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Legacy, Leisure and the 'Work Hard – Play Hard' Hypothesis

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Abstract: Do people who work hard also tend to play hard? We tested this hypothesis using an online questionnaire-based study of a large volunteer sample of university undergraduate students. Participants responded to questions designed to detect variation in attraction to accomplishment/fame (or 'work') and attraction to leisure (or 'play'). Additional questions were asked, for use in post-hoc exploratory analyses, to evaluate attraction to parenthood and attraction to religion, as well as assessment of mortality salience and negative mood. Using partial correlation analyses, by far the strongest pairwise relationship was between attraction to accomplishment and attraction to leisure. Both were also positively correlated with mortality salience. Multi-dimensional scaling analysis distinguished two clusters (groups) of participants suggesting two general categories of mortality anxiety buffering strategies involving legacy delusion: one incorporating primarily religion combined with parenthood — a 'religious family-oriented' type — and one involving primarily accomplishment (also with attraction to parenthood), but combined strongly with leisure in place of religion — a 'secular go-getter'; the 'work hard – play hard' type.

Keywords: Legacy drive, leisure drive, mortality salience, parenthood, religion.

INTRODUCTION

'Work hard – play hard' is a familiar slogan in popular culture. Its origin is uncertain but it can be traced to at least 1827 in Newnham [1]: "Whatever is done, it should be habitually done with earnestness; in every pursuit, exertion should be employed; work hard and play hard; always recollecting that quiescence, the stillness of inactivity is destructive to the mental welfare, and approaches very nearly to the winter of the faculties, the torpor of an hibernating animal, the unprotected state of sleep, or the complete cessation of life" (p. 602). The phrase also appears in an 1884 advertisement for Racine College (a 19th Century Episcopal preparatory school in Racine, Wisconsin) where it is attributed to its first Warden, James deKoven within the motto "Work hard, Play hard, Pray hard." [2, p. 88]. The traditional inference, therefore, involves a work ethic, with the principal focus on virtue in hard work, and connecting this (secondarily it seems) to associated value in leisure (enjoyable free-time pursuits); apparently, mental welfare required that both be pursued with gusto (along with prayer, for the converted).

The modern inference of 'work hard – play hard', however, remains uncertain. Thus, we conducted an exploratory study in order to initiate interest in uncovering a deeper understanding of this popular manifesto within contemporary society. An interesting question is whether 'work hard – play hard' is meant as a kind of prescription for a cultural norm or lifestyle (effected through social learning) to indulge in leisure following (as an earned reward for, or to motivate additional) hard work. Perhaps it serves to extol a kind of 'work-life' balance or blend, thus recommending (for one's well-being) against 'all work and no play' [3, 4]. Or perhaps 'work hard, play hard' refers to an assumed, perceived or expected association between two fundamental human penchants across a range of phenotypic variation (without any particular precedence of one necessarily needing to follow or to be evoked/triggered by the other). In other words, perhaps—interacting with effects of environment / social learning—there are deeply ingrained personality traits that

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drive one to work hard, and that these tend generally to be correlated with personality traits (also deeply ingrained) that drive one to play hard.

Or perhaps their alleged positive relationship is largely mythical, or weak at best. In addition to the slogan's meaning or why it exists, even more fundamentally the question remains as to the extent that 'working hard' and 'playing hard' tend in fact to be found together in representing the interests and motivations of resident individuals within a population. Even clear anecdotal evidence is hard to find. The present study was designed to address this question with an empirical test using a large sample population of undergraduate students enrolled at a Canadian university. Our central objective was to test the prediction, according to the 'work hard – play hard' hypothesis, that attraction to accomplishment-based legacy/fame ('work') and attraction to leisure ('play') would be strongly correlated, consistent with the popular 'work hard – play hard' aphorism.

METHODS

Subjects

Undergraduate students in the Faculty of Arts and Science at Queen's University were invited in January 2013, by electronic mail, to participate voluntarily in an online questionnaire about attitudes, interests and preferences regarding personal well-being. Subject recruitment and data collection methods were approved by the General Research Ethics Board, Queen's University, and the questionnaire was hosted on http://www.surveymonkey.com. Participants were instructed that they were not obligated to respond to any particular questions that they found objectionable or that made them feel uncomfortable.

Questionnaire Description

Participants were presented with two series of questions designed to detect variation in levels of attraction to 'work', and 'play' respectively. We considered that attraction to play can be interpreted as attraction to activities that one might pursue for pleasurable free-time indulgence, and we refer to this as 'leisure drive'. We measured attraction to 'work' in terms of potential indicators of attraction to accomplishment / fame, assuming that the latter is likely to motivate attraction to work (in order to achieve accomplishment, recognition or fame). We considered attraction to accomplishment/fame as a component of 'legacy drive' — *i.e.* a concern for one's reputation, self-image, and influence after death [5 - 9]. Responses to four additional series of questions were also collected — regarding attraction to parenthood, attraction to religion, expression of mortality salience, and expression of negative mood / self-esteem — in part to help conceal the central purpose of the study (and hence minimize its potential to influence participant responses), but also in order to explore, post-hoc, the possibility of multivariate relationships involving leisure drive (attraction to 'play') and legacy drive (attraction to 'work') that might serve to inspire future research.

Participants were asked initially to identify their age, gender, religious affiliation, and cultural affiliation that they most closely identify with. They were then asked a series of questions (in the following order) associated with attraction to: Religion (Appendix **1**), Parenthood (Appendix **2**), Accomplishment/fame (Appendix **3**), and Leisure/recreation (Appendix **4**). Because both Accomplishment and (in particular) Leisure could be perceived and pursued through many possible domains, we included a large number of questions for these in order to capture, as much as possible, the range of potential variation among participants. Questions were also included to evaluate participants in terms of their 'baseline' mortality salience (Appendix **5**) followed by expression of negative mood/self-esteem (Appendix **6**). The latter included components from the Rosenberg [10] self-esteem scale. In order to assess whether presentation of these latter questions might have priming effects on attraction to accomplishment or leisure, half of the participants (Group A) were randomly assigned to respond to questions on mortality salience and negative mood *prior to* questions on accomplishment and leisure, while the other half (Group B) were randomly assigned conversely — to respond to mortality salience and negative mood questions *after* responding to questions on accomplishment and leisure. After completing each question series (represented in Appendices 1-6), participants could not return to modify their answers within that series.

