The Association Between Mating Performance, Marital Status, and the Length of Singlehood: Evidence From Greece and China

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Abstract
A considerable proportion of people in postindustrial societies experience difficulties in intimate relationships and spend considerable time being single. In the current research, we attempted to examine mating performance, and occurrence and length of singlehood in a Greek (\(N = 884\)) and a Chinese (\(N = 2,041\)) sample. We found that, in both samples, about half of the participants experienced difficulties in intimate relationships. In addition, more than half of the participants were single, and nearly one in four participants indicated that they were single because they faced difficulties attracting a partner. Moreover, more than one in five singles in the Greek sample were without a partner for more than 3 years, and almost half of the singles in the Chinese sample had never been in a relationship. Mating performance predicted marital status, with low scorers being more likely to be single because they faced difficulties in attracting a partner than high scorers. Mating performance predicted also the length of singlehood, with low scorers spending more time being single than high scorers. In addition, singles who faced difficulties in attracting partners experienced lengthier spells of singlehood than other categories of singles. Furthermore, there were significantly more participants who preferred to be single and who never had a relationship in the Chinese than in the Greek sample. Overall, in both samples, a considerable proportion of participants experienced low mating performance, which was associated with increased incidence of prolonged spells of singlehood.

Keywords
singlehood, involuntary singlehood, mating, mismatch problem

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Recent studies indicate that a considerable proportion of individuals experience poor mating performance, meaning that they face difficulties in attracting and retaining mates (Apostolou, Paphiti, Neza, Damianou, & Georgiadou, 2019; Apostolou, Shialos, Kyrou, Demetriou, & Papamichael, 2018). This low performance can result in prolonged spells of involuntary singlehood, that is, being single without wanted to be so. For instance, a recent study has found that, in the Greek cultural context, about one in two people who were single were involuntarily so (Apostolou, Papadopoulou, & Georgiadou, 2019). Other studies found also that a substantial proportion of the population was single, but they did not distinguish between voluntary and involuntary singlehood. For example, studies in the United States have found that between one in three and one in four adults did not have an intimate partner (Pew Research Center, 2006, 2013; Rosenfeld, Reuben, & Falcon, 2015). The current study aims to contribute to the limited literature on mating performance and involuntary singlehood by (a) estimating the occurrence of poor mating performance, involuntary singlehood, and the time period people spend being single in the Greek and the Chinese cultural contexts; (b) examining whether poor mating performance was associated with involuntary singlehood; and (c) estimating

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differences in these dimensions between the two cultural contexts. We will start our analysis by exploring the ultimate reasons behind difficulties in the domain of mating.

**Causes of Poor Mating Performance**

There are many reasons why people experience poor performance in the domain of mating, including stochastic ones such as accidents, genetic mutations, and illnesses (Apostolou, 2017b). For instance, individuals may experience a serious accident, which could result in disfigurement that in turn could impair their capacity to attract mates. Similarly, random genetic mutations may significantly affect the functioning of adaptations involved in mating, causing difficulties in this area. In the same vain, individuals may be affected by a serious disease, which could affect their mate value as well as their capacity to allocate resources in mate-seeking. However, serious accidents, random genetic mutations with a substantial phenotypic effect, and grave illnesses are rare and can consequently account only for a small percentage of people who face difficulties in mating.

It has been proposed that the main factor behind the high prevalence of poor mating performance has been the mismatch between ancestral and modern conditions (Apostolou, 2015). More specifically, selection forces shape adaptations to work optimally (i.e., to increase individuals’ surviving and reproductive success or fitness) in the specific environment they occupy. If this environment changes, selection forces would adjust these adaptations to work optimally in the new environment. Nevertheless, this process takes time, and in the interim, there would be many individuals with adaptations that do not work optimally, which is known as the mismatch problem (Crawford, 1998; Li, van Vugt, & Colarelli, 2017; Maner & Kenrick, 2010). The environment in which mating takes place has undergone substantial changes very recently in the evolutionary timescale, which means that the mismatch problem is likely to play a major role in explaining poor performance in mating.

