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RESEARCH ARTICLE

Emotional Wellbeing and Life Satisfaction of Singles and Mated People Across 12 Nations

Menelaos Apostolou[1] · Mark Sullman[1] · Agata Błachnio[2] · Ondřej Buršek[3] · Ekaterina Bushina[4] · Fran Calvo[5] · William Costello[3,6] · Mai Helmy[7] · Tetiana Hill[8] · Maria Galatiani Karageorgiou[1] · Yanina Lisun[9] · Denisse Manrique-Millones[10] · Oscar Manrique-Pino[11] · Yohsuke Ohtsubo[12] · Aneta Przepiórka[2] · Orestis Cleanthous Saar[1] · Burcu Tekeş[13] · Andrew G. Thomas[3] · Yan Wang[14] · Sílvia Font-Mayolas[15]

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Abstract
The increasing occurrence of singlehood raises the question of whether people enjoy greater emotional wellbeing alone or in an intimate relationship. Guided by an evolutionary theoretical framework of human emotions, the current research aimed to address whether individuals are emotionally better off single than in an intimate relationship, taking a cross-cultural perspective. The quality of the relationship is also crucial; thus, the study also aimed to determine whether individuals in a good or bad intimate relationship differ from each other and from those who are single in terms of emotional wellbeing. In a sample of 6338 participants from 12 nations, we found that singles experienced lower emotional wellbeing and life satisfaction than those in relationships. More specifically, participants who were in a relationship or married reported the highest life satisfaction and emotional wellbeing, while those involuntarily single reported the lowest levels, with individuals who are between relationships or voluntarily single reporting intermediate levels. Additionally, participants in a good relationship experienced higher emotional wellbeing and life satisfaction than those in a bad relationship. The findings among the involuntarily single participants were similarly negative, but to a lesser extent than those in a bad relationship. These results were consistent across the different nations in our sample.

Keywords Involuntary Singlehood · Singlehood · Emotions · Life Satisfaction · Emotional Wellbeing · Optimism · Meaning in Life

Introduction

Not having an intimate partner constitutes a common state in contemporary post-industrial societies (Apostolou et al., 2023; Kislev, 2019; Klinenberg, 2012), with evidence indicating that being single versus being in an intimate relationship is consequential for one's emotional wellbeing (Apostolou et al., 2019; Girme et al., 2016). Nevertheless, being in a poor-quality intimate relationship can also lead to negative emotions and physical harm (Buss, 2021; Kiecolt-Glaser & Newton, 2001; Lemay et al., 2012). The present research aims to examine the impact of different varieties of singlehood on emotional wellbeing and life satisfaction and compare them to relationships of differing quality. The term emotional wellbeing refers to the positive emotions (i.e., pleasant to experience such as happiness) and negative emotions (i.e., unpleasant to experience such as loneliness) that people experience. For the purpose of our study, we will include in the definition optimism and meaning in life (see also Park et al., 2022). It utilizes samples from 12 culturally diverse nations, including China, Egypt, Greece, Japan, Oman, Peru, Poland, Russia, Spain, Turkey, the UK, and Ukraine, to make the comparisons more broadly applicable. We will start our discussion by exploring the occurrence of the different types of singlehood.

The Occurrence of Singlehood

People enter into intimate relationships for various reasons. For instance, some may want to have children, while others seek casual sex. These different motivations give rise to different types of relationships, such as casual or committed ones (e.g., marriage). This is also true for singlehood: people are single for different reasons (Apostolou, 2017; Apostolou

Extended author information available on the last page of the article

et al., 2021), which indicates that there are different types of singlehood (Girme et al., 2022). The current paper focuses on singlehood, aiming to examine how single people fare in terms of emotional wellbeing compared to those who are in an intimate relationship. Therefore, we will discuss in more detail the various reasons for being single.

To begin with, individuals may have recently ended an intimate relationship and have not yet found another partner (Apostolou & Wang, 2019). Additionally, some people may prefer to be single to focus on advancing their careers or enjoy the freedom of casual relationships (Apostolou, 2017). Furthermore, individuals may be single due to challenges in attracting potential partners, such as poor flirting skills or difficulty perceiving romantic signals (Apostolou, 2017; Costello et al., 2022).

To explore the occurrence of different types of singlehood, one study utilized a Greek sample ($N = 884$) and a Chinese sample ($N = 2041$). In the Greek sample, approximately 25% of participants reported being involuntarily single (i.e., they wanted to be in a relationship but faced difficulties securing an intimate partner), about 17% were voluntarily single (i.e., they preferred not to be in an intimate relationship), and roughly 11% were between relationships single (Apostolou & Wang, 2019). In the Chinese sample, around 30% of participants indicated that they were voluntarily single, 22% were involuntarily single, and approximately 9% were between relationships single. In a more recent study with a sample of 7181 participants from 14 post-industrial nations, approximately 13% reported being involuntarily single, over 15% indicated being voluntarily single, and 10% were between relationships single (Apostolou et al., 2023).

While further studies using probability samples are necessary to obtain a more accurate understanding of the prevalence of different types of singlehood, existing literature suggests that they are common in contemporary post-industrial societies. Theoretical and empirical reasons indicate that not having an intimate partner is likely to have a negative impact on an individual's emotional wellbeing.

Singlehood and Emotional Wellbeing

Emotions are mechanisms that have evolved to increase the chances of the genes that code for them being passed on to future generations by motivating behaviors that enhance individuals' and their genetic relatives' chances of survival and reproduction, also known as fitness (Nesse, 2019; Tooby & Cosmides, 2008). When individuals find themselves in situations that could compromise their fitness, negative emotions are triggered, motivating them to take corrective action. For example, if someone slips, falls, and suffers a fractured bone, they experience negative emotions such as pain and worry, which motivate them to seek medical attention. Conversely, when individuals find themselves in situations that could enhance their fitness, emotional mechanisms generate positive emotions to reward them and motivate the continuation or repetition of those actions. For instance, receiving a job promotion elicits positive emotions like happiness and pride, motivating individuals to continue working toward career advancement.

Attracting and maintaining mates is a significant predictor of one's fitness because failure to do so reduces the capacity to pass on genetic material, including genes that encode emotional mechanisms, to future generations. Consequently, emotional mechanisms have evolved to motivate people to form intimate relationship: sexually mature individuals who are not in an intimate relationship experience negative emotions such as loneliness and sadness, which motivate them to seek an intimate partner. Additionally, these negative emotions also motivate individuals who are already in an intimate relationship to maintain it and avoid experiencing those emotions. Conversely, individuals in an intimate relationship experience positive emotions, including happiness and fulfillment, which enable them to sustain the relationship. Furthermore, these emotions motivate single individuals to form intimate relationships in order to experience similar positive emotions. Therefore, it has been hypothesized that being single, as opposed to being in an intimate relationship, is associated with more negative emotions, fewer positive emotions, and lower life satisfaction (Apostolou et al., 2019). In other words, having a partner is associated with higher fitness compared to not having one, resulting in the activation of different emotional responses.

Moreover, as discussed in the previous section, people may be single for various reasons, such as recently ending an intimate relationship, choosing to be single to focus on career advancement, or facing difficulties in attracting partners. In the former two cases, being single would be less compromising or even beneficial to one's fitness compared to the latter case. For example, individuals who are between relationships and capable of attracting a mate, but have not yet done so, potentially enjoy higher fitness than those who are single due to difficulties in the mating market. Similarly, those who remain single to develop their strengths and increase their chances of attracting mates in the future would potentially have higher fitness than those who are single due to difficulties in attracting mates at present. The potential fitness of these two categories of singles is higher than that of involuntarily single individuals but lower than that of those who are in an intimate relationship. Therefore, it has been hypothesized that voluntarily single individuals and those between relationships would experience higher emotional wellbeing and life satisfaction than involuntarily single individuals but lower than individuals in committed relationships (Apostolou et al., 2019). The existing literature provides support for this hypothesis.

To begin with, several studies have found that married individuals are happier than those who are not married (Diener et al., 2000; Haring-Hidore et al., 1985; Kislev, 2022; Marks & Lambert, 1998; Stack & Eshleman, 1998). However, these studies did not differentiate between participants who were in a relationship and participants who did not have a partner, categorizing both as single or never married. Addressing this limitation, Girme et al. (2016), using a student sample in New Zealand, found that individuals in an intimate relationship reported higher life satisfaction than single individuals, but the effect was moderated by participants' goals in maintaining their close relationships. Yet, this study did not differentiate between different types of single individuals. Moreover, Costello et al. (2022) compared British men who identified as incels (men who perceive an inability to form sexual or romantic relationships as a central part of their identity) with non-incels and found that incels had higher levels of depression, anxiety, loneliness, and lower life satisfaction. Similarly, a Canadian study found that incel men experienced more loneliness than non-incel men (Sparks et al., 2023). Furthermore, Adamczyk (2016) conducted a study with a sample of young adults in Poland and found that voluntarily single individuals reported a lower level of romantic loneliness compared to involuntarily single individuals.