For each question series, the collection of responses was collapsed into a single index ranging from 0 to 1 with all questions weighted equally. Response values for each question within a series were first transposed to a common scale from 0 - 6, with 6 representing responses that were largest in magnitude (*e.g.* most frequent, most positive, most affirmative), or in the case of negative mood (Appendix **6**), most negative about oneself. Thus questions with 7-level responses were assigned values of 0, 1, 2, 3, 4, 5 and 6 respectively, and questions with <7-level responses were

similarly scaled -; *e.g.* 5-level responses were assigned values of 0, 1.5, 3.0, 4.5 and 6 respectively. A given index score (*e.g.* for attraction to leisure) was thus calculated for each participant as the sum of response values across all questions within the series, divided by the maximum possible score (*i.e.* 6 multiplied by the number of questions in the series).

Data Analyses

In order to interpret relationships between the computed indices, standard parametric tests (and non-parametric tests, as required, for meeting assumptions of data distribution/variances) for correlation and analysis of variance were employed using SigmaStat 3.5 (2006 Systat Software, Inc.) and Statgraphics Centurion XVI (2013, Statpoint Technologies Inc.). (Effect sizes, *e.g.* coefficients, are reported only for analyses that were statistically significant at the $P<0.05$ level). The multivariate structure of the data was examined by classification (clustering ordination) of similar individuals using Multidimensional Scaling (MDS) analysis [11], conducted with R [12]. Euclidean distance was used to compute the dissimilarity between each pair of individuals in the data set since all variables were on a 0-1 scale, and so no single variable in the original data was likely to contribute overwhelmingly to the computed dissimilarities.

RESULTS

Voluntary responses were received from 1,396 participants, involving 267 males and 1129 females (reflecting a strongly female biased sex ratio among resident students). The vast majority (90%) were between 18-21 years of age, and with a Canadian cultural affiliation (84%) (Table **1**). About half of the participants (48%) identified themselves as having a religious affiliation, mostly Christian-based (36%), and half (52%) indicated no current religious affiliation (Table **1**).

Table 1. Summary of demographic data for undergraduate student survey participants (N=1396).

Gender	Age	Religious affiliation	Cultural affiliation*
81% Female	1% ≤17	52% None	84% Canadian
19% Male	20% 18	16% Christian – Roman Catholic	12% European
	27% 19	11% Christian – Protestant	10% East Asian
	23% 20	9% Christian – Other	9% British
	20% 21	5% Jewish	5% American
	6% 22	2% Muslim	2% Middle Eastern
	3% >22	2% Buddhist	1% African
		1% Christian – Orthodox	1% Australia/NZ
		1% Hindu	1% Filipino
		1% Other	1% First Nations
			1% Latino
			1% Caribbean
			1% Russian
			2% Other

* Total exceeds 100% because participants could select more than one.

Neither the index of attraction to accomplishment, nor the index of attraction to leisure was significantly affected by question order (Group A *versus* Group B) ($P>0.05$, Mann-Whitney U). Hence there was no evidence of priming effect—in Group A, in terms of their earlier question responses regarding mortality salience / negative mood expression—on later question responses regarding attraction to accomplishment, or attraction to leisure. Males and females did not differ significantly ($P>0.05$, Mann-Whitney U) in terms of mortality salience index, negative mood index, attraction to leisure, or attraction to accomplishment — and ANOVAS (GLM or Kruskal-Wallis) revealed no significant ($P>0.05$) interaction effect with Group (A *versus* B), for any of the six indices. Female participants however reported significantly greater attraction to both religion ($P<0.001$; Mann-Whitney U) and parenthood ($P<0.001$, Mann-Whitney U) compared with male participants.

Pairwise plots of the six variables are shown in Fig. (**1**). Partial correlation coefficients were used because this evaluates a particular pairwise relationship while 'holding constant' the potentially confounding effects of correlations that the two variables might have with other variables in the data set at the same time. By far the strongest relationship was detected between attraction to accomplishment and attraction to leisure (Figs. **2a**, **3**). Attractions to parenthood and

religion were also strongly correlated, and correlations of parenthood with attractions to both accomplishment and leisure were particularly significant as well (Fig. **3**). Mortality salience index was negatively correlated with negative mood index ($P<0.001$), but positively correlated with both attraction to accomplishment ($P<0.05$) and attraction to leisure ($P<0.01$). Negative mood index was positively correlated with both attraction parenthood ($P<0.001$) and attraction to leisure ($P<0.05$), but negatively correlated with attraction to religion ($P<0.05$) (Fig. **3**).