More specifically, anthropological, historical, and phylogenetic evidence indicates that, until recently, the typical form of long-term mating has been arranged marriage (Broude & Greene, 1976; Coontz, 2006; Walker, Hill, Flinn, & Ellsworth, 2011). For instance, a study of 16 historical societies found that arranged marriage was the norm in 15 of them (Apostolou, 2012). Another study examined 190 contemporary hunting and gathering societies, whose way of life reflected the way of life of ancestral foragers and found that arranged marriage was the typical form of mating (Apostolou, 2007). Furthermore, men form male coalitions in order to monopolize the women of other men (Tooby & Cosmides, 1988). Historical, anthropological, and physiological evidence indicates that raids, wars, and conflicts, aiming also to obtain women, had been common in ancestral human societies (Bowles, 2009; Keegan, 2004; Puts, 2016). Such evidence indicates further that in ancestral human societies people could exercise free mate choice. For example, they could choose their own mates in later marriages that were less controlled by parents or in marriage in extramarital relationships (Apostolou, 2017a).

Following the industrial revolution in 18th century, most human societies transited to postindustrialism. In the postindustrial context, mate choice is freely exercised, while mating is not forced by coalitions of powerful men. Nevertheless, adaptations involved in mating have evolved in a context where mates were secured predominantly through parents or imposed by male coalitions. These adaptations may not work optimally in a context where individuals have to obtain mates on their own. For instance, a high level of aggression may have enabled ancestral men to obtain women by fighting other men, but it constitutes an obstacle in keeping a partner for men living in postindustrial societies.

Consistent with this argument, one study identified 76 reasons that could lead people to be single, including poor flirting skills and interpersonal difficulties such as shyness and fear of commitment (Apostolou, 2017b). Another study analyzed 13,429 responses from a Reddit thread, asking the question why men were single (Apostolou, 2019). The responses were classified in 43 broader categories, with the most frequent ones being poor flirting skills, low self-confidence, poor looks, shyness, low effort, and bad experiences from previous relationships.

On this basis, it is predicted that a considerable proportion of the population today would experience poor performance in mating. In accordance with this prediction, a study which employed 1,894 Greek-speaking participants found that almost one in two experienced difficulties in attracting and/or keeping an intimate partner (Apostolou et al., 2018). A subsequent study which employed 1,358 Greek-speaking participants produced similar results (Apostolou et al., 2019). It could be further predicted that, due to difficulties in the domain of mating, there would be many people who are involuntarily single. Consistent with this prediction, one study estimated that, in the Greek cultural context, about half of the participants who were single were so because they faced difficulties in attracting a partner (Apostolou et al., 2019).

**Research Objectives**

To our knowledge, there has not been any attempt to examine the occurrence of poor mating performance and involuntary singleness in a different than the Greek cultural context, which is one of the goals of the present study. In addition, poor mating performance would impair people’s capacity to attract mates, resulting in involuntary singleness. Thus, the present research aims to examine whether poor mating performance is associated with involuntary singleness. It needs to be said that, although the relationship between poor performance in mating and involuntary singleness appears obvious, it still needs to be tested. One reason is that, even if people experience difficulties in approaching or in keeping partners, they may nevertheless manage somehow to overcome these difficulties and establish intimate relationships. Alternatively, it could be the case that the difficulties in attracting and keeping mates are not that severe to actually prevent people from being in a relationship.

Furthermore, if adaptations involved in mating were not properly optimized for the demands of the contemporary postindustrial context, the difficulties individuals face in the domain of mating...
would not be transitory but more long-lasting. The reason is that people have limited control over their adaptations; for instance, extroversion is associated with higher mating performance (Apostolou et al., 2018), but people cannot readily adjust their level of extroversion to influence mating performance. On this basis, it could be predicted that poor mating performance is a trait which is relatively stable in individuals’ adult life, and as such could result in prolonged periods of singlehood.

To our knowledge, there has not been any attempt to estimate how lengthy the spells of singlehood are. Accordingly, the current research aims to measure the length of singlehood in general and of involuntary singlehood in particular, in the Greek and in the Chinese cultural contexts. Last but not least, cultural differences are likely to affect mating performance and the rates of singlehood. More specifically, adaptations are not rigid but are responsive to environmental conditions (Tooby & Cosmides, 2015). Thus, differences between cultures are likely to affect the adaptations involved in mating, resulting in differences in mating performance and the rates of singlehood between the two cultural contexts. Accordingly, the current research aims to examine such differences between the Greek and the Chinese cultures.

