there were linear or curvilinear effects for each element and whether any of the findings varied by age or sex.

Method

Participants

Participants were 495 college students recruited from undergraduate psychology courses at a large university.¹ Their mean age was 20.9 years ($SD = 4.3$, range = 17–55) and 70% were female.

Procedure

Participants were recruited from undergraduate psychology courses. Announcements informed students that at the beginning or end of their next scheduled class, they would have the opportunity to participate in a self-report survey in exchange for extra course credit. For those who wished to participate, the survey was administered at the next class meeting or an alternative time for students who could not attend the class administration.

Each participant first completed the Lifestyle Elements Scale, which asked them to indicate daily amounts of the six lifestyle elements experienced for the last week. They then indicated their level of distress by completing the Beck Depression Inventory and the

Hopkins Symptom Checklist.

The sample included only those who completed at least 20 of the 21 items on the Beck Depression Inventory, 55 of the 58 items on the Hopkins Symptom Checklist, and an entry for at least one day for each of the lifestyle elements. Missing scores were handled by estimating the missing value from the mean of the other items on the measure.

When responding to the daily entries on the Lifestyle Elements Scale, a few participants entered a verbal designation instead of a number. Verbal responses for a small amount such as “a little” were assigned a value one standard deviation below the mean for that day, terms for a large amount such as “a lot” were given a value one standard deviation above the mean, and a response of “all day” was scored as the maximum reported number for the day.²

Measures

Beck Depression Inventory. The Beck Depression Inventory II (Beck, Steer, and Brown, 1996) is a widely used self-report measure for depression that includes 21 items. Each item is scored from 0 to 3 to reflect the presence and severity of a depressive symptom, with higher scores indicating a greater severity of depression.

Hopkins Symptom Checklist. The 58-item version of the Hopkins Symptom Checklist (Derogatis, Lipman, Rickels, Uhlenhuth, and Covi, 1974a, 1974b) is a self-report measure of symptoms commonly reported by individuals seeking psychological help. Each symptom item is scored on a 4-point scale, indicating that the symptom bothered them *not at all* (1), *a little* (2), *quite a bit* (3), or *extremely* (4).

Lifestyle Elements Scale. The Lifestyle Elements Scale is a self-report questionnaire developed for this research to assess the amount of sleep, omega-3, exercise, rumination, sunlight, and socialization that individuals have over the course of a week. Respondents first indicate their age and sex. Then, for each day of the week, they enter a numerical value in response to the following six questions: (a) “How many hours did you sleep each night?”; (b) “How many servings of the following did you consume: fresh fish, canned fish, an omega-3, or fish oil dietary supplement (pills)?”; (c) “How many minutes of physical exercise did you receive each day? (i.e. aerobics programs, weightlifting, jogging, lap swimming, sports such as basketball, soccer, racquetball, or similar exercise activities)”;

(d) “How many minutes during the day did you find yourself thinking or worrying over any particular issue(s) in a nonproductive manner? (i.e. stressing, ruminating, obsessing, etc.)”;

(e) “How many minutes did you spend directly exposed to sunlight? Please only consider times you were directly outdoors (not in the car, not sitting in shade, etc.)”;

(f) “How many minutes each day did you spend socializing outside of class? (i.e. attending parties, shopping with friends, going to movies with friends, attending study groups, etc.)”

Table 1. Mean, Standard Deviation, and Range for Lifestyle Elements and Measures of Psychological Distress.

Variable	<i>M</i>	<i>SD</i>	Range
Lifestyle elements ^a			
Sleep hrs	6.7	1.1	2.9–13.7
Omega-3 servings	0.3	0.7	0.0–11.6
Exercise hrs	0.4	0.6	0.0–5.3
Rumination hrs	0.6	1.0	0.0–12.0
Sunlight hrs	0.6	0.8	0.0–8.3
Socialization hrs	2.0	1.9	0.0–11.0
Psychological distress			
BDI ^b	11.4	8.1	0.0–51.5
SCL ^c	1.6	0.4	1.0–3.3

Note. *N* = 495.