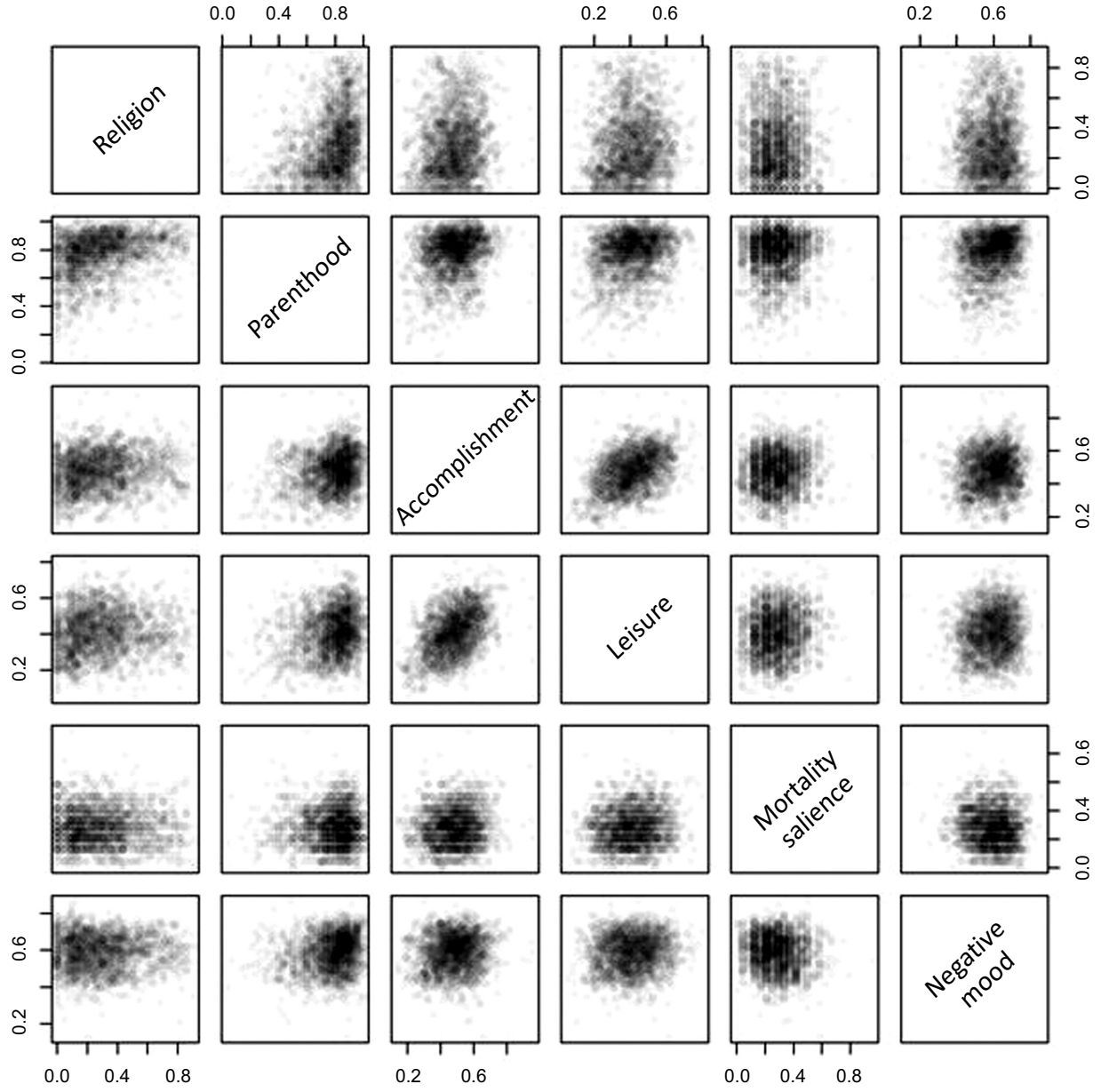

Fig. (1). Pairwise plots of the six indices calculated from participant responses to six series of questions (Appendices **1-6**), designed to measure between-participant variation in attraction to Religion; attraction to Parenthood; attraction to Accomplishment; attraction to Leisure; expression of Mortality salience; and expression of Negative mood. Note that data points are defined with transparency so that the degree of overlap among points can be easily deciphered; *i.e.* greater overlap (concentration of data points) is indicated by darker colour.

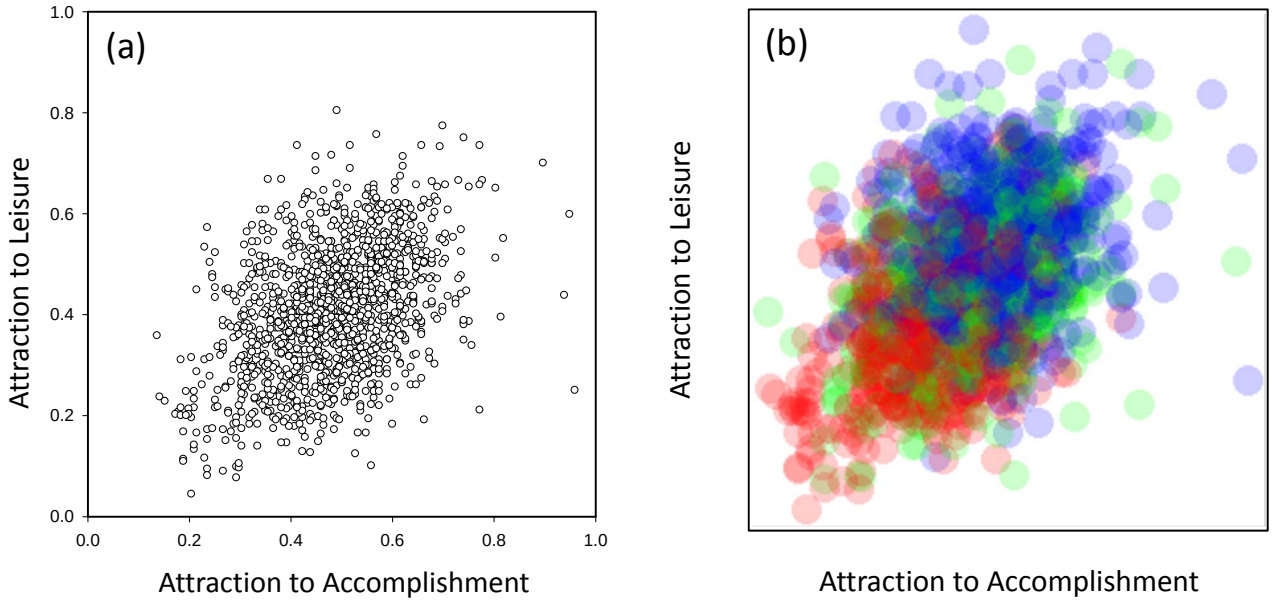

Fig. (2). Relationship between Attraction to Accomplishment and Attraction to Leisure for undergraduate student survey participants (n=1396, partial correlation coefficient = 0.388, $P<0.001$): (**a**) raw index scores; (**b**) with data coloured according to each individual's type identified by Multi-Dimensional Scaling: (1 – red) low religion / low parenthood scores; (2 – green) high religion / high parenthood scores; and (3 – blue) low religion / high parenthood scores (see text). Note that data points in (**b**) are defined with transparency so that the degree of overlap among points can be easily deciphered; *i.e.* greater overlap (concentration of data points) is indicated by more intense colour.