In particular, in China, the adoption of one-child policy along with a preference for having male children has resulted in an unbalanced sex ratio favoring men (Deng, 2000). This bias has translated in a shortage of available women, which could impair the capacity of men to attract a partner. The opposite is true in the Greek cultural context: The recent and prolonged financial crisis has resulted in many young people to immigrate, looking for work in other countries. Men were disproportionally represented among these people, which means that there may be fewer available men, which could impair the capacity of women to attract mates. Yet, the cultural differences are many for directional predictions to be made.

In sum, our theoretical framework predicts that, across cultures, a considerable proportion of people would experience poor mating performance, which could result in a high prevalence involuntary singlehood and prolonged periods of involuntary singlehood. It predicts also the presence of cross-cultural variation in these dimensions. Our theoretical framework does not make specific predictions about prevalence rates, so our research is also explorative.

**Study 1**

**Method**

**Participants**

Participants completed an online survey. The survey link was forwarded to university students and employees in different academic disciplines, and it was forwarded as a Facebook ad to participants residing in Greece. Participants received no compensation for participating. Overall, 884 Greek-speaking people took part (467 women, 417 men). The mean age of women was 31.92 (SD = 10.93, range = 41), and the mean age of men was 36.24 (SD = 11.61, range = 56).

**Materials**

The survey was in Greek and was constructed using Google Forms. In order to measure mating performance, we employed the instrument developed by Apostolou and colleagues (2018), which was a 5-item scale designed to measure how well individuals perform with respect to starting and keeping intimate relationships. Participants rated questions using a five-point Likert-type scale (1 = strongly disagree, 5 = strongly agree), with a higher total score indicating higher mating performance. The items of the instrument are reported in Table 1.

### Table 1. Mating Performance in the Greek and in the Chinese Samples.

| Item                                                                 | Greek Sample | Chinese Sample |
|----------------------------------------------------------------------|--------------|----------------|
| Mean (SD)                                                             | 1–2          | 3              | 4–5           | 1–2          | 3              | 4–5           |
| (1) I do well in romantic relationships.                             | 3.19 (1.25)  | 28.4           | 30.3          | 41.3          | 3.30 (0.99)   | 19.9          | 38.7          | 41.4          |
| (2) I find romantic relationships difficult.                         | 2.45 (1.32)  | 55.1           | 21.2          | 23.7          | 2.70 (1.15)   | 45.9          | 26.6          | 27.5          |
| (3) Some people are doing well with romantic relationships. They find partners easily and have no difficulty in keeping a romantic relationship. This description characterizes me. | 2.66 (1.28)  | 46.4 (46)      | 26.9 (27)     | 26.8 (26.8)   | 3.10 (1.04)   | 29.3 (30)     | 35.3 (34.2)   | 35.5 (35.9)   |
| (4) I find it easy to start a romantic relationship.                 | 2.89 (1.34)  | 42.4           | 22.7          | 34.9          | 2.82 (1.10)   | 40.7          | 31.4          | 27.9          |
| (5) I find it easy to keep a romantic relationship.                  | 3.13 (1.24)  | 31.2 (31.3)    | 29.3 (29.3)   | 39.6 (39.4)   | 3.02 (1.04)   | 31.5 (30)     | 35.6 (34.2)   | 32.9 (35.9)   |

*Note.* The numbers above reflect the percentages of participants’ answers in each question of the instrument which employed the scale, 1 = strongly disagree, 5 = strongly agree. The percentages that indicate poor mating performance are in bold. In addition, the numbers in the parenthesis are the percentages of all participants’ responses except the ones who indicated that they have never being in a relationship.
Demographic information was recorded including sex, age, and marital status. In order to measure marital status, the following options were given: “Single (I am not in relationship and I have never married),” “Single (I am not in relationship and in the past I was married but I have separated),” “Single (I am not in relationship and in the past I was married but my spouse has died),” “In a relationship,” and “Married.” As part of the demographics of the study, if participants were single, they were asked to indicate the reason why. Three options were given, namely, “I find it difficult to attract a mate,” “I am between relationships,” and “I prefer to be single.” The order of presentation of the three options was randomized across participants. Participants were also asked to indicate how long they had been single in the following scale: “less than a year,” “1–3 years,” “more than 3 years,” and “I have never been in a relationship.”

