**Supplementary Material**

***Bootstrapping Procedure***

We therefore used smoothed-cases bootstrapping to generate standard errors and confidence intervals for the model coefficients from models investigating the average cost of parasitism [1-4]. Smoothing was done to improve the coverage of confidence intervals, which may be negatively biased for bootstraps with small sample sizes [4]. We used the boot package for R 4.0 to generate 10,000 bootstrap samples of the associated dataset [2]. For each data point in each bootstrap sample, we added a simulated random deviate from the standard gaussian kernel (mean = 0, variance = 1) multiplied by the smoothing bandwidth *h* [1,5]*.* We estimated *h* using Silverman’s rule of thumb, with the inter quartile range as our measure of scale [5]. Each bootstrap sample was run through its associated meta-analytic model to create the bootstrap distributions of model coefficients. We generated bias-corrected and accelerated bootstrap confidence intervals for each coefficient using the boot package in R 4.0 [2].

***References***

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3. DiCiccio TJ, Efron B. 1996 Bootstrap Confidence Intervals. *Stat. sci.* 11. 189-228.

4. Davison AC, Hinkley DV. 1997 *Bootstrap Methods and Their Applications*. Cambridge: Cambridge University Press.

5. Silverman B.W. 1986. *Density estimation for statistics and data analysis*. New York: Chapman and Hall.

***Supplementary Tables***

**Table S1.** Full dataset (*k* = 85 observations from 64 species) used to quantify the overall survival cost of parasitism, its sex difference, and test the effect of mating system on both. *Study* is the publication from which