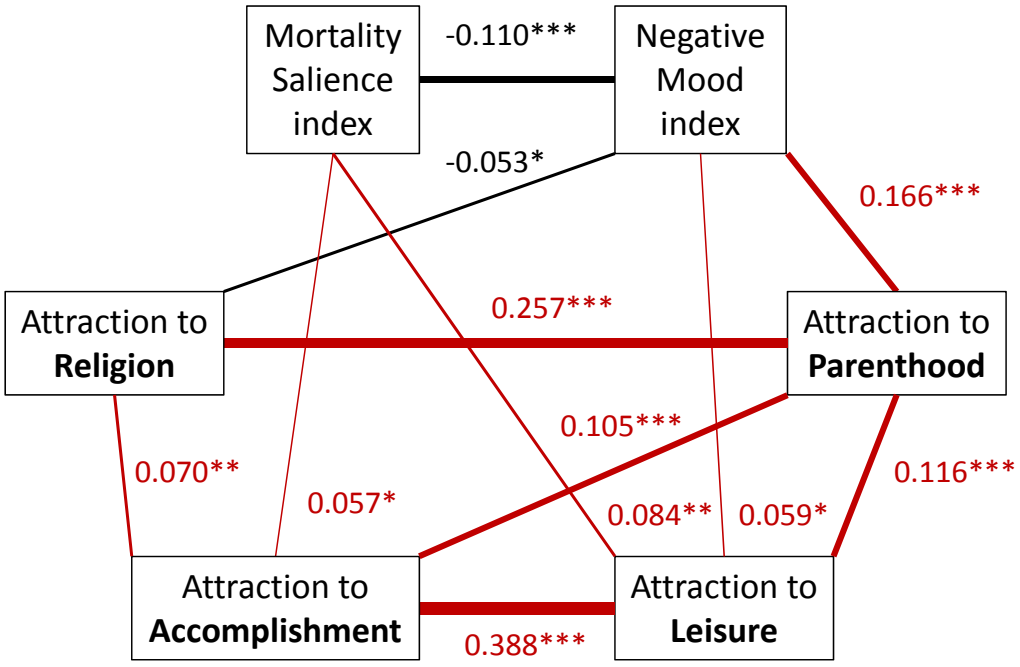

Fig. (3). Results from partial correlation analysis involving six indices calculated from participant responses to six series of questions (Appendices 1-6), respectively, designed to measure between-participant variation in expression of Mortality Salience, expression of Negative Mood, attraction to Leisure, and attraction to three different domains for Legacy — through Religion, Parenthood, and Accomplishment/fame. Black lines indicate significant ($P<0.05$) negative correlations; red lines indicate significant ($P<0.05$) positive correlations (*$P<0.05$; **$P<0.01$; ***$P<0.001$). Line thickness connecting pairs of indices is proportional to effect size, *i.e.* the partial correlation coefficient, indicated next to each line. [Non-significant correlations ($P>0.05$) are not shown in order to minimize clutter].

It is difficult however to do exploratory data analyses on 6-dimensional data. The multivariate structure of the data is thus better accounted for in the ordination analyses, where we are seeking to reduce the dimensionality. This involved two approaches. In the first — classical MDS (equivalent to Principal Components Analysis (PCA) — the first two components explain 60% of the variation in the original data (Table **2**). Looking at the loadings (equivalent to coefficients of the linear transformation used to create each component), the first component appears to be strongly associated with both religion and parenthood — that is, people who have either large values for both religion and parenthood or small values for both religion and parenthood (Table **2**). The second component appears to be strongly associated with people who have large values for parenthood but small values for religion, or *vice-versa*. The second component also suggests that those with lower religion scores and higher parenthood scores are attracted to both accomplishment and leisure. The third component is associated with a negative relationship between mortality salience and parenthood, but explains only 15% of the total variation. The fourth component is associated with a contrast between parenthood and mortality salience, and accomplishment and leisure, but explains only 12% of the total variation. The standard way to decide on the number of components to use is to look at the variance explained by each component (using a Scree Plot) and choose the number where the plot bends (*i.e.* just before it levels off). In our data, this occurs at 2.

Table 2. Results of principal components analysis. The loadings are scaled so that the sum of the squared loadings for a given component is equal to one. Dashes (–) indicate loadings smaller than 0.1.

Loadings	Comp 1	Comp 2	Comp 3	Comp 4	Comp 5	Comp 6
Religion	0.91	-0.39	0.15	–	–	–
Parenthood	0.37	0.61	-0.54	-0.41	0.17	–
Accomplishment	0.14	0.42	0.27	0.42	0.11	0.74
Leisure	0.12	0.49	0.32	0.44	–	-0.67
Mortality salience	–	0.21	0.69	-0.67	-0.17	–
Negative mood	–	0.15	-0.18	0.11	-0.96	–
Proportion Variation	0.395	0.200	0.146	0.122	0.069	0.066
Cummulative Variation	0.395	0.596	0.742	0.864	0.934	1.000

The second approach then involved non-metric MDS, allowing a monotonic transformation of the dissimilarities before ordination and display in two-dimensional space. Thus, only the rank of the dissimilarities is important. This makes non-metric ordination more robust to differences in scale both between and within variables. The two dimensional non-metric MDS representation has a boomerang shape (Fig. **4a**) suggesting that there are three groups present, which we distinguished using k-means clustering [13], with two groups making up the 'arms' of the 'boomerang', and the third group, the 'elbow" (Fig. **4b**). Each individual in the data set is thus classified here as one of three types. Mapping these onto the pairwise scatterplot shows that the types can be characterized by their index scores (Fig. **5**), and also appear to agree more or less with the structure suggested by the principal components analysis. Most obviously, the three types are associated with: (1; red) low religion / low parenthood scores; (2; green) high religion / high parenthood scores; and (3; blue) low religion / high parenthood scores (Fig. **5**, top left panels).

DISCUSSION

Our results provide strong empirical support for the 'work hard – play hard' hypothesis; *i.e.* there is a conspicuous association between desire to work hard (reflected by our index of attraction to accomplishment) and desire to play hard (reflected by our index of attraction to leisure) for a Canadian university undergraduate student population (Fig. **2**). Moreover, this correlation was much stronger than any other pairwise correlation for the 6 indices (Fig. **3**). The 'work hard – play hard' connection, therefore, is clearly not just mythical or ideological; it actually displays as a particular pattern of co-variation in motivations / personalities — at least for our sample of university undergraduate students.