Results

Occurrence

Initially, we attempted to estimate the rates of poor mating performance by calculating the frequencies of participants’ answers to the mating performance instrument. From Table 1, we can see that more than one in five participants indicated that they found intimate relationships difficult, while more than 40% indicated that they found it difficult to start a relationship and more than 30% to keep a relationship. We calculated further that, 20.3% of the participants indicated low performance only in starting, and 9.2% only in keeping a relationship, while 22.2% indicated low performance in both domains. Accordingly, 51.6% of the participants indicated difficulties in at least one domain of mating performance.

Furthermore, 6% of the participants indicated that they have never been in an intimate relationship. Thus, the questions about how difficult it was to keep a relationship were less relevant to these participants. In order to control for this bias, for these two questions related to keeping a relationship, in Table 1, we have also estimated in parenthesis the frequency of responses of all the participants except for those who indicated that they had never been in a relationship. We can see that the scores were very similar with the scores of the entire sample and statistical analysis using the $t$ test indicated no significant differences. Accordingly, for the remaining of the analysis, all participants’ responses were included in estimating total mating performance.

We moved on to estimate the occurrence of the different types of singlehood in the sample by estimating the percentages in each category. From Figure 1, we can see that more than half of the participants were single. The largest category of singles were those who preferred to be in a relationship but faced difficulties in doing so, followed by those who were between relationships and those who preferred to be single. Among singles, 46.9% indicated that they faced difficulties in attracting a partner, 32.3% indicated that they were between relationships, and 20.8% indicated that they preferred to be single.

The marital status percentages were expected to change with age. Accordingly, the sample was divided in four age categories, and the respective percentages were calculated for each category. We can see from Table 2 that, as participants became older, there was a sharp increase in those who were married and a sharp decrease in those who were in a relationship, suggesting that many intimate relationships in younger age turned into marriages in later age. There was also a limited decrease in the percentage of people who preferred to be single. Finally, the percentage of those who were involuntary single remained relatively stable across the different age groups.

Turning to the length of singlehood, from Table 3, we can see about 38% of the participants were single for less than a year, about 34% were single between 1 and 3 years, and 21.4% for more than 3 years. We also examined these rates across different age groups. From Table 3, we can see that, although there were variations, the rates were not particularly affected by age. Finally, we estimated the same percentages separately for
the group of participants who were involuntarily single. As we can see from Table 3, it appears that the percentages for the “1–3 years” and for the “more than 3 years” were higher than for the involuntary single group.

**Significant Effects**

We attempted first to estimate whether mating performance predicted marital status. For this purpose, we ran multinomial logistic regression, where the marital status was entered as the dependent variable, and the mating performance, the age, and the sex were entered as the independent variables. The results indicated a significant effect of mating performance, $\chi^2(4, N = 766) = 81.10, p < .001$. The Wald statistic and the odds ratio ($OR$) indicated that one-unit increase in the mating performance increased the probability to be in the “single-between relationships” category than in the “single-difficult to attract a partner” category by 80%. In addition, one-unit increase in the mating performance increased the probability to be in the “in a relationship” category than in the “single-difficult to attract a partner” category by 126%. Finally, one-unit increase in the mating performance increased the probability to be in the “married” category than in the “single-difficult to attract a partner” category by 122%. The sex was also significant, $\chi^2(4, N = 766) = 39.17, p < .001$. The Wald statistic and the $OR$ indicated that men were less likely than women to be married ($OR = .28$) and in a relationship ($OR = .61$) than single because they faced difficulties in attracting a partner. In addition, the age variable was significant, $\chi^2(4, N = 766) = 146.50, p < .001$, with $OR$ indicating that as people aged they were more likely to be married ($OR = 1.10$) and less likely to be in a relationship ($OR = 0.97$) than to be single because they faced difficulties in attracting a partner. No significant interactions were produced.