Moving on, Apostolou et al. (2019) examined a Greek sample of participants and found that involuntarily single individuals reported fewer positive emotions, more negative emotions, and lower life satisfaction than participants in a relationship or married. They also found that voluntarily single individuals and those between relationships reported fewer positive emotions, more negative emotions, and lower life satisfaction than individuals in committed relationships. Nonetheless, voluntarily single individuals and those between relationships reported fewer negative emotions, more positive emotions, and higher life satisfaction than involuntarily single individuals. These findings were replicated in a subsequent study with a different Greek-speaking sample (Apostolou & Kagialis, 2020).

Overall, the current literature indicates that single individuals, especially those who are involuntarily so, experience lower emotional wellbeing and life satisfaction than those in an intimate relationship. Yet, having an intimate partner does not guarantee higher emotional wellbeing and life satisfaction, with the quality of the relationship playing a substantial role.

Emotional Wellbeing and Intimate Relationships

We have argued above that intimate relationships are emotionally rewarding because they increase individuals' fitness. Nonetheless, not all intimate relationships achieve this goal. In other words, individuals may find themselves in a relationship that does not promote their reproductive success but actually hinders it. One reason for this is that individuals may be in a relationship with partners who constrain them from employing their mating strategy, a phenomenon known as strategic interference (Haselton et al., 2005). More specifically, mating is strategic in the sense that people employ specific strategies that direct their mating efforts toward achieving specific mating goals (Gangestad & Simpson, 2000). One of the most common strategies is to seek long-term partners, usually with the purpose of having children (Buss, 2016). Yet, individuals adopting a long-term mating strategy may find themselves in relationships with partners who are unable or unwilling to support a family, or who are less committed to the relationship because they are pursuing a short-term mating strategy (i.e., seeking only casual partners). Such instances could be common because people frequently employ deception to exaggerate or lie about their qualities or intentions (Haselton et al., 2005). For example, individuals adopting a short-term mating strategy may pretend to be interested in a long-term relationship in order to engage in casual sex with partners who adopt a long-term mating strategy. Similarly, as the acquisition of resources is valued in a mate (Buss, 2016; Thomas et al., 2020), individuals may attempt to deceive others about their own wealth by wearing more expensive clothes than their budget allows, lying about their salary, or engaging in conspicuous consumption (Kruger, 2022).

The fitness cost of being in an intimate relationship that impairs reproductive success would translate into evolutionary pressure shaping mechanisms that motivate people to exit such relationships. Conversely, the fitness benefits of being in an intimate relationship that promotes reproductive success would also lead to evolutionary pressure shaping mechanisms that motivate people to maintain the relationship. Specifically, in terms of emotions, we expect that individuals in a relationship that does not enhance their fitness would experience negative emotions such as anger and disappointment, which would motivate them to terminate the relationship and seek a better one. These negative emotions would also motivate individuals seeking mates to be more selective and cautious in their choices to avoid experiencing such negative outcomes in future relationships. On the other hand, individuals in a fitness-increasing relationship would experience positive emotions that would motivate them to continue the relationship. Additionally, these positive emotions would drive single individuals to seek mates in order to experience similar positive emotions. Overall, we hypothesize that individuals in a good relationship (i.e., one that increases fitness) would experience higher emotional wellbeing and life satisfaction than those in a bad relationship (i.e., one that impairs fitness). Furthermore, considering that single individuals potentially have lower fitness than those in a good relationship, we further predict that the latter group

would enjoy higher emotional wellbeing and life satisfaction than the former.

The Current Study

Although there has been arguments in favor (see DePaulo, 2007; Kislev, 2019) and against singlehood (see Olds & Schwartz, 2010; Waite & Gallagher, 2001), surprisingly little research has examined the differences in emotional wellbeing between different types of singles and those in an intimate relationship. The existing literature also has limitations that hinder reaching more definitive conclusions. Specifically, Costello et al. (2022) and Sparks et al. (2023) focused only on a specific category of male singles, while Girme et al. (2016) focused on life satisfaction without differentiating between different categories of singles. Adamczyk (2016) examined voluntarily and involuntarily single individuals but did not compare them with those in relationships. Apostolou et al. (2019) examined differences between single and mated individuals, but their results were limited to the Greek cultural context and may not apply to other cultural settings.

In the current study, our aim is to expand on the existing literature by comparing the emotional wellbeing (positive and negative emotions, optimism, and meaning in life) and life satisfaction of single and mated individuals in a sample drawn from 12 nations. The current research represents the first attempt to date to examine differences between these two groups across a large number of nations and using an extensive measure of wellbeing that includes optimism and meaning in life. We will test the hypothesis that single individuals would experience lower emotional wellbeing and life satisfaction than individuals in an intimate relationship. Specifically, we predict that involuntarily single individuals would have the lowest emotional wellbeing and life satisfaction, while voluntarily single individuals and those between relationships would have higher emotional wellbeing and life satisfaction than involuntarily single individuals, but lower emotional wellbeing and life satisfaction than those in an intimate relationship (i.e., in a relationship or married) (H_1).

As discussed in the previous section, being in an intimate relationship does not guarantee high emotional wellbeing as some relationships entail high costs and lead to numerous negative outcomes. Therefore, research on emotional wellbeing and relationship status needs to consider the quality of the intimate relationship, which is one of the main objectives of the current work. Specifically, we aim to test the hypothesis that individuals in a good intimate relationship would experience higher emotional wellbeing and life satisfaction than those in a bad intimate relationship and those who are single (H_2). In our theoretical perspective, a bad intimate relationship is one that impairs fitness, while a good intimate relationship is one that promotes fitness. We assume that people's satisfaction depends on the fitness of the relationship, such that their satisfaction would be higher in a fitness promoting relationship than in a fitness impairing one. Otherwise, people would be satisfied with being in a fitness-impairing relationship, which would not make evolutionary sense. Accordingly, we will use subjective relationship satisfaction as a proxy for relationship quality.

Moreover, emotional mechanisms work to motivate people to take action that increases their fitness. Across different cultures, lacking an intimate partner or being in a bad intimate relationship impairs fitness, while having an intimate partner and being in a good relationship promote fitness. This rationale leads to the prediction that, across different cultural settings, there would be consistency, with involuntarily single individuals experiencing lower emotional wellbeing and life satisfaction than mated individuals, while those in a good relationship would experience higher emotional wellbeing and life satisfaction than those in a bad relationship or who are single (H_3). Finally, we aim to examine whether being in a bad intimate relationship is better or worse in terms of emotional wellbeing and life satisfaction than being single, without making a directional hypothesis.

Method

Participants

In total, 6338 individuals (3910 women, 2411 men, and 17 participants who did not indicate their sex) took part in the study. Participants were recruited from 12 different countries, namely, China, Egypt, Greece, Japan, Oman, Peru, Poland, Russia, Spain, Turkey, the UK, and Ukraine. The mean age of participants was 32.7 ($SD = 14.1$). Moreover, 29.4% of the participants were married, 23.5% of the participants were in a relationship, 19.3% were single by choice, 12.2% were single because they faced difficulties attracting a mate, 9.1% were between relationships, and 6.5% indicated their relationship status as "other." The number of participants from each country, along with their demographic characteristics, can be found in Table 1. It should be noted that we sampled from both Greece and the Republic of Cyprus, but since the responses came from a Greek population in both cases, we treated the sample as one (i.e., Greece). The study received ethical approval from the respective ethics committees in each country. The only requirement for participation was that participants were at least 18 years old.

For the Japanese and Polish samples, participants received monetary compensation or credits that could be exchanged for a product. Participants from Oman received course credits for their participation. For the Ukrainian and Russian samples, participation was both voluntary and compensated. In the remaining samples, participation was

Table 1 Demographic information for the pooled and individual samples

Countries		Age	Relationship status					
			Single (difficulties in attracting mates)	Single (by choice)	Single (between relationships)	In a relationship	Married	Other
	N	Mean (SD)	%(*N*)	%(*N*)	%(*N*)	%(*N*)	%(*N*)	%(*N*)
Total	6338	32.7 (14.1)	12.2	19.3	9.1	23.5	29.4	6.5
China	427	27.8 (7.0)	14.8 (63)	10.5 (45)	11.0 (47)	25.3 (108)	32.3 (138)	6.1 (26)
Egypt	427	21.5 (3.4)	14.5 (62)	46.8 (200)	6.8 (29)	9.8 (42)	10.8 (46)	11.2 (48)
Greece	779	28.7 (11.1)	17.6 (137)	13.0 (101)	13.0 (101)	28.3 (220)	20.8 (162)	7.2 (56)
Japan	622	50.2 (13.6)	11.4 (71)	12.9 (80)	5.9 (37)	5.6 (35)	60.0 (373)	4.2 (26)
Oman	355	22.9 (3.6)	14.1 (50)	38.3 (136)	4.5 (16)	2.5 (9)	16.6 (59)	23.9 (85)
Peru	766	28.0 (10.5)	6.4 (49)	32.9 (252)	11.0 (84)	28.5 (218)	15.1 (116)	6.1 (47)
Poland	558	46.5 (12.9)	8.2 (46)	8.2 (46)	6.8 (38)	22.2 (124)	54.5 (304)	0.0 (0)
Russia	400	40.4 (11.1)	9.3 (37)	7.8 (31)	7.5 (30)	15.5 (62)	56.3 (225)	3.8 (15)
Spain	410	36.1 (12.8)	8.5 (35)	10.0 (41)	5.1 (21)	42.2 (173)	28.5 (117)	5.6 (23)
Turkey	733	30.2 (11.9)	11.5 (84)	17.2 (126)	9.3 (68)	26.7 (196)	29.5 (216)	5.9 (43)
UK	461	34.6 (13.4)	16.3 (75)	18.7 (86)	6.9 (32)	33.2 (153)	19.7 (91)	5.2 (24)
Ukraine	400	20.2 (6.4)	16.8 (67)	19.3 (77)	18.8 (75)	36.6 (146)	3.3 (13)	5.3 (21)

voluntary only. Japanese participants were recruited using a private recruitment agency (https://www.cross-m.co.jp/). Similarly, a private agency was also used for recruiting participants from Russia and Ukraine (https://anketolog.ru). Polish participants were recruited from a Polish national survey panel (https://panelariadna.pl/). For the rest of the samples, participants were recruited by promoting the study link through social media and forwarding it to students and colleagues. Data collection took place from December 2021 to May 2022.