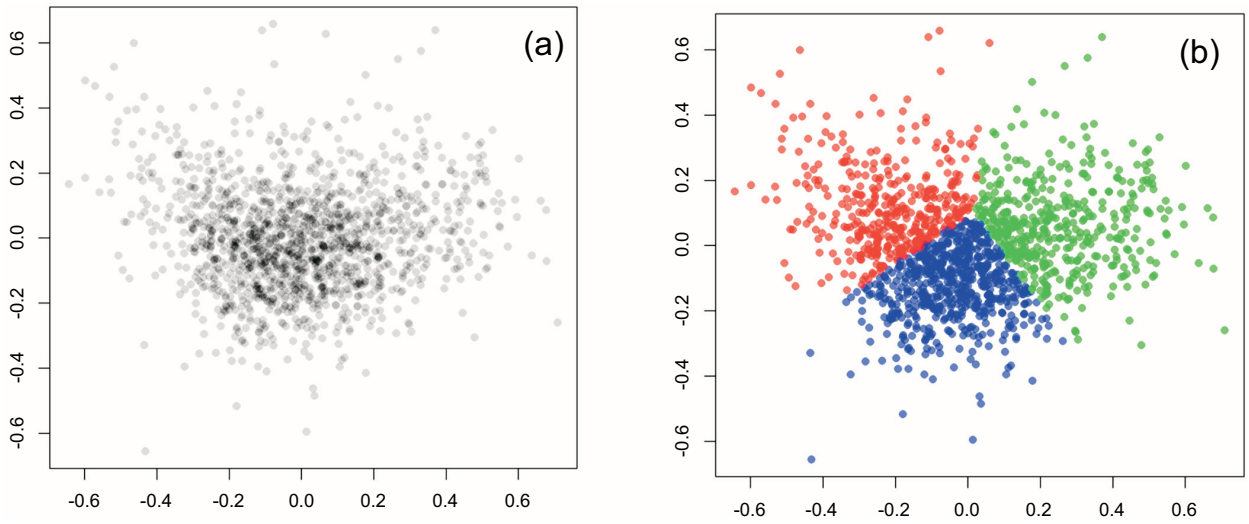

Fig. (4). Two-dimensional representation of the data using non-metric MDS. The boomerang shape (**a**) suggests three types of people in the data, distinguished by the three colours in (**b**), after k-means clustering (see text).

The MDS analyses allows us to explore post-hoc hypotheses as potential inspiration for future research, pointing to preliminary evidence suggesting that attraction to parenthood and religion—interacting with attraction to legacy and leisure—may also be diagnostic in representing motivational types. In particular, the results suggest a classification of participants into three more or less distinct clusters based on attractions to Religion and Parenthood (Fig. **4**, Fig. **5**, top left panels): In terms of the 'work hard – play hard' scale, type (1; red)—distinguished by low attraction to both parenthood and religion—tend to align themselves with low attraction also to both accomplishment and leisure (essentially an 'apathetic type') (Fig. **2b**). Type (2; green)—distinguished by high attraction to both parenthood and religion—distribute themselves nearly evenly in terms of moderate attraction to both accomplishment and leisure (essentially a 'religious, family-oriented type'). And Type (3; blue)—distinguished by high attraction to parenthood (and low attraction to religion)—tend to align themselves with high attraction also to both accomplishment and leisure (essentially a secular 'go-getter type') (Fig. **2b**).

Many previously published references to the 'work hard – play hard' slogan seem at best clichéd, based not so much on empirical evidence, but serving as a motto for group bonding/solidarity in some professional (*e.g.* engineering) cultures [14], or as an organizational manifesto for motivating employees, engendering a 'team spirit', or for attracting a particular type of employee [15]. In these contexts, 'work hard – play hard' serves to legitimate that work predominates; it "… encompasses much of an image of the ethic of high achievement—long hours in the office followed by champagne-drinking evenings" [16, p. 584]; "... the party image supports the notion of the hard-working, dedicated engineer who meets the heavy demands of his or her profession and unwinds with intensity and energy" [14, p. 679].

The above interpretations imply (with largely anecdotal evidence) that 'work hard – play hard' is a lifestyle that one may (or may not) learn from membership within a particular professional or organizational culture. And, importantly here, in virtually all cases, 'play' is associated with partying (commonly involving alcohol or recreational drug use) (see also [17]). In contrast, 'play' in our study is represented more broadly as 'leisure', involving engagement in many dozens of possible domains of pleasurable free-time enjoyment (Appendix **4**). The participants in our study also have no particular organizational affiliation and have a broad range of career aspirations. They are all university undergraduate students (and hence mostly not yet fully engaged in the world of work), and identify as mostly female and mostly Canadian, but they were sampled broadly from across many (more or less) equally-demanding academic programs/disciplines (ranging from sciences, to social sciences and the humanities) within the school's Faculty of Arts and Science.