Moving on, we would like to investigate whether the time being single was predicted by mating performance. For this purpose, we ran multinomial logistic regression, where the time being single was entered as the dependent variable, and the mating performance, the type of singlehood, the age, and the sex were entered as the independent variables. The sex and the age were not significant, but there was a significant interaction between the mating performance and the type of singlehood, $\chi^2(9, N = 398) = 104.51, p < .001$. No other significant interactions were produced. To investigate the significant interaction, we ran multinomial logistic regression, where the time being single was entered as the dependent variable, and the mating performance, the age, and the sex were entered as the independent variables. The analysis was performed 3 times, once for each category of singlehood. For the “single-difficult to attract a partner,” mating performance was significant, $\chi^2(6, N = 195) = 18.56, p < .001$. The Wald statistic and the $OR$ indicated that one-unit increase in the mating performance

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**Table 2. Marital Status Across Different Age Groups.**

| Marital Status                        | Greek Sample | Chinese Sample |
|---------------------------------------|--------------|---------------|
|                                       | 18–24  | 25–31 | 32–38 | 39< | 18–24 | 25–31 | 32–38 | 39< |
| Single-difficult to attract a partner | 27     | 28.5  | 25.7  | 23.5 | 26.4  | 15.6  | 3.9   | 0.8 |
| Single-between relationships          | 12.4   | 18.4  | 21.6  | 17.7 | 9.8   | 8.1   | 6.8   | 4.2 |
| Single-prefer to be single            | 13.8   | 10.8  | 8.1   | 7.3  | 35    | 21.5  | 3.9   | 4.2 |
| In a relationship                     | 45.1   | 35.4  | 21.6  | 15.8 | 28.1  | 31.6  | 1.9   | 4.2 |
| Married                               | 0.9    | 7     | 23    | 35.8 | 0.7   | 23.1  | 83.5  | 86.4 |

*Note*. The numbers above are percentages.

**Table 3. Length of Singlehood Across Different Age Groups.**

| Length of Singlehood | Greek Sample | Chinese Sample |
|----------------------|--------------|---------------|
|                      | Total  | 18–24 | 25–31 | 32–38 | 39< | Total | 18–24 | 25–31 |
| All singles          |        |       |       |       |     |       |       |       |
| Never been in a relationship | 6     | 6.8   | 7.8   | 9.9   | 2.4 | 47.7  | 48.8  | 46.4 |
| Less than a year     | 38.3   | 40.7  | 40    | 37    | 34.4 | 16.1  | 16.5  | 16.4 |
| 1–3 Years            | 34.4   | 31.4  | 37.8  | 32.1  | 36   | 18.8  | 17.8  | 20.7 |
| More than 3 years    | 21.3   | 21.2  | 14.4  | 21    | 27.2 | 17.4  | 16.9  | 16.4 |
| Involuntary singles  |        |       |       |       |     |       |       |       |
| Never been in a relationship | 3.7  | 3.3   | 6.8   | 8.1   | 0   | 54    | 54.2  | 56.3 |
| Less than a year     | 24.1   | 32.8  | 25    | 10.8  | 25   | 14    | 14.2  | 12.5 |
| 1–3 Years            | 41.7   | 31.1  | 45.5  | 45.9  | 36.7 | 15.1  | 14.9  | 14.6 |
| More than 3 years    | 30.6   | 29.5  | 22.7  | 35.1  | 38.3 | 16.9  | 16.7  | 16.7 |

*Note*. The numbers above are percentages.
decreased the probability to be in the “more than 3 years” category than in the “less than a year” category by 53%. For the “prefer to be single” and for the “single-between relationships” categories, no significant effects were produced. Accordingly, the mating performance predicted the length of singlehood only for the involuntary single group.

Moving on, we would like to examine whether those who were involuntarily single experienced longer spells of singlehood than the other categories of singles. Accordingly, we ran multinomial logistic regression, where the time being single was entered as the dependent variable and the singlehood variable (involuntary single/remaining singles), and the sex were entered as the independent variables. Age was also entered as a covariate. The sex and the age were not significant, but there was a significant main effect of the singlehood variable, $\chi^2(3, N = 409) = 46.74, p < .001$. The Wald statistic and the OR indicated that those who were involuntarily single were 2.76 times more likely than the other singles to be in the “1–3 years” than in the “less than a year” category. Similarly, involuntarily singles were 6.08 times more likely than the other singles to be in the “more than 3 years” than in the in the “less than a year” category. No significant interactions were produced.