Materials

The instruments were translated into the primary language of each country in the sample using the back translation method. The survey was conducted online, and was created using the Google Forms, Microsoft Forms, Qualtrics or Sojump tools. The survey had seven parts. In each part, we measure different aspects of emotional welling (the means of each of the variable measured can be found in the Supplementary Material A).

Satisfaction with Life Scale

In the first part, we measured life satisfaction using the Satisfaction with Life Scale (Diener et al., 1985), which is a five-item instrument that asks participants to rate each item using a 7-point Likert scale (1—*Totally disagree*, 7—*Totally agree*) (Cronbach's alpha = 0.86). Examples of items include "In most ways my life is close to my ideal" and "I am satisfied with my life." A higher total score indicated higher satisfaction with life.

Happiness Measures

In the second part, we measured participants' happiness using the Happiness Measures (HM), which consisted of two measures. The first measure asked participants to rate "how happy or unhappy do you usually feel" using an 11-point scale (0—*Very low* and 10—*Very high*). The second part asked participants to report the proportion of time they spent in the happy, unhappy, and neutral moods (Fordyce, 1988).

Positive and Negative Affect Schedule–Expanded Form

The third section contained the Positive and Negative Affect Schedule–Expanded Form (PANAS-X), which is a self-report measure specifically designed to assess the extent to which participants have experienced distinct emotions during the past few weeks (Watson & Clark, 1999). More specifically, we used two basic negative emotion scales (Guilt—Cronbach's alpha = 0.87, Sadness—Cronbach's alpha = 0.89) and the two basic positive emotion scales (Joviality—Cronbach's alpha = 0.93, Self-assurance—Cronbach's alpha = 0.90). Participants recorded their answers in a five-point Likert scale, which ranged from 1 (very slightly or not at all) to 5 (extremely).

Optimism

In the fourth section, we measured optimism using an instrument developed by Scheier et al. (1994). The instrument consisted of 10 items that participants had to rate using a five-point scale (0—strongly disagree, 4—strongly agree) (Cronbach's alpha = 0.79). The actual instrument consisted

of five items with the remaining five being filler items. Examples of items include "In uncertain times, I usually expect the best" and "I am always optimistic about my future." A higher total score indicated more optimism.

Meaning in Life

In the fifth part, we assessed meaning in life using a 10-item instrument designed by Steger et al. (2006). Participants answered each item using a seven-point Likert-type scale which ranged from 1 (absolutely true) to 7 (absolutely untrue) (Cronbach's alpha = 0.76). Examples of items include "I understand my life's meaning" and "I have discovered a satisfying life purpose." A higher total score indicated higher meaning in life.

Demographics

In the sixth part, demographic information was collected, including sex, age, and relationships status. Relationship status was measured using a previously developed instrument (Apostolou & Wang, 2019) that included the following categories: "In a relationship," "Married," "Involuntarily single (I want to be in a relationship, but I find it difficult to attract a mate)," "Single between relationships (My relationship has recently ended and I have not yet found another partner)," "Prefer to be single (I am not interested in being in a relationship)," and "Other."

Relationship Satisfaction

Participants who indicated that they were "in a relationship" or "married" were directed to the seventh section, where their satisfaction with the relationship was assessed. For this purpose, we employed the seven-item instrument developed by Hendrick (1988), in which participants were asked to answer each item using a five-point scale ranging from 1 (low satisfaction) to 7 (high satisfaction) (Cronbach's alpha = 0.92). Examples of questions included "How well does your partner meet your needs?" and "How many problems are there in your relationship?" The total score was calculated by averaging the scores of each question of the instrument.

Data Analysis

Pooled Sample

The primary objective of our analysis was to investigate the impact of relationship status on various indicators of emotional wellbeing. However, within the pooled sample, individuals were nested within countries. Consequently, we implemented a multilevel model to estimate the effect of relationship status on emotional wellbeing while considering the possibility that individuals from the same country might be more similar to each other than individuals from different countries.

Specifically, at level one, the dependent variable was an indicator of emotional wellbeing (e.g., happiness), while the independent variables were relationship status, sex, and age. The sample was included as a level two variable. For the estimation process, we employed the Maximum Likelihood (ML) method. In accordance with Heck et al.'s (2013) recommendations, we initially ran an unspecified model (i.e., only the dependent variable and the second level factor) to determine whether multilevel analysis was necessary (i.e., if the random effect was significant). If this was the case, we proceeded with running the complete model by incorporating the independent variables. In all instances, the analysis indicated that multilevel model analysis was appropriate. These and subsequent analyses were performed using IBM SPSS version 28.

Additionally, for each analysis, we computed the Intraclass Correlation Coefficient (ICC), which represents the proportion of the total variance in the dependent variable that is explained by the clustering. It can be interpreted as a measure of the effect size of the second level variable. It generally ranges between 0 and 1, with higher values indicating greater between-group variability and, therefore, a larger impact of the second level variable (sample in this case).

Furthermore, our study aimed to compare the emotional wellbeing and life satisfaction of single individuals with those in intimate relationships of varying quality. For instance, we sought to examine how individuals in intimate relationships of poor quality compare with those who are involuntarily single. We used relationship satisfaction as a proxy for relationship quality, measuring it on a continuous scale. To facilitate the intended comparisons, we categorized participants in relationships into three levels of relationship quality as follows: In more detail, the relationship satisfaction instrument gave a total mean score, which ranged from "1" to "7," with scores closer to "7" indicating high relationship satisfaction and those close to "1" denoting low relationship satisfaction. Accordingly, we created a relationship quality variable with three levels (bad, moderate, good). Participants who reported mean total scores that ranged from "1" to "3" were classified as being in a bad relationship, those above "3" and below "5" were classified as being in a moderate quality relationship, and those who scored from "5" to "7" were classified as being in a good relationship. In the current sample, 38.5% of participants were in a good relationship, 55.4% in a moderate relationship, and 6.1% in a bad relationship. Moreover, we repeated the statistical procedure above replacing the relationship status with the quality of relationship variable, which had seven levels (involuntarily single, voluntarily single, between relationships single,

bad, moderate, good, other). We have also applied post hoc analysis using Bonferroni in order to detect significant differences between the different levels of the independent variable.

Individual Samples

We moved on to examine the effect of the relationship status on emotional wellbeing for each sample separately. More specifically, we performed a series of MANCOVA tests for each subscale of the positive and negative emotions from the PANAS instrument. In particular, the emotions that comprised each scale entered as the dependent variables, and the relationship status entered as the categorical independent variable. In order to keep them statistically constant, we have also entered sex as a categorical variable and age as a continuous independent variable. In order to examine the effect of relationship status on the Happiness Measures (HM), optimism, meaning in life, and life satisfaction, we performed a series of ANCOVA tests. More specifically, the variable of interest (e.g., optimism) was entered as the dependent variable, while participants' relationship status and sex were entered as categorical independent variables, and their age as a continuous independent variable. The analysis was performed twice, initially with the original relationship status variable, and subsequently with the modified one that accounted for the quality of the relationship. The results of the analysis for each sample is presented in Supplementary Materials B and C.

Results

A significant interaction between sex and relationship status was not detected in any of the analysis. This finding indicates that the effect of relationship status on emotional wellbeing is similar across the two sexes. Accordingly, we did not perform our analysis separately on male and female participants.

H_1: Singles Would Experience Lower Emotional Wellbeing and Lower Life Satisfaction Than Mated Individuals

For testing this hypothesis, we have applied 32 different test, which could inflate the probability of Type I error. Accordingly, Bonferroni correction could be applied to reduce the alpha level to 0.002 (0.05/32). Thus, the reader should not consider as significant any fixed effects above this level. Yet, this correction should not be applied to the random intercept variance effect, as it specifically examines whether there is a second level effect within in a specific comparison and it does not relate to our hypothesis. Moreover, for the analysis on individual samples, in total, nine different statistical tests were performed, so the alpha level was set to 0.005 (0.05/11). The reason that we have fewer test is that MANCOVA test was used to analyze the positive and negative emotions from the PANAS, which examined the effect of the relationship status variable on each emotion allowing for multiple comparisons. Thus, each MANCOVA test should count for one statistical test. The reader also needs to be cautioned that the Bonferroni correction is conservative and could inflate the probability of Type II error.