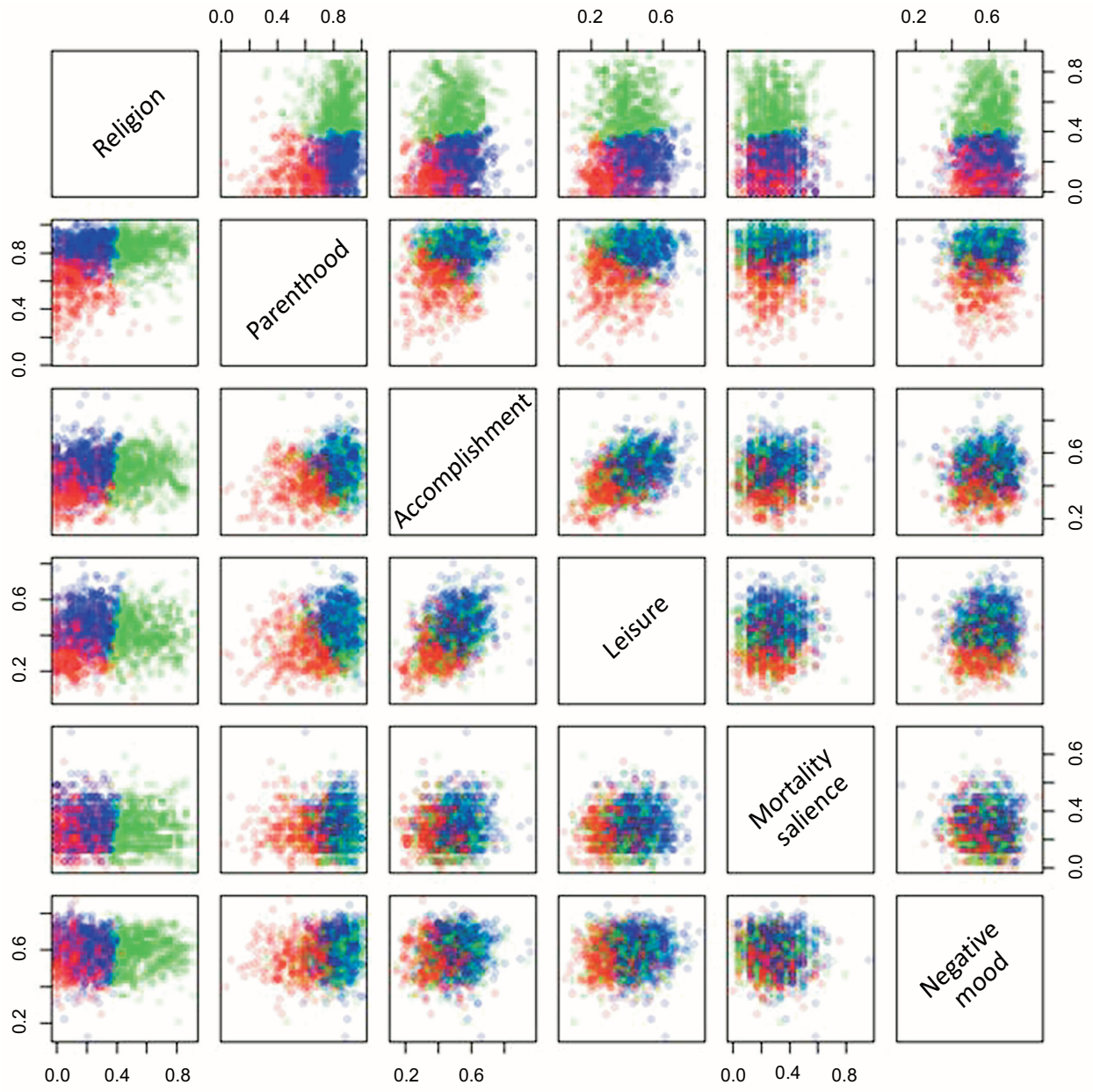

Fig. (5). Pairwise plots of the six indices coloured according to each individual's type, distinguished by Multi-Dimensional Scaling analysis: (1 – red) low religion / low parenthood scores; (2 – green) high religion / high parenthood scores; and (3 – blue) low religion / high parenthood scores. Note that data points are defined with transparency so that the degree of overlap among points can be easily deciphered; *i.e.* greater overlap (concentration of data points) is indicated by more intense colour.

Students that have self-imposing inclinations to work harder may be drawn to engage in more leisure as respite from their harder-working habits [18, 19]. However, there is no reason to expect that a higher attraction to accomplishment in our data set represents students that have higher demands placed on them by their particular academic programs. Playing hard then, rather than a 'recovery' from working hard, may instead be the goal that *requires* working hard in order to achieve or to earn; *i.e.* perhaps "… people work to live, and live to play" [3, p. 428]. A large literature in psychology has identified leisure as a core ingredient for happiness and overall well-being [20], but work can also be an important source of self-esteem and fulfillment in life [21].

The 'work hard – play hard' association then is more than just a cliché, and possibly also more than just a product of social learning. Our data suggest that it may characterize a bivariate motivational construct or personality continuum — from low intensity to high intensity (Fig. **2**), where 'working hard' may not necessarily evoke 'playing hard', or *vice versa*. Research on personality has produced several classification schemes [22] in which elements of 'attraction to

accomplishment' (hard working, competitive, ambitious, fame-seeking) figure prominently as a component of particular 'types' [23]. Desire for fame/social recognition has been shown to be associated with neuroticism, agreeableness and conscientiousness [24], narcissism and the need to belong and feel valued by others [25], and with desire for materialism [26].

In contrast, while leisure is the subject of a large literature in sociology [27 - 30], 'attraction to leisure' or 'play' *per se* is scarcely represented as a component descriptor of specific personality types in traditional classifications. Personality however may partially influence *how* leisure time is spent [31 - 34], and the latter may map onto particular work interests [35]. Some studies, for example, have found extroversion to be positively associated with some leisure pursuits [36]. Kirkcaldy and Cooper [37] report a positive association between a particular style of leisure preference (competitive sports games) and higher scores on work-oriented competitiveness. Other studies however have shown that the amount of participation (time spent) in leisure pursuits can be negatively correlated with Type A behavior [38, 39], assertiveness [40], and with extroversion, conscientiousness, and openness [41]. But these data suggest a time trade-off constraint effect — *i.e.* more work leaves less time for play, and *vice versa* — rather than an interest/attraction/motivation trade-off (although the latter might be expected for workaholics and hedonists).

One body of research has suggested that participation in leisure activities "… broadens an individual's perspective on the world-of-work …" and " …facilitates the synthesizing process of vocational development." [42, p. 244]. These earlier studies (some also involving university students) have thus shown in some cases that more engagement with leisure tends to be associated with better academic outcomes, and greater preparation and competence for exploring and deciding among work/career options [42 - 44].

We find our results interesting to interpret from an evolutionary function perspective [45] — *i.e.*, to ask: do 'working hard' and 'playing hard' represent deeply ingrained motivations (conscious or unconscious), representing priorities / personalities informed at least partially by genetic inheritance, resulting from selection in the ancestral past? We suggest that these motivations may tend to occur together because they represent components of innate human drives that routinely served to alleviate the same uniquely human limitation on the reproductive success of ancestors: self-impermanence anxiety (fear of failed legacy) associated with mortality salience [6, 46 - 49]. Specifically, attraction to accomplishment can be regarded as a component of 'legacy drive', *i.e.* an impulsive motivation to engage in goals that instill a delusional sense of being able to leave 'something of oneself' — an 'extension-of-self' — for the future, as a perception of death transcendence. Similarly, attraction to play can be regarded as a manifestation of 'leisure drive', also delivering self-impermanence anxiety buffers, but of a different sort — involving 'escape-from-self', as distractions, deployed through pleasurable free-time indulgences. Interestingly, there is an echo of this in the quotation from Newnham [1] (1827) in our Introduction: "… the stillness of inactivity is destructive to the mental welfare, and approaches very nearly to … the complete cessation of life".