Finally, we would like to investigate whether participants who indicated that they preferred to be single had similar mating performance with participants who indicated that they were single because they faced difficulties in attracting a partner. For this purpose, we applied a $t$ test to the mean differences of mating performance between the two groups. The result was not significant.

**Study 2**

**Method**

**Participants**

Participants completed an online survey. The survey link was forwarded to university students and employees in different academic disciplines who were also asked to forward the link of the study to their friends and relatives. Participation was on a volunteer basis. Overall, 2,041 Chinese people (1,165 women, 876 men) took part. The mean age of women was 23.51 ($SD = 6.27$, range = 42), and the mean age of men was 24.56 ($SD = 7.28$, range = 40).

**Materials.** The survey was in Chinese and was constructed using the software “sojump,” which is a widely used tool in China for collecting data online. In order to ensure consistency, the items of the instrument were translated in Chinese and back-translated in English. The study was part of a larger study on intimate relationships. The survey instruments were the same as the ones employed in Study 1.

**Results**

**Occurrence**

Initially, we attempted to estimate the rates of poor mating performance by calculating the frequencies of participants’ answers to the mating performance instrument. From Table 1, we can see that more than one in four participants indicated that they had never been in an intimate relationship (see below). Thus, as in Study 1, for the two questions related to keeping a relationship, we have also estimated in parenthesis the frequency of responses of all the participants except for those who indicated that they had never been in a relationship. The scores were very similar with the scores of the entire sample, and statistical analysis using the $t$ test indicated no significant differences. Thus, for the remaining of the analysis, all participants’ responses would be included in estimating total mating performance.

We moved on to estimate the occurrence of the different types of singlehood, by estimating the percentages in each category. From Figure 1, we can see that more than 60% of the participants in the sample were single. The category with most participants was the one with those who preferred to be single, followed by those who preferred to be in a relationship, but they faced difficulties in doing so, and by those who were between relationships. In more detail, among the singles, 48.9% indicated that they preferred to be single, 36.2% indicated that they faced difficulties in attracting a partner, and 14.8% indicated that they were between relationships. As we can see from Table 2, this hierarchy was roughly consistent for the two younger age categories, but there was a considerable change in the older categories, where the majority of participants were married.

With respect to the length of singlehood, from Table 3, we can see that almost half of the singles had never been in a relationship, while the remaining singles were roughly equally divided between the three periods. Participants who were older than 31 tended to be married, but our sample was included predominantly participants of younger age. Consequently, there were very few single participants in the two older age groups for meaningful conclusions to be made; thus, the percentages in these age groups were not calculated.

**Significant Effects**

In order to estimate whether mating performance predicted marital status, we ran multinomial logistic regression, where marital status was entered as the dependent variable, and the
mating performance, the age, and the sex were entered as the independent variables. The results indicated a significant effect of mating performance, $\chi^2(4, N = 2,025) = 160.71$, $p < .001$. The Wald statistic and the OR indicated further that one-unit increase in the mating performance increased the probability to be in the “single-between-relationships” category than in the “single-difficult to attract a partner” category by 157%. Moreover, one-unit increase in the mating performance increased the probability to be in the “single-preferred to be single” category than in the “single-difficult to attract a partner” category by 34%. In addition, one-unit increase in the mating performance increased the probability to be in the “in a relationship” category than in the “single-difficult to attract a partner” category by 160%. Finally, one-unit increase in the mating performance increased the probability to be in the “married” category than in the “single-difficult to attract a partner” category by 217%.

The sex was also significant, $\chi^2(4, N = 2,025) = 17.15$, $p = .002$. The Wald statistic and the OR indicated that men were more likely than women to be in the “in single-between-relationships” ($OR = 1.45$) and less likely to be in the “single-prefer to be single category” ($OR = 0.76$) than in the “single-difficult to attract a partner” category. The age was also significant, $\chi^2(4, N = 2,025) = 919.33$, $p < .001$, with the OR indicating that as people aged, they were more likely to be “single-between-relationships” ($OR = 1.15$), “in a relationship” ($OR = 1.11$) and “married” ($OR = 1.52$) than in the “single-difficult to attract a partner” category. No significant interactions were produced.