Positive Emotions

From Table 2, we can see that relationship status was significant for all positive emotions. In all cases, participants who were involuntarily single reported significantly lower positive emotions than participants who were between relationships single, voluntarily single, in a relationship or married. For the "Joviality" category, in several cases, the between relationships and voluntarily singles participants gave significantly lower scores than the participants who were in a relationship or married. For the "Self-assurance" category, in all cases, the between relationships and voluntarily singles did not differ significantly from participants who were in a relationship or single.

Table 4 shows that there was a significant effect for relationship status on happiness and on the percentage of time feeling happy, on optimism, and on meaning in life, although the effect sizes were small. Participants who indicated that they were involuntarily single experienced lower optimism, lower meaning in life, less happiness, and spent less time feeling happy than participants who were between relationships, voluntarily single, in a relationship or married. With respect to happiness and time spent feeling happy, those who were between relationships and voluntarily single gave significantly lower scores than participants who were married. With respect to optimism, those who were between relationships and voluntarily single did not have significantly different scores than those who were in a relationship or married. With respect to the meaning in life, voluntarily singles reported significantly lower scores than those who were in a relationship or married, while singles who were between relationships reported significantly lower scores than participants who were married.

We can also see that, in all cases, the random intercept variance was significantly different from zero, indicating that there was significant amount of variability in mean positive emotions scores attributed to differences between countries, after accounting for the fixed effects of relationship status. This result suggests that there are both individual-level and country-level factors influencing positive emotions. The ICC indicates a considerable effect of country level factors explaining positive emotions. For instance, for the "happy"

Table 2 The effect of relationship status on "Joviality" and "Self-assurance"

Positive emotions	Single (difficulties in attracting mates)	Single (by choice)	Single (between relationships)	In a relationship	Married	Other	Fixed effect	Random intercept variance	ICC
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	*p*-value	*p*-value	
Joviality									
Happy	2.92 (1.05)	3.27 (1.08) B,O	3.23 (1.06) P,O	3.50 (0.98) Ma	3.37 (1.03)Ir	3.21 (1.08) P,B	< .001	.008	.103
Joyful	2.90 (1.07)	3.29 (1.09) B,O	3.27 (1.09) P,Ma,Ir,O	3.40 (1.06),Ma,O	3.27 (1.03) B,Ir,O	3.17 (1.13) P,B	< .001	.009	.096
Delighted	2.81 (1.10)	3.20 (1.11) B,Ir,O	3.10 (1.15) P,Ir,O	3.26 (1.13) P,B,Ma,O	3.16 (1.11) P,Ir,O	3.10 (1.17) P,B,Ir,Ma	< .001	.008	.141
Cheerful	2.94 (1.13)	3.30 (1.14) B,O	3.23 (1.12) P,O	3.43 (1.09)	3.27 (1.06) Ma	3.25 (1.20) P,B	< .001	.008	.144
Excited	2.83 (1.18)	3.14 (1.20) B,Ir,Ma,O	3.17 (1.13) P,Ir,Ma,O	3.20 (1.16) P,B,Ma,O	2.94 (1.13) P,B,Ir,O	3.11 (1.25) P,B,Ir,Ma	< .001	.009	.098
Enthusiastic	2.74 (1.20)	3.08 (1.22) B,Ir,Ma,O	3.16 (1.14) P,Ir,Ma,O	3.21 (1.18) P,B,Ma,O	2.92 (1.20) P,B,Ir,O	3.08 (1.25) P,B,Ir,Ma	< .001	.007	.164
Lively	2.79 (1.18)	3.12 (1.19) B,Ir,O	3.16 (1.14) P,Ir,Ma,O	3.26 (1.16) P,B,Ma,O	3.13 (1.14) B,Ir,O	3.17 (1.21) P,B,Ir,Ma	< .001	.008	.134
Energetic	2.87 (1.19)	3.17 (1.21) B,Ir,O	3.19 (1.16) P,Ir,Ma,O	3.23 (1.14) P,B,Ma,O	3.06 (1.16) B,Ir,O	3.17 (1.25) P,B,Ir,Ma	< .001	.008	.135
Self-assurance									
Proud	2.82 (1.27)	3.28 (1.26) B,Ir,Ma,O	3.20 (1.23) P,Ir,Ma,O	3.30 (1.24) P,B,Ma,O	3.15 (1.25) P,B,Ir,O	3.26 (1.32) P,B,Ir,Ma	< .001	.007	.208
Strong	2.95 (1.25)	3.37 (1.23) B,Ir,Ma,O	3.34 (1.16) P,Ir,Ma,O	3.39 (1.21) P,B,Ma,O	3.16 (1.23) P,B,Ir,O	3.37 (1.30) P,B,Ir,Ma	< .001	.007	.222
Confident	2.92 (1.21)	3.41 (1.20) B,Ir,Ma,O	3.34 (1.13) P,Ir,Ma,O	3.37 (1.11) P,B,Ma,O	3.23 (1.17) P,B,Ir,O	3.32 (1.26) P,B,Ir,Ma	< .001	.007	.185
Bold	2.74 (1.21)	3.17 (1.26) B,Ir,Ma,O	3.26 (1.16) P,Ir,Ma,O	3.17 (1.23) P,B,Ma,O	2.86 (1.27) P,B,Ir,O	3.10 (1.25) P,B,Ir,Ma	< .001	.007	.241
Daring	2.62 (1.23)	3.01 (1.24) B,Ir,Ma,O	3.04 (1.18) P,Ir,Ma,O	3.00 (1.23) P,B,Ma,O	2.80 (1.20) P,B,Ir,O	2.92 (1.26) P,B,Ir,Ma	< .001	.008	.147
Fearless	2.59 (1.23)	2.97 (1.24) B,Ir,Ma,O	3.02 (1.13) P,Ir,Ma,O	2.96 (1.20) P,B,Ma,O	2.69 (1.18) P,B,Ir,O	2.87 (1.20) P,B,Ir,Ma	< .001	.008	.150

The capital letters indicate the groups from which a mean score was NOT significantly different with (based on the results of post hoc analysis using Bonferroni). We used the following letters for each group: (I) single (difficulties in attracting mates), (P) single (by choice), (B) single (between relationships), (Ir) in a relationship, (Ma) married, (O) other

emotion, the ICC was 0.103 (Table 2) indicating that 10.3% of the variation in happiness occurs between countries. Moreover, from Table 8, we can see that, across samples, the effect size of relationship status on "Joviality," "Self-assurance," happiness, optimism and meaning in life, was generally small and in a few cases moderate in size.

Negative Emotions

From Table 3, we can see that relationship status was significant for negative emotions. In almost all cases, the involuntarily single group reported more negative emotions than the in a relationship or married groups. Furthermore, for the "Guilt" category, in some instances, the between relationships and voluntarily singles reported significantly higher scores than participants who were in a relationship or married. The same pattern was seen in the "Sadness" category, but in all instances. Moreover, in Table 4, we can see that there was a significant effect of relationship status on time spent feeling unhappy. In particular, participants who were involuntarily single indicated that they spent more time feeling unhappy than participants who were voluntarily single, in a relationship or married. Additionally, participants who were voluntarily single had significantly higher scores than participants who were married, while singles who were between relationships had significantly higher scores than participants who were in a relationship or married.

Table 3 The effect of relationship status on "Guilt" and "Sadness"