But why the variation in our data? In other words, what accounts for participants who declared relatively low attractions to work (accomplishment/fame), or play, or both? A possible answer may be found in recognizing that legacy delusions can be associated with not just accomplishment, but also (or instead) with additional 'post-self' domains [49]: through having offspring (attraction to parenthood), and through the 'soul' narrative (attraction to religion) [50 - 53]. Thus our multivariate analysis suggests that there may be two distinguishable anxiety-buffering strategies that involve delusions of legacy: one incorporating primarily religion combined with parenthood — the 'religious family-oriented' type (*i.e.* type 2, green in Fig. (**5**), top left panels) — and one involving primarily accomplishment (also with parenthood), but combined strongly with leisure ($P<0.001$, Fig. **3**) in place of religion — the secular 'go-getter' (type 3, blue in Figs. (**2b**, **5**)); *i.e.* the 'work hard – play hard' type. Leisure drive here may thus serve as an effective distraction from self-impermanence anxiety, deployed especially when buffers available from belief in religion are absent.

These interpretations are congruent with a now large body of research on terror management theory, showing deployment of mortality anxiety buffers manifesting as behaviours that bolster self-esteem (meaning/purpose/redemption/value for one's life), connected with a sense of membership in (and validation for) 'larger than self' cultural worldviews [54, 55]. Many of these are associated with religion, spirituality, mysticism and other supernatural conceptions [50, 56]. But in one recent study [7], students who were asked to contemplate about their own death reported higher desire for fame than did students asked to consider other unpleasant experiences. In our study, we also incorporated experimental mortality priming, and negative mood priming (by switching the order of the question series for two separate groups) to test their effects on participant responses for attraction to accomplishment and for attraction to leisure. No significant priming effects were detected but baseline expressions of mortality salience and

negative mood (regardless of group), nevertheless showed several significant correlations with other indices.

Interestingly, while attractions to religion and parenthood are strongly correlated, both are independent of our assessment of base-line mortality salience (Fig. **3**). Note that there was no test, in our study, of mortality priming on attraction to either religion or parenthood; and note also that we can reasonably assume that our pool of participants—undergraduate university students—has generally not (yet) had personal experience as parents. A higher attraction to religion in our data, however, is generally associated with less negative mood ($P<0.05$; Fig. **3**), suggesting, for some participants at least, a palliative role for religion in anxiety/self-esteem management, consistent with previous studies [57, 58]. Other correlation results (Fig. **3**), however, suggest that (for some participants at least): (i) those with higher negative mood scores tend to be more attracted to parenthood (especially; $P<0.001$) and (to a less extent) more attracted to leisure ($P<0.05$); (ii) those with relatively high mortality salience tend to be attracted to both accomplishment and leisure (possibly as mortality anxiety buffers — and possibly accounting in turn for the association of mortality salience with a relatively weak expression of negative mood ($P<0.05$).

Are there genes that inform legacy drive and leisure drive? If so, their identification awaits further research, but their postulation is plausible given recent compelling evidence for heritable genetic variation in subjective well being [59 - 62] and other components of personality [63]. The broad range of between-individual variation in our data (Figs. **1**, **2**) is thus undoubtedly a product of environmental / social learning variation, combined with genetic variation, plus their interaction. For those participants in our study toward the 'low' end of this variation - *i.e.* the 'apathetic' type (1; red) with relatively low attraction to everything (religion, parenthood, accomplishment, and leisure) (Fig. **5**) — an interesting question is whether these represent individuals that happen not to have inherited genetic predisposition for strong legacy drive or for strong leisure drive. Alternatively, perhaps they have this inheritance but only rarely does personal experience trigger need to deploy these drives. Compared with other participants, therefore, they may tend to express relatively little attraction to these domains of legacy and leisure simply because—luckily for them—they happen to enjoy relatively low base-line mortality salience and low expression of negative mood.

CONCLUSION

Our results provide, in our view, the most convincing empirical support to date for the 'work hard – play hard' hypothesis. We are unaware of any previous research examining the question of whether inclinations for 'working hard' and 'playing hard' tend to be found together. And so while our results and conclusions are necessarily limited to inferences from questionnaire data collected from participants (university students) that are not representative of broader society, they nevertheless provide a novel starting point for informing future research. In particular, we think, they point to opportunities for new directions of study in the interpretation of evolutionary roots of human nature and culture associated with work and play.

APPENDIX

Appendix 1. Survey questions associated with attraction to religion:

1.1 On a scale of 1 to 7 below, how important is religion in your life?

O 1 - not at all important
O 2
O 3
O 4
O 5
O 6
O 7 - extremely important

1.2 How often do you engage in private time or activity for religion?

O Never
O Rarely
O About once a week, on average
O About once a day, on average
O Usually more than once a day

1.3 How often do you attend a public place of worship?

O Never
O Once a year, on average
O Once a month, on average
O Once a week, on average
O Usually more than once a week

1.4 Do you think that you have a soul that will continue to exist after your body dies?

O Definitely not
O Probably not
O Not sure
O Probably yes
O Definitely yes

1.5 Will (or did) religion play a bigger role in your life once you start(ed) a family?

O Strongly disagree
O Disagree
O Disagree somewhat
O Not sure
O Agree somewhat
O Agree
O Strongly agree

Appendix 2. Survey questions associated with attraction to parenthood:

2.1 On a scale of 1 to 7 below, indicate how important it is for you - as a life goal - to be, or to become a parent?

O 1 - not at all important
O 2
O 3
O 4
O 5
O 6
O 7 - extremely important

2.2 How many children would you like to have over your lifetime?

O None
O 1
O 2
O 3
O 4 or more

2.3 On a scale of 1-7 below, how much do you value your parents' influence on you (through parenting)?

O 1 - do not value at all
O 2
O 3
O 4
O 5
O 6
O 7 - highly value

2.4 On a scale of 1-7 below, how important is good parenting to you?

O 1 - not at all important
O 2
O 3
O 4
O 5
O 6
O 7 - extremely important

2.5 On a scale of 1 to 7 below, how family oriented are you?

O 1 - not at all family oriented
O 2
O 3
O 4
O 5
O 6
O 7 - extremely family oriented