Moving on, we would like to investigate whether the time being single was predicted by mating performance. For this purpose, we ran multinomial logistic regression, where the time being single was entered as the dependent variable, and the mating performance, the type of singlehood, the age, and the sex were entered as the independent variables. The sex was not significant, but there was a significant main effect of age, $\chi^2(3, N = 1,232) = 54.49$, $p < .001$, with the ORs indicating that older individuals were more likely to be in the “less than a year” ($OR = 1.41$), “1–3 years” ($OR = 1.14$), and in the “more than 3 years” ($OR = 1.15$) than in the “never been in a relationship” category. No significant interactions were produced.

First, we would like to investigate whether there were cultural differences in mating performance. For this purpose, we ran an analysis of covariance, where the mating performance was entered as the dependent variable, and the sample was entered as the independent variable. In order to control for possible confounding effects, we have also entered the age and the sex as independent variables. The results indicated that the sample was not significant, suggesting that there were no differences in mating performance between the Chinese and the Greek participants.

Furthermore, we would like to examine whether there were significant cultural differences across the various types of singlehood. Accordingly, we ran multinomial logistic regression, where the type of singlehood was entered as the dependent variable and the sample was entered as the independent variable. As above, in order to control for possible confounding effects, we have also entered the age and the sex as independent variables. The sample was significant, $\chi^2(2, N = 1,648) = 58.97$, $p < .001$. The Wald statistic and the OR indicated that Greek participants were 3.29 times more likely to be in the “single-difficult to attract a partner” and 3.61 times more likely than the Chinese to be in the “single-between-relationships” than in the “single-prefer to be single” category.

In addition, we would like to examine whether there were significant cultural differences in the length of time people spent being single. Accordingly, we ran multinomial logistic regression, where the length of singlehood was entered as the dependent variable, and the sample, the sex, and the age were entered as the independent variables. The sample was significant, $\chi^2(3, N = 1,643) = 132.26$, $p < .001$. The Wald statistic
and the OR indicated that Greek participants were 11.71 times more likely to be in the “less than a year,” 7.09 times more likely to be in the “1–3 years,” and 4.14 time more likely to be in the “more than 3 years” category than in the “never been in a relationship” category in relation to the Chinese. No significant interactions were found.

Discussion

Our results indicated that in both Chinese and Greek samples, a considerable proportion of participants experienced low mating performance, which was associated with increased incidence of prolonged spells of singlehood. In particular, in both Chinese and Greek samples, about half of the participants experienced difficulties in intimate relationships. Furthermore, more than half of the participants in each sample were single, with nearly one in four indicating that they were so because they faced difficulties in attracting a partner. In addition, more than one in five singles in the Greek sample were without a partner for more than 3 years, and almost half of the singles in the Chinese sample had never been in a relationship. Mating performance predicted marital status, with low scorers being more likely to be single because they faced difficulties in attracting a partner than high scorers. Mating performance predicted also the length of singlehood, with lower scores spending more time being single than higher scores. Moreover, involuntarily singles experienced lengthier spells of singlehood than other categories of singles. Finally, there were considerably more participants who preferred to be single and who were never in a relationship in the Chinese than in the Greek sample.

Our findings are consistent with the hypothesis that the mismatch between ancestral and modern conditions would impair mating performance, which in turn could result in a considerable proportion of people being involuntarily single and experience lengthy spells of singlehood. It was also found that several participants indicated that they preferred to be single. This finding could be potentially explained by the hypothesis that it is profitable for people to stay single for some time in order to focus on building their strengths and on developing their career, and return to the mating market at a later time, when they would have better chances of success (Apostolou, 2017b). This argument applies to younger individuals, as they are the ones who still need to develop their strengths, which can explain why the “preferred to be single” group was much more numerous in the Chinese sample, which was younger in age than the Greek sample.

Still, the difference between the samples persisted even when the age was controlled for, suggesting that there were additional cultural factors contributing to it. One such factor is that in China, teachers (Qian, 2017) and parents (Dai, 2018) are disapproving of adolescents’ romantic relationship before the children entered the university which is called “ZAO LIAN (早恋, love at an early age).” Growing up under this background, many young people, especially those who have been single until graduating from high school, would hold the view that it is fine to wait for the emerge of romance naturally without any purposeful efforts.

Furthermore, we found that those who classified themselves as single because they faced difficulties in attracting a partner had similarly low mating performance than those who indicated that they preferred to be single. In particular, in the Greek sample, there was no significant difference between the two categories, while in the Chinese sample the difference was significant but small as indicated by the effect size. These findings raise the possibility that a considerable proportion of those who indicated that they preferred to be single were actually single because they faced difficulties in attracting a partner. One of the reasons why could be the workings of some defense mechanisms which protect people’s self-esteem by making them believe that it was not was not their inability to attract a partner but their choice to be single. Another, not mutually exclusive possibility, is that people who experienced poor mating performance experienced also repeated and emotionally painful relationship failures, which made them to prefer to be single in order to avoid such unpleasant experiences in the future.

Most evolutionary and personal relationships research focuses on intimate relationships (Buss, 2017; Miller, 2000). The high prevalence of singlehood demands a shift in this focus, with much more research to be allocated in studying its underlying causes. Such research may have practical implications. For instance, involuntary singlehood is expected to be associated with negative emotions, such as loneliness (Beckmeyer & Cromwell, 2018), so research that would enable the development of interventions that could help people to overcome the obstacles that keep them single could improve people’s emotional well-being. Furthermore, the high rates of singlehood may have demographic consequences. In particular, poor mating performance may result in prolonged spells of singlehood, delaying considerably people’s success in establishing an intimate relationship. Thus, people may start a family when they have few reproductive years ahead of them, resulting in having few or no children.

As discussed above, apart from the mismatch problem, people stay single in order to build their strengths and develop their careers. Postindustrial societies are technology oriented, which demands that individuals spend considerable time in education prior to being able to participate effectively in the labor market. Accordingly, it would pay for people to postpone entering in relationships or getting married and start a family before they have finished their education and have established themselves professionally. However, such a considerable delay in starting a family is evolutionary novel; in the contemporary preindustrial context and most probably in the ancestral one, individuals, and especially women, marry and start a family soon after they reach sexual maturity. This difference causes an evolutionary mismatch problem: The reproductive system has been shaped by selection forces to work optimally in an age range optimal for the ancestral conditions. Modern conditions result in several individuals trying to reproduce outside this range, with their reproductive system not being able to work
well. Overall, involuntary singlehood caused by the mismatch problem may result in low fertility, but voluntary singlehood may also result in low fertility due to the mismatch problem.

One limitation of the current research is that it was based on nonprobability samples, so our findings cannot be readily generalized to the population. In addition, the Chinese sample involved predominantly young adults, so the occurrence of marital status in older generations could not be properly estimated. Furthermore, our data were based on self-report measures and are thus subject to several biases. For instance, people may not have an accurate perception of their mating performance. Related to this limitation, we did not measure objective mating performance but participants’ perceptions about their difficulties in this area. In addition, our design was correlational and not experimental, so causality between mating performance and marital status was inferred and not proved. Moreover, some of the participants who indicated that they were not good in intimate relationships may have done so because they were not interested in forming intimate relationships, and not because they were not good in doing so.

Also, our theoretical framework focused on the ultimate reasons behind poor mating performance and singlehood, but more research is required in order to identify the proximate causes (see Pepping & MacDonald, 2018; Pepping, MacDonald, & Davis, 2018). Furthermore, we have interpreted our findings on the basis of the mismatch problem and the potential fitness benefits of not having an intimate partner. Yet, the phenomenon of singlehood is complex, which means that there may be additional factors at play, requiring different theoretical frameworks in order to be understood. In turn, more theoretical work is necessary if the ultimate causes of singlehood are to be understood. Last but not least, the current study indicated that cultural factors may have substantial effects on the rates of singlehood, so our findings cannot be generalized to other cultural contexts.

Despite the different limitations, the present data make a strong case that a considerable proportion of adult population in the postindustrial context experiences poor performance in the domain of mating and is involuntarily single. In addition, for many people, singlehood is not temporary, but long-lasting. Much more research is necessary, however, in order to examine the prevalence of singlehood and better understand its causes.

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