^aPer day across 1 week. ^bTotal score on Beck Depression Inventory. ^cMean item score on Hopkins Symptom Checklist.

Results

Table 1 displays the mean, standard deviation, and range for the lifestyle elements and measures of psychological distress. As can be seen, participants reported relatively low daily averages of each element: approximately seven hours of sleep; less than half a serving of omega-3; one-half hour of exercise, rumination, and exposure to sunlight; and two hours socializing.

Because the Beck Depression Inventory and symptom checklist were highly correlated, $r(493) = .80$, $p < .001$, a primary measure of overall distress was created by transforming depression inventory scores and symptom checklist scores into standard scores and then averaging these standard scores. To normalize their distributions, values for the lifestyle elements were transformed by the square root.

Table 2 displays correlations between the lifestyle elements and the measure of overall distress, Beck Depression Inventory, and Hopkins Symptom Checklist. Only levels of rumination related reliably with either the overall distress measure or the component measures of the depression inventory and symptom checklist. Correlations for the other five elements were all close to zero. Moreover, a regression analysis of all the elements except for rumination failed to predict overall distress reliably, $R^2 = .01$, $F(5, 489) = 1.22$, $p = .3$. Given the size of the sample, any substantial relationship would likely have been detected. In fact, power analysis indicates that a sample of this size has a 95% chance of

detecting correlations greater than .16 at the .05 confidence level.

It is possible that moderate levels of some of the lifestyle elements are associated with better mental health, whereas extreme levels are related to greater distress. We therefore assessed this possibility of curvilinear effects. Analysis revealed a curvilinear pattern for sleep, $t(492) = 2.61, p = .009$. Participants reporting moderate levels of sleep (5–9 hours) had lower levels of distress (mean overall distress = 0.0, $n = 468$) than those with sleep values outside this range (mean overall distress = 0.4, $n = 27$), $t(493) = 2.71, p = .007$. There was no similarly strong evidence of a curvilinear pattern for the remaining five elements ($ps > .07$).

Although the age of our college sample was fairly homogeneous, some older students were involved. We therefore assessed whether participant age might moderate relationships between the lifestyle elements and distress. These analyses failed to indicate that the relationship of any of the elements with distress varied as a function of age (all interaction $ps > .1$).

Table 2. Correlations of Lifestyle Elements with Overall Distress, Beck Depression Inventory, and Hopkins Symptom Checklist.

Element ^a	Distress measure		
	Overall ^b	BDI	SCL
Sleep	-.06	-.08	-.03
Omega-3	.07	.06	.07
Exercise	-.04	-.06	-.02
Rumination	.40*	.35*	.40*
Sunlight	-.04	-.05	-.03
Socialization	-.06	-.08	-.04

Note. $N = 495$ ($df = 493$).

^aAll elements except omega-3 are square root of hours per day. Omega-3 is square root of servings per day. ^bOverall distress is mean of standardized scores for BDI and SCL.

* $p < .05$.

The sex of participants affected the findings of two elements, rumination and exposure to sunlight. Rumination was related to distress more strongly for males ($r = .52, p < .001$) than for females ($r = .34, p < .001$), interaction partial $r = .10, p = .02$. Although the relationship between exposure to sunlight and distress differed between males and females, interaction partial $r = .09, p = .05$, neither the relationship for males ($r = -.11, p = .2$) nor

for females ($r = .08, p = .2$) differed reliably from zero.

Discussion

Among participants in the study, time spent ruminating was the only one of the six lifestyle elements to yield a simple linear relationship with psychological distress. This finding is consistent with previous research regarding ruminative thought processes (e.g., Morrison and O’Conner, 2005; Nolen-Hoeksema, Morrow, and Fredrickson, 1993). In contrast, levels of sleep, omega-3, exercise, exposure to sunlight, and socialization—either individually or taken together—did not correlate reliably with the distress measures. The failure to detect such correlations is especially striking given the substantial statistical power of the analyses.

Further analysis did indicate that sleep was related to mental health, although in a nonlinear fashion. There seemed to be an optimum range of sleep: Typical amounts were associated with lower distress, whereas participants who slept either less or more than the mid values reported greater distress. This result parallels evidence from other research suggesting the advantages of an optimum sleep range (e.g., Kaneita et al., 1996).

Participants in the study reported relatively low levels for many of the lifestyle elements and this may explain the lack of other relationships with distress. For example, although research has established the effectiveness of light therapy for improving mood (e.g., Golden et al., 2005), investigators have noted that the time individuals typically spend exposed to sunlight is rather low—as was the case in the present sample—and the intensity of natural sunlight is less than that provided in bright light therapy research (Espiritu et al., 1994). Similarly, investigations that have linked omega-3 and exercise to psychological distress involved much higher levels than observed in our sample (e.g., for omega-3, see Nemets, Stahl, and Belmaker, 2002; Peet and Horrobin, 2002; Stoll et al., 1999; for exercise, see Dunn et al., 2005).

Relationships between the lifestyle elements and distress may also have been suppressed because of the way the elements were measured. For instance, research focusing on the quality of social interactions has found that positive social experiences correlate with better mental health (e.g., Cohen, 2004; Ezquiaga, Garcia, Pallares, and Bravo, 1999). In this study, however, participants indicated only how much time they spent socializing, not the quality of those interactions. Also, participants may have been inaccurate in their reporting of the lifestyle elements. In particular, they may not have been sufficiently knowledgeable about omega-3 or the amounts of omega-3 typically found in foods (e.g., Verbeke, Sioen, Pieniak, Van Camp, and De Henauw, 2005). Further, past research measuring omega-3 has used biological measures such as blood levels (Edwards, Peet, Shay, and Horrobin 1997). Measuring the elements using similar biological measures or daily intake diaries may yield more accurate reports than retrospective recollections. Nevertheless, if the links with mental health are robust, even a relatively crude self-report measure of the lifestyle elements would be expected to reveal relationships between these elements and distress.

Because our goal was to examine the role of the lifestyle elements in the general population, participants were drawn from a nonclinical sample. Not surprisingly, the degree of psychological distress reported by participants in the study was relatively modest compared to that observed in clinical populations (e.g., see Beck et al., 1996, chap. 3; Derogatis et al., 1974b). Relationships between the lifestyle elements and distress may simply not occur within the range of distress levels of a normal population.

We did not find that the pattern of relationships between the lifestyle elements and distress varied as a function of age. However, this was a college-age sample in which there were relatively few older participants. Therefore, any moderating effect of age may have been difficult to detect.

Although rumination was related to distress for both males and females, our analyses indicated that the relationship was stronger for males. It is unclear why this pattern differs from other research, which has suggested a stronger relationship among females (e.g., Nolen-Hoeksema, 1987; Nolen-Hoeksema, Larson, and Grayson 1999).

Because rumination had by far the strongest and most straightforward relationship with distress, adding other lifestyle elements to traditional anti-rumination strategies may be unnecessary. Dealing only with problematic thought processes might be as effective as a therapy combining multiple elements. Of course, this treatment implication presupposes that our observed correlation between rumination and distress stems from rumination causing distress rather than the other way around.

Promoting a lifestyle more consistent with that of the evolutionary past seems a plausible approach to enhancing mental health. In fact, researchers have recently recommended to the general public just such lifestyle changes for alleviating psychological distress (e.g., Klein, 2007). However, results from the present study suggest that relationships between many of these lifestyle elements and distress may not be particularly prominent within the range of values typically found in the general population. To be effective in reducing psychological distress, an intervention may need to expose individuals to these lifestyle elements at the higher levels more similar to those experienced by our Paleolithic ancestors.

Notes

¹ An additional 22 individuals were excluded from the analyses because their questionnaires were not fully completed.

² Only 21 individuals used a verbal response when completing the Lifestyle Elements Scale. The pattern of correlations between the lifestyle elements and the measures of distress were comparable when these participants were excluded.

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