Negative emotions	Single (difficulties in attracting mates)	Single (by choice)	Single (between relationships)	In a relationship	Married	Other		Random intercept variance	ICC
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	*p*-value	*p*-value	
Guilt									
Guilty	2.43 (1.31) P,B,O	2.49 (1.33) I,B,O	2.36 (1.21) I,P,O	2.14 (1.19)Mr	2.01 (1.09) B,Ir	2.47 (1.35) I,P,B	< .001	.008	.152
Ashamed	2.35 (1.29) P,B,O	2.44 (1.31) I,B,O	2.20 (1.17) I,P,O	2.04 (1.17) Mr	1.90 (1.07) B,Ir	2.39 (1.29) I,P,B	< .001	.007	.197
Blameworthy	2.26 (1.22) P,B,Ir,O	2.22 (1.25) I,B,Ir,O	2.22 (1.20) I,P,Ir,O	2.20 (1.32) I,P,B,Mr,O	1.95 (1.20) B,Ir	2.64 (1.32) I,P,B,Ir	.002	.007	.299
Angry at self	2.76 (1.29)O	2.47 (1.26) B,Ir,Mr,O	2.49 (1.25) P,Ir,Mr,O	2.34 (1.23) P,B,Mr	2.14 (1.15) P,B,Ir	2.56 (1.32) I,P,B	< .001	.012	.028
Disgusted with self	2.20 (1.28) P,B,O	2.05 (1.23) I,B,O	2.04 (1.20) I,P,Ir,O	1.89 (1.19) B,Mr	1.76 (1.06)Ir	2.12 (1.27) I,P,B	< .001	.009	.076
Dissatisfied with self	2.75 (1.28)	2.38 (1.24) B,Ir,O	2.36 (1.24) P,Ir,O	2.26 (1.23) P,B,Mr,O	2.07 (1.12)Ir	2.40 (1.30) P,B,Ir	< .001	.013	.020
Sadness									
Sad	2.87 (1.22)P	2.54 (1.21) Ir,O	2.72 (1.21)I,O	2.41 (1.20) P,Mr	2.21 (1.11)Ir	2.64 (1.20)P,B	< .001	.012	.029
Blue	2.85 (1.31)P	2.54 (1.26)O	2.72 (1.23)I	2.40 (1.23) Mr,O	2.16 (1.16) Ir,O	2.50 (1.33) P,Ir,Mr	< .001	.010	.049
Downhearted	2.73 (1.33)P	2.41 (1.28) Ir,O	2.60 (1.31)I,O	2.30 (1.23) P,Mr,O	2.10 (1.16)Ir	2.47 (1.34) P,B,Ir	< .001	.010	.041
Alone	3.00 (1.42)	2.57 (1.35) B,O	2.74 (1.32)P,O	2.12 (1.24)	1.88 (1.11)	2.54 (1.39)P,B	< .001	.011	.029
Lonely	2.92 (1.38)P	2.41 (1.34)O	2.79 (1.32)I	2.13 (1.25)	1.86 (1.10)	2.41 (1.37)P	< .001	.010	.039

The capital letters indicate the groups from which a mean score was NOT significantly different with (based on the results of post hoc analysis using Bonferroni). We used the following letters for each group: (I) single (difficulties in attracting mates), (P) single (by choice), (B) single (between relationships), (Ir) in a relationship, (Ma) married, (O) other

In all cases, the random intercept variance was significant, indicating that there was significant amount of variability in mean negative emotions scores attributed to differences between countries, after accounting for the fixed effects of relationship status (Tables 3 and 4). The ICC exhibited high variation, in some cases being small (i.e., dissatisfied with self) and in others large (i.e., blameworthy). From Table 9, we can see that across different samples, the effect size of relationship status on negative emotions was small. Yet, for the emotions "alone" and "lonely, the effects were moderate to large (Supplementary Material B).

Life Satisfaction

From Table 4, we can see that there was a significant effect of relationship status on life satisfaction. In more detail, participants who were involuntarily single reported significantly lower life satisfaction than participants who were between relationships single, voluntarily single, in a relationship or married. Participants who were voluntarily single reported significantly lower scores than participants who were in a relationship or married. In addition, between relationships singles had significantly lower scores than married participants. We can also see that the random intercept variance was significant, with the ICC indicating that 12.3% of the variation in life satisfaction occurs between countries. Moreover, from Table 8, we can see that, in the majority of countries, the effect size of relationship status was small.

H_2: People in a Good Intimate Relationship Would Experience Higher Emotional Wellbeing and Life Satisfaction Than Those in a Bad Intimate Relationship or Single

Positive Emotions

In Table 5, we can see that there was a significant effect of relationship status on all positive emotions. For the "Joviality" category, in all cases, and for the "Self-assurance" category, in most cases, participants who were in a good intimate relationship reported significantly more positive emotions than participants who were in a bad relationship

Table 4 The effect of relationship status on happiness, meaning in life, optimism, and life satisfaction

	Single (difficulties in attracting mates)	Single (by choice)	Single (between relationships)	In a relationship	Married	Other	Fixed effect	Random intercept variance	ICC
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	*p*-value	*p*-value	
Happiness	5.51 (2.24)	6.24 (2.24) B,O	6.15 (2.33) P,O	6.53 (2.12)O	6.89 (1.91)	6.18 (2.40) P,B,Ir	< .001	.008	.121
Happy	36.94 (22.78)	46.68 (25.65) B,Ir,O	46.70 (24.80) P,Ir,O	47.92 (24.59) P,B,O	52.16 (25.90)	45.78 (26.26) P,B,Ir,	< .001	.008	.095
Unhappy	35.07 (22.22) B	31.13 (24.03) B,Ir,O	32.54 (23.18) I,P,O	28.21 (22.49) P,Mr,O	22.31 (19.82) Ir	31.38 (24.29) I,P,B,Ir	< .001	.009	.099
Neutral	38.77 (23.31) P,B,O	37.18 (23.40) I,B,Ir,O	35.35 (22.92) I,P,Ir,Mr,O	34.63 (21.63) P,B,O	31.85 (22.83) B	36.21 (23.80) I,P,B,Ir	< .001	.012	.025
Life satisfaction	3.72 (1.29)	4.20 (1.28) B,O	4.26 (1.22) P,Ir,O	4.43 (1.26) B,Mr	4.46 (1.31)Ir	4.14 (1.33) P,B	< .001	.014	.120
Meaning in life	3.76 (1.02)	4.11 (1.02) B,O	4.16 (0.95) P,Ir,O	4.27 (1.03) B,O	4.54 (1.00)	4.15 (1.02) P,B,Ir	< .001	.015	.085
Optimism	3.69 (0.73)	3.93 (0.69) B,Ir,Mr,O	4.01 (0.64) P,Ir,Mr,O	3.97 (0.67) P,B,Mr,O	4.06 (0.69) P,B,Ir,O	3.90 (0.69) P,B,Ir,Mr	< .001	.016	.061

The capital letters indicate the groups from which a mean score was NOT significantly different with (based on the results of post hoc analysis using Bonferroni). We used the following letters for each group: (I) single (difficulties in attracting mates), (P) single (by choice), (B) single (between relationships), (Ir) in a relationship, (Ma) married, (O) other

or single. Table 7 shows that there was a significant effect of relationship status on happiness and on time spent feeling happy. More specifically, participants who indicated that they were in a good relationship reported more happiness and spent more time feeling happy than participants who were in a bad relationship or single. Furthermore, there was a significant effect of relationship status on optimism and meaning in life. In particular, participants who were in a good intimate relationship reported higher optimism than participants who were in a bad relationship or single.

We can see further that, in all cases, the random intercept variance was significant (Tables 5 and 7). From Table 5, we can observe that the ICC tended to be higher for the emotions under "Self-assurance" than emotions under "Joviality." Furthermore, from Table 10, we can see that across samples, the effect sizes of relationships status for "Joviality" and "Self-assurance" tended to be small. On the other hand, for happiness, time spent happy, optimism, and meaning in life, some of the effects were small, other moderate, and other large in size.

Negative Emotions

Table 6 shows that there was a significant effect of relationship status on the "Guilt" and on the "Sadness." In almost all cases, participants who indicated that they were in a good intimate relationship reported significantly fewer negative emotions than participants who indicated that they were in bad intimate relationship or single. Moreover, Table 7 shows that there was a significant effect of relationship status on time feeling unhappy. More specifically, participants who were in a good relationship reported significantly less time feeling unhappy than participants who were in a bad relationship or single.

We can see also that, in all cases, the random intercept variance was significant (Tables 6 and 7). From Table 6, we can see that the ICC tended to be higher for the emotion under "Guilt" than emotions under "Sadness." From Table 11, we can see that, across samples, the effect size or relationship status tended to be small. Nevertheless, there were frequent instances where the effect size was moderate in size. In addition, for the emotions "alone" and "lonely, the effects were moderate to large (Supplementary Material CB).

Life Satisfaction

Table 7 shows that there was a significant effect of relationship status on life satisfaction, with a moderate to large effect size. More specifically, participants who were in a good intimate relationship reported higher life satisfaction than participants who were in a bad intimate relationship or single. The random intercept variance was also significant, with the ICC indicating that 12.3% of the variation in life satisfaction occurs between countries. Moreover, from Table 11, we can see that, for most countries, the effect size of relationship status was moderate, but there were instances where it has small or large.

Table 5 The effect of relationship quality on "Joviality" and "Self-assurance"

Positive emotions	Single (difficulties in attracting mates)	Single (by choice)	Single (between relationships)	Bad	Moderate	Good	Other		Random intercept variance	ICC
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	*p*-value	*p*-value	
Joviality										
Happy	2.92 (1.06)	3.27 (1.08) B,O	3.23 (1.06) P, O	2.30 (0.98)	3.33 (0.92) O	3.77 (0.88)	3.23 (1.07) P, B, Mr	< .001	.009	.094
Joyful	2.90 (1.07)	3.29 (1.09) B,O,Mr	3.27 (1.09) P,O,Mr	2.45 (1.03)	3.22 (0.97) P,B,O	3.65 (1.03)	3.19 (1.13) P, B, Mr	< .001	.008	.102
Delighted	2.81 (1.11)	3.20 (1.11) B,O,Mr	3.10 (1.15) P,O,Mr	2.16 (1.05)	3.08 (1.04) P,B,O	3.56 (1.10)	3.14 (1.15) P, B, Mr	< .001	.008	.115
Cheerful	2.94 (1.13)	3.30 (1.14) B,O,Mr	3.23 (1.12) P,O,Mr	2.44 (1.13)	3.25 (1.00) P,B,O	3.64 (1.06)	3.28 (1.20) P, B, Mr	< .001	.008	.134
Excited	2.83 (1.18) Br	3.14 (1.20) B,O,Mr	3.17 (1.13) P,O,Mr	2.38 (1.4) I	2.91 (1.03) P,B,O	3.38 (1.15)	3.16 (1.23) P, B, Mr	< .001	.009	.091
Enthusiastic	2.74 (1.20)	3.08 (1.22) B,O,Mr	3.16 (1.14) P,O,Mr	2.21 (1.13)	2.98 (1.11) P,B,O	3.28 (1.28)	3.11 (1.25) P, B, Mr	< .001	.008	.161
Lively	2.79 (1.18)	3.12 (1.20) B,O,Mr	3.16 (1.14) P,O,Mr	2.33 (1.06)	3.14 (1.08) P,B,O	3.40 (1.21)	3.19 (1.21) P, B, Mr	< .001	.008	.124
Energetic	2.87 (1.19)	3.17 (1.21) B,O,Mr	3.19 (1.16) P,O,Mr	2.35 (1.11)	3.10 (1.09) P,B,O	3.32 (1.20) O	3.20 (1.25) P, B, Mr, Gr	< .001	.008	.129
Self-assurance										
Proud	2.82 (1.27)Br	3.28 (1.26) B,O,Mr	3.20 (1.23) P,O,Mr	2.47 (1.22) I	3.16 (1.19) P,B,O	3.43 (1.29)	3.30 (1.31) P,B,Mr	< .001	.007	.248
Strong	2.95 (1.25)	3.37 (1.23) B,O,Mr	3.34 (1.16) P,O,Mr	2.50 (1.22)	3.20 (1.15) P,B,O	3.49 (1.26) O	3.39 (1.30) P,B,Mr, Gr	< .001	.007	.216
Confident	2.92 (1.21)	3.41 (1.20) B,O,Mr,Gr	3.34 (1.13) P,O,Mr	2.44 (1.14)	3.27 (1.07) P,B,O	3.48 (1.18) P	3.33 (1.26) P,B,Mr,	< .001	.007	.188
Bold	2.74 (1.21) Br	3.17 (1.26) B,O,Mr,Gr	3.26 (1.16) P,O,Mr,Gr	2.20 (1.17) I	2.99 (1.19) P,B,O,Gr	3.14 (1.34) P,B,O,Mr	3.12 (1.26) P,B,Mr, Gr	< .001	.007	.240
Daring	2.62 (1.23) Br	3.01 (1.24) B,O,Mr,Gr	3.04 (1.18) P,O,Mr,Gr	2.19 (1.05) I	2.91 (1.15) P,B,O,Gr	2.96 (1.30) I,B,O,Mr	2.94 (1.26) P,B,Mr, Gr	< .001	.008	.141
Fearless	2.59 (1.23) Br	2.97 (1.24) B,O,Mr,Gr	3.02 (1.13) P,O,Mr,Gr	2.12 (1.08) I	2.81 (1.14) P,B,O,Gr	2.92 (1.26) I,B,O,Mr	2.90 (1.20) P,B,Mr, Gr	< .001	.008	.168

The capital letters indicate the groups from which a mean score was NOT significantly different with (based on the results of post hoc analysis using Bonferroni). We used the following letters for each group: (I) single (difficulties in attracting mates), (P) single (by choice), (B) single (between relationships), (Br) bad, (Mr) moderate, (Gr) good, (O) other

Table 6 The effect of relationship quality on "Guilt" and "Sadness"

Negative emotions	Single (difficulties in attracting mates)	Single (by choice)	Single (between relationships)	Bad	Moderate	Good	Other		Random intercept variance	ICC
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	*p*-value	*p*-value	
Guilt										
Guilty	2.43 (1.31) P,B,O,Br	2.49 (1.33) I,B,O,Br	2.36 (1.42) I,P,O,Br,Mr	2.15 (1.20) I,P,B,O, Mr	2.10 (1.10) B,Br	1.87 (1.09)	2.51 (1.35) I,P,B, Br,Mr	< .001	.008	.185
Ashamed	2.35 (1.29) P,B,O,Br	2.44 (1.31) I, O,Br	2.20 (1.17) I,Br,GR	2.00 (1.10) Gr	1.98 (1.10) B,Br	1.79 (1.05)	2.44 (1.28) I,P,B, Br	< .001	.008	.199
Blameworthy	2.26 (1.22) P,B,O,Br,Mr	2.22 (1.25) I,B,O,Br,Mr	2.22 (1.21) I,P,O,Br,Mr	1.93 (1.23) I,P,B,O,Mr,Gr	2.10 (1.25) I,P,B,O,Gr,Mr,	1.96 (1.28) Br	2.32 (1.23) I,P,B,Br	< .001	.007	.441
Angry at self	2.76 (1.29)O,Br	2.47 (1.26) B,O,Br,Mr	2.49 (1.25) P,O,Br,Mr	2.47 (1.32) I,P,B,O,Mr	2.31 (1.17) P,B,O,Br	2.00 (1.14)	2.59 (1.32) I,P,B,O,Br,Mr	< .001	.012	.033
Disgusted with self	2.20 (1.28) P,B,O,Br	2.05 (1.23) I,B,O,Br,Mr	2.04 (1.21) I,P,O,Br,Mr	2.11 (1.32) I,P,B,O,Mr	1.88 (1.12)P,Br	1.63 (1.02)	2.15 (1.27)	< .001	.008	.096
Dissatisfied with self	2.75 (1.28)Br	2.38 (1.24) B,O,Br,Mr	2.36 (1.24) P,O,Br,Mr	2.49 (1.30) I,P,B,O,Mr	2.25 (1.17) P,B,O,Mr	1.91 (1.10)	2.42 (1.30)	< .001	.012	.030
Sadness										
Sad	2.87 (1.22)B,Br	2.54 (1.21)O,Mr	2.72 (1.21)I,O,Br	2.89 (1.39)I,B	2.36 (1.12)P	2.06 (1.11)	2.66 (1.30)P,B	< .001	.011	.038
Blue	2.85 (1.31)B,Br	2.54 (1.26)O,Mr	2.72 (1.23)I,O,Br	2.81 (1.30)I,B	2.34 (1.16)P,O	2.02 (1.15)	2.51 (1.34)P,B,Mr	< .001	.009	.059
Downhearted	2.73 (1.33) B,Br	2.41 (1.28)O,Mr	2.60 (1.31) O,Mr	2.76 (1.37) I,B	2.22 (1.17) P,O	1.99 (1.13)	2.50 (1.33) P,B,Mr	< .001	.010	.056
Alone	3.00 (1.42)	2.57 (1.35)B,O,Br	2.74 (1.32)P,O,Br	2.59 (1.28)P,B,O	2.10 (1.18)	1.66 (1.04)	2.57 (1.39)P,B,Br	< .001	.010	.052
Lonely	2.92 (1.37)B,Br	2.41 (1.34)O,Br	2.79 (1.32)I,Br	2.66 (1.31)I,P,B,O	2.09 (1.18)	1.68 (1.04)	2.44 (1.38)P,Br	< .001	.009	.066

The capital letters indicate the groups from which a mean score was NOT significantly different with (based on the results of post hoc analysis using Bonferroni). We used the following letters for each group: (I) single (difficulties in attracting mates), (P) single (by choice), (B) single (between relationships), (Br) bad, (Mr) moderate, (Gr) good, (O) other

Table 7 The effect of relationship status on happiness, meaning in life, optimism, and life satisfaction

	Single (difficulties in attracting mates)	Single (by choice)	Single (between relationships)	Bad	Moderate	Good	Other	Fixed effect	Random intercept variance	ICC
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	*p*-value	*p*-value	
Happiness	5.59 (2.25)Br	6.22 (2.22)B,O,Mr	6.16 (2.32)P,O,Mr	5.99 (2.27)I	6.63 (1.89)P,B,O	7.25 (1.90)	6.22 (2.40)P,B,Mr	<.001	.008	.143
Happy	36.74 (22.78)	46.68 (25.66) B,O,Mr	46.70 (24.79) P,O,Mr	29.73 (19.99)	48.11 (24.40) P,B,O	57.24 (25.56)	46.25 (26.18) P,B,Mr	<.001	.009	.099
Unhappy	35.07 (22.22)B,O	31.13 (24.03) B,O,Mr	32.54 (23.18)I,P,O	39.43 (24.32)	25.56 (20.25)P,O	20.62 (21.08)	31.70 (24.13) I,P,B,Mr	<.001	.009	.110
Neutral	38.77 (23.31) P,B,O	37.18 (23.40) I,B,O,Br,Mr	35.35 (22.92) I,P,O,Br,Mr	34.78 (22.25) I,P,B,O,Mr	34.34 (22.38) P,B,O,Br	30.84 (22.77)	35.96 (23.55) I,P,B,Br,Mr	<.001	.012	.027
Life satisfaction	3.72 (1.29)	4.20 (1.28)B,O,Mr	4.26 (1.23)P,O,Mr	3.02 (1.23)	4.32 (1.20)P,B,O	4.92 (1.19)	4.17 (1.33)P,B,Mr	<.001	.014	.123
Meaning in life	3.76 (1.02)Br	4.11 (1.02) B,O,Mr	4.16 (0.95) P,O,Mr	3.87 (0.95)I	4.32 (0.94) P,B,O	4.70 (1.10)	4.13 (1.02) P,B,Mr	<.001	.015	.085
Optimism	3.69 (0.73)Br	3.93 (0.69) B,O,Mr	4.01 (0.64) P,O,Mr	3.66 (0.73)I	3.99 (0.63) P,B,O	4.16 (0.72)	3.89 (0.69) P,B,Mr	<.001	.016	.062

The capital letters indicate the groups from which a mean score was NOT significantly different with (based on the results of post hoc analysis using Bonferroni). We used the following letters for each group: (I) single (difficulties in attracting mates), (P) single (by choice), (B) single (between relationships), (Br) bad, (Mr) moderate, (Gr) good, (O) other

H_3: H_1 and H_2 Would Be Supported Across Samples

H_1

With respect to positive emotions, as we can see from Table 8, in the majority of cases, the effect of relationship status was significant and in the predicted direction (see Supplementary Material B). Also, in many cases, it was close to the significance level. Still, in several instances, the mean difference did not pass the significance level in post hoc analysis, probably indicating some power issues. The most robust effect was with respect to the time spent feeling happy where, with the exception of Egypt, in all countries, those who were mated tended to report more time spent feeling happy than those who were single. The meaning in life was also robust, as in the majority of cases, the effect was significant or close to significance. With respect to negative emotions, Table 9 shows that the most robust effect was for "Sadness" where in all cases was significant, with the exception of Egypt. Moreover, the effect of relationship status was also robust for life satisfaction, as in most cases, it was significant or close to the significance level.

H_2

Table 10 shows that, in the majority of cases, the effect of relationship status was significant and in the predicted direction (see Supplementary Material C). The effect was more robust for the "Joviality" and the "Happiness" variables. In terms of negative emotions, Table 11 shows that for "Sadness," the effect was significant for all other countries except for Egypt. The effect was less robust for the "Guilt" group and the percentage of time feeling unhappy, yet in most cases, it was significant. In addition, the effect was robust for life satisfaction, as in the majority of the cases, this was significant and to the predicted direction.

Bad Relationship vs. Single

Comparing bad relationship group with the single groups, we can observe that, in most cases, people in a bad relationship reported less "Joviality" and "Self-assurance" than people who were single (Table 5). With respect to the happiness instrument, involuntarily single participants indicated less happiness and voluntary singles and those between relationships reported more happiness than those in bad intimate relationships. In addition, single participants indicated more time spent feeling happy than participants in a bad intimate relationship. With respect to the negative emotions of "Guilt" and "Sadness," in most cases, there were no significant differences between those who were in a bad relationship and those who were single (Table 6). Moreover, participants in a bad intimate relationship reported spending

Table 8 The effect of relationship status on "Joviality," "Self-assurance," happiness, optimism, and meaning in life across different samples

Countries	Joviality		Self-assurance		Happiness		Happy (%)		Optimism		Meaning in life	
	p-value	η_p^2	*p*-value	η_p^2	*p*-value	η_p^2	*p*-value	η_p^2	*p*-value	η_p^2	*p*-value	η_p^2
China	.287	.021	.229	.017	.022	.031	.023	.031	.645	.008	.211	.017
Egypt	.535	.018	.381	.015	.294	.015	.130	.020	.838	.005	.651	.008
Greece	< .001	.028	.035	.012	< .001	.061	< .001	.055	< .001	.031	< .001	.049
Japan	.033	.019	.242	.011	< .001	.068	< .001	.044	< .001	.040	.003	.029
Oman	.367	.024	.662	.015	.384	.015	.029	.036	.028	.036	.103	.026
Peru	.001	.019	.027	.012	< .001	.034	.009	.020	.020	.018	< .001	.030
Poland	.001	.028	.004	.021	.001	.034	< .001	.044	< .001	.041	.001	.033
Russia	.270	.023	.592	.014	< .001	.053	.002	.049	.211	.018	.011	.038
Spain	.139	.026	.003	.028	.001	.049	.090	.024	.105	.023	.013	.037
Turkey	.003	.019	.016	.014	< .001	.040	< .001	.041	.056	.015	< .001	.066
UK	< .001	.036	< .001	.028	< .001	.098	< .001	.075	< .001	.061	< .001	.076
Ukraine	.148	.025	.720	.013	.443	.012	.001	.052	.465	.012	.152	.021

Table 9 The effect of relationship status on "Guilt," "Sadness," unhappy, and life satisfaction across different samples

Countries	Guilt		Sadness		Unhappy (%)		Life satisfaction	
	p-value	η_p^2	*p*-value	η_p^2	*p*-value	η_p^2	*p*-value	η_p^2
China	.126	.019	< .001	.027	.632	.008	.010	.036
Egypt	.819	.011	.184	.015	.245	.016	.531	.010
Greece	.009	.014	< .001	.047	< .001	.047	< .001	.054
Japan	.024	.015	< .001	.023	.002	.030	< .001	.078
Oman	.201	.021	.011	.025	.331	.017	.178	.022
Peru	.113	.010	< .001	.023	.343	.007	< .001	.030
Poland	.074	.016	< .001	.052	< .001	.048	< .001	.046
Russia	.378	.016	.036	.020	.021	.034	.122	.022
Spain	.287	.017	< .001	.031	.078	.025	.001	.052
Turkey	.026	.013	< .001	.016	.028	.018	< .001	.038
UK	.060	.019	< .001	.048	< .001	.058	< .001	.130
Ukraine	.660	.013	.001	.027	.565	.010	.187	.019

Table 10 The effect of relationship quality on "Joviality," "Self-assurance," happiness, optimism, and meaning in life across different samples

Countries	Joviality		Self-assurance		Happiness		Happiness (%)		Optimism		Meaning in life	
	p-value	η_p^2	*p*-value	η_p^2	*p*-value	η_p^2	*p*-value	η_p^2	*p*-value	η_p^2	*p*-value	η_p^2
China	.062	.026	.004	.025	< .001	.068	.329	.017	.131	.024	.140	.023
Egypt	.395	.022	.209	.019	.123	.027	.039	.035	.864	.007	.754	.009
Greece	< .001	.034	< .001	.018	< .001	.106	< .001	.081	.002	.028	< .001	.078
Japan	< .001	.035	.021	.015	< .001	.174	< .001	.132	< .001	.099	< .001	.054
Oman	.558	.027	.038	.030	.461	.020	.026	.049	.063	.041	.177	.031
Peru	< .001	.031	.006	.013	< .001	.082	< .001	.078	< .001	.045	< .001	.057
Poland	< .001	.058	< .001	.045	< .001	.158	< .001	.181	< .001	.122	< .001	.138
Russia	-	-	-	-	-	-	-	-	-	-	-	-
Spain	.131	.025	.011	.025	.003	.049	.022	.038	.128	.025	.175	.023
Turkey	< .001	.025	.006	.014	< .001	.079	< .001	.073	.003	.028	< .001	.085
UK	< .001	.046	< .001	.029	< .001	.153	< .001	.123	< .001	.090	< .001	.148
Ukraine	.357	.022	.456	.015	.317	.018	.001	.056	.239	.020	.418	.016

Due to a technical error, the relationship satisfaction in the Russian sample was not properly recorded; so, the analysis was not recorded

Table 11 The effect of relationship quality on "Guilt," "Sadness," unhappy, and life satisfaction across different samples

Countries	Guilt		Sadness		Unhappy (%)		Life satisfaction	
	p-value	η_p^2	*p*-value	η_p^2	*p*-value	η_p^2	*p*-value	η_p^2
China	.061	.020	< .001	.032	.009	.041	< .001	.121
Egypt	.570	.015	.406	.017	.259	.021	.110	.028
Greece	< .001	.017	< .001	.057	< .001	.067	< .001	.088
Japan	< .001	.021	< .001	.038	< .001	.148	< .001	.054
Oman	.127	.026	.017	.033	.446	.020	.203	.029
Peru	.003	.014	< .001	.033	.543	.007	< .001	.068
Poland	< .001	.024	< .001	.066	< .001	.123	< .001	.177
Russia	-	-	-	-	-	-	-	-
Spain	.435	.016	.017	.025	.514	.014	.002	.053
Turkey	.001	.017	< .001	.025	< .001	.070	< .001	.062
UK	< .001	.028	< .001	.058	< .001	.131	< .001	.188
Ukraine	.984	.009	.003	.028	.144	.024	.229	.021

Due to a technical error, the relationship satisfaction in the Russian sample was not properly recorded; so, the analysis was not recorded

more time unhappy than those who were single. In terms of meaning in life and optimism, voluntary singles and those between relationships had higher scores than those in a bad relationship (Table 7). In addition, participants who were single indicated higher life satisfaction than those who were in a bad intimate relationship (Table 7).

Discussion

In a large sample from 12 different countries, we found that participants who were single experienced lower emotional wellbeing and life satisfaction than participants who were in a relationship or married. Participants in a relationship or married reported the highest levels of emotional wellbeing and life satisfaction, while those who were involuntarily single reported the lowest levels, with those between relationships or voluntarily single falling somewhere in between. Additionally, participants in a good intimate relationship reported higher emotional wellbeing and life satisfaction than those in a bad intimate relationship or who were single. These findings were generally consistent across the different cultural groups in our sample. We also found that single people reported higher emotional wellbeing and life satisfaction than people in a bad intimate relationship.

Our findings supported the hypothesis that mated people would enjoy higher levels of emotional wellbeing and life satisfaction than those who were single especially involuntarily so. These results are consistent with previous studies in the field (Apostolou & Kagialis, 2020; Apostolou et al., 2019). Additionally, this is the first study to examine the association of relationship status with optimism and meaning in life, and we found that mated individuals were more optimistic and found more meaning in life than individuals who were single. The effect sizes were generally small, but for some emotions (e.g., feeling alone and lonely), the effect was moderate. Therefore, we can argue that, single individuals, especially those who are involuntarily single, are likely to experience sizable spells of loneliness and feelings of being alone.

The results also supported our second hypothesis, which stated that people in a good intimate relationship would experience higher emotional wellbeing and life satisfaction than those in a bad intimate relationship or who were single. Specifically, the group in a good intimate relationship reported the highest levels of positive emotions and life satisfaction compared to all other groups. While the effect sizes tended to be small, for specific emotions (such as happiness, loneliness, feeling alone, and life satisfaction), the effects were moderate to large. These findings suggest that relationship quality can make a substantial difference in how someone feels in terms of happiness, feelings of being alone, loneliness, and overall life satisfaction.

Our third hypothesis that the effects of relationship status and relationship quality on emotional wellbeing would be consistent across different cultures, was also supported. The most robust effects were observed for the "Sadness" category of negative emotions and for life satisfaction. In cases where the effects were not significant, the means were in the predicted direction, suggesting that some samples lacked the statistical power to detect small effect sizes. These findings further suggest that the association of relationship status and relationship quality with emotions is generally consistent across different cultural settings. Nevertheless, more studies are needed to support this argument. Furthermore, there were difference between the samples; for instance, there was considerable variation in effect sizes between countries. This variation is likely due to differences in cultural variables

or due to differences in the sampling procedures across the different countries in the sample. Our study was designed to identify consistency rather than the sources of cross-cultural variation, which should be examined by future research.

The results of the current study contribute to the discussion on whether single life is better for people's emotional wellbeing than being in a relationship. Some authors have favored singlehood over being in an intimate relationship (DePaulo, 2007; Kislev, 2019). Nevertheless, our results suggest that, across different nations, people who are in an intimate relationship experience higher emotional wellbeing and life satisfaction than those who are single. Other authors have favored being in a relationship over being single, arguing that the former is always better than the latter (Olds & Schwartz, 2010; Waite & Gallagher, 2001). Yet, regarding positive emotions and life satisfaction, our findings indicate that people in a bad intimate relationship are similar or worse off compared to those who are single. Overall, this discussion could benefit from empirical data that differentiate between different types of singlehood and take into consideration the quality of the relationship.

Our study is not without limitations. Firstly, we used non-probability samples, so our findings may not readily generalize to the population (but see Coppock et al., 2018). Additionally, as we employed different sampling procedures and non-probability samples, we cannot discern whether the differences between samples were due to cultural factors or differences in the sampling procedures. Moreover, we have assumed that the more fitness increasing an intimate relationship is, the more satisfactory would be, and based on this assumption, we have used relationship satisfaction as a proxy of relationship quality. Still, although this assumption is consistent with the evolutionary theoretical framework, it needs to be tested by future research. Similarly, we have assumed that participants are both aware of and willing to report the reasons for being single. However, some singles may not be aware of these reasons (for example, they may be unwilling to admit to themselves that they face difficulties in attracting an intimate partner) or if they are aware, they may not be willing to disclose them (for instance, they may be unwilling to disclose that they face difficulties attracting an intimate partner).

Furthermore, our data are correlational, so causality cannot be attributed. We have argued that relationship status and quality of the relationship predict emotional wellbeing, but it could also be the case that emotional wellbeing predicts relationship status and quality of the relationship (see Oh et al., 2022). We believe that the relationship is indeed bidirectional, and future studies using a longitudinal research design should be undertaken to disentangle the two effects. Such studies will not only enable us to determine the causality involved between relationship status, quality of relationships, and emotional wellbeing but also to examine how the relationship between those variables changes as people get older.

In the current research, we examined emotional wellbeing and life satisfaction in 12 different nations. Our findings support the conclusion that, in general, mated people are better off than single people, but relationship quality matters more than relationship status. People in a good relationship experience more positive emotions, optimism, meaning in life, and life satisfaction. On the other hand, people in a bad relationship experience more negative emotions, less optimism, less meaning in life, and lower life satisfaction. The second most negative pattern of findings was observed for those who were involuntarily single. However, more replication studies are needed to examine whether these conclusions hold in more cultural settings.

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Data Availability All data are available on request by the first author.

Code Availability Not applicable.

Declarations

Ethics Approval The current research received ethics approval from the department of social sciences ethics committee.

Consent to Participate Consent was asked from all participants prior to participation.

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Authors and Affiliations

Menelaos Apostolou[1] · Mark Sullman[1] · Agata Błachnio[2] · Ondřej Buryšek[3] · Ekaterina Bushina[4] · Fran Calvo[5] · William Costello[3,6] · Mai Helmy[7] · Tetiana Hill[8] · Maria Galatiani Karageorgiou[1] · Yanina Lisun[9] · Denisse Manrique-Millones[10] · Oscar Manrique-Pino[11] · Yohsuke Ohtsubo[12] · Aneta Przepiórka[2] · Orestis Cleanthous Saar[1] · Burcu Tekeş[13] · Andrew G. Thomas[3] · Yan Wang[14] · Sílvia Font-Mayolas[15]

✉ Menelaos Apostolou
m.apostolou@gmail.com

Mark Sullman
sullman.m@unic.ac.cy

Agata Błachnio
gatta@kul.pl

Ondřej Buryšek
ondra.burysek@gmail.com

Ekaterina Bushina
bushinka85@gmail.com

Fran Calvo
fran.calvo@udg.edu

William Costello
williamcostello@utexas.edu

Mai Helmy
m.helmy@squ.edu.om

Tetiana Hill
t.hill4@herts.ac.uk

Yanina Lisun
y.lisun@knute.edu.ua

Denisse Manrique-Millones
denissemanriquemillones@gmail.com

Yohsuke Ohtsubo
yohtsubo@l.u-tokyo.ac.jp

Aneta Przepiórka
aneta.przepiorka@kul.pl

Orestis Cleanthous Saar
orestis.c.saar@gmail.com

Burcu Tekeş
burcutekes@gmail.com

Andrew G. Thomas
research@agthomas.net; a.g.thomas@swansea.ac.uk

Yan Wang
yanwang@fudan.edu.cn

Sílvia Font-Mayolas
silvia.font@udg.edu

[1] Department of Social Sciences, University of Nicosia, 46 Makedonitissas Ave., 1700 Nicosia, Cyprus

[2] Institute of Psychology, The John Paul II Catholic University of Lublin, Al. Racławickie 14, 20-950 Lublin, Poland

[3] School of Psychology , Swansea University, Swansea, Wales SA2 8PP, UK

[4] Center for Sociocultural Research, National Research University Higher School of Economics, Moscow, Russia

[5] Department of Pedagogy, Quality of Life Research Institute, Universitat de Girona, Pujada de Sant Domènec, 9, 17004 Catalonia, Spain

[6] Department of Psychology, University of Texas at Austin, The University of Texas at Austin, 1 University Station, Austin, TX, USA

[7] Psychology Department, College of Education, Sultan Qaboos University, Muscat, Oman

[8] Business School, University of Hertfordshire, Hatfield AL10 9EU, UK

[9] Department of Journalism and Advertising, Kyiv National University of Trade and Economics, 19 Kioto Street, Kiev 02156, Ukraine

[10] Carrera de Psicología, Universidad Científica del Sur, Panamericana Sur 19, Villa El Salvador 15067, Lima, Peru

[11] Universidad Católica Sedes Sapientiae, Constelaciones y Sol de Oro s/n Urb. Sol de Oro. Los Olivos, Lima, Peru

[12] Department of Social Psychology, Graduate School of Humanities and Sociology, University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan

[13] Department of Psychology, Başkent University, Bağlıca Kampüsü, Ankara, Turkey

[14] Department of Psychology, Fudan University, No. 220 Handan Road, Shanghai, China

[15] Department of Psychology, Quality of Life Research Institute, Universitat de Girona, Girona, Spain

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