Appendix 3. Survey questions associated with attraction to accomplishment/fame:

On a scale of 1 (not at all important) to 7 (extremely important) below, indicate how important each of the following is (or has been) to you, as a life goal:

3.1 Pursuing a post-graduate degree (*e.g.* MSc, PhD, MD, Law *etc.*)

3.2 Accumulation of financial wealth

3.3 Career in politics/government

3.4 Position of leadership in business

3.5 Engaging in competition for awards, trophies, or championships

3.6 Obtaining the highest grades possible when completing course work

3.7 Volunteering for community service

3.8 Career in teaching

3.9 Career in social work

3.10 Career in health care or medicine

3.11 Career involving research, invention or making new discoveries

3.12 Career in the military

3.13 Career in the arts (*e.g.* involving writing, acting, film production, artistic or musical performance)

3.14 How many friends do you regularly associate with in person?

O None
O 1
O 2-4
O 59
O 10 or more

3.15 How many Facebook friends do you have?

O None I don't have Facebook
O 1 100

O 101 - 300
O 301 - 500
O 500 - 800
O 800+

Appendix 4. Survey questions associated with attraction to leisure/recreation, *i.e.* activities that one might pursue for pleasurable free-time indulgence: On scale of 1 (not at all important) to 7 (extremely important), indicate how important each of the following is (or has been) to you, as a source of enjoyment in your life:

4.1 Attending shows/concerts	4.27 Home decorating / renovating	4.53 Snow-boarding
4.2 Ballet	4.28 Horseback riding	4.54 Snowmobiling
4.3 BBQ-ing	4.29 Humour	4.55 Social media
4.4 Biking	4.30 Hunting	4.56 Socializing with friends
4.5 Billiards	4.31 Ice-skating	4.57 Spending time with family
4.6 Board games	4.32 Knitting / sewing	4.58 Sun-bathing
4.7 Boating / sailing	4.33 Landscaping	4.59 Swimming
4.8 Bowling	4.34 Listening to music	4.60 Tennis
4.9 Bungee-jumping	4.35 Meditation	4.61 Theatre
4.10 Camping	4.36 Opera	4.62 Travelling
4.11 Canoeing	4.37 Paint-balling	4.63 Using recreational drugs
4.12 Card games	4.38 Partying	4.64 Video games
4.13 Club membership	4.39 Photography	4.65 Viewing art
4.14 Collecting antiques or other collectibles	4.40 Playing a musical instrument	4.66 Visiting amusement parks
4.15 Consuming alcohol	4.41 Playing team sports	4.67 Visiting museums
4.16 Cooking	4.42 Politics	4.68 Visiting parks or zoos
4.17 Cottaging	4.43 Racing	4.69 Walking
4.18 Cross-country skiing	4.44 Reading	4.70 Watching films / movies
4.19 Downhill skiing	4.45 Rock-climbing	4.71 Watching sports
4.20 Eating out	4.46 Running / jogging	4.72 Watching TV programs
4.21 Exercising / physical fitness	4.47 Sex	4.73 Water-skiing
4.22 Fishing	4.48 Shopping	4.74 Water-surfing
4.23 Gambling	4.49 Singing	4.75 Wind-surfing
4.24 Gardening	4.50 Skate-boarding	4.76 Woodworking
4.25 Golfing	4.51 Sky-diving	4.77 Yoga
4.26 Hiking	4.52 Snacking	

Appendix 5. Survey questions associated with expression of mortality salience:

5.1 Imagine you learned that - starting tomorrow, because of new advances in science - you would be able to live a healthy life, forever, without aging. Do you think this would have any affect on the plans that you make for your life over the next 10 years?

O Definitely no
O Probably no
O Not sure
O Probably yes
O Definitely yes

5.2 Have you ever experienced a funeral service for a close friend?

O No
O Yes, for one friend
O Yes, for more than one friend

5.3 Have you experienced a funeral service for a parent?

O No
O Yes, for one parent
O Yes, for more than one parent

5.4 Have you experienced a funeral service for a grandparent?

O No
O Yes, for one grandparent
O Yes, for more than one grandparent

5.5 Have you experienced a funeral service for a sibling?

O No
O Yes, for one sibling
O Yes, for more than one sibling

5.6 Have you ever had an experience where you felt you were in danger of losing your life?

O No
O Yes, once
O Yes, more than once

Appendix 6. Survey questions associated with expression of negative mood. Note that depression and feelings of low self-esteem are considered here to be a manifestation of negative mood, and that sleep disorders are considered to be normally associated with depression / negative mood (and not normally with a positive frame of mind). Items 6.4 - 6.14 represent different contexts that respondents might reasonably recognize for diagnosing one's experience of negative mood.

6.1 On the whole, how often do you experience anxiety or negative moods?

O Virtually never
O Rarely
O Occasionally
O Frequently
O Most of the time

6.2 How often do you have difficulty sleeping?

O Virtually never
O Rarely
O Occasionally
O Frequently
O Most of the time

6.3 How often - on average - would you say that you have an optimistic outlook about things?

O Most of the time
O Frequently
O Occasionally
O Rarely
O Virtually never

Select the answer below that best fits each of the following statements:

O strongly agree	O agree	O somewhat agree	O neutral	O somewhat disagree	O disagree	O strongly disagree

6.4 I feel that my life has meaning

6.5 I feel that I'm a person of worth at least on an equal plane with others.

6.6 I feel that I have a number of good qualities.

6.7 All in all, I am inclined to feel that I am a failure.

6.8 I am able to do things as well as most other people.

6.9 I feel I do not have much to be proud of.

6.10 I take a positive attitude toward myself.

6.11 On the whole, I am satisfied with myself.

6.12 I wish I could have more respect for myself.

6.13 I certainly feel useless at times.

6.14 At times I think that I'm no good at all

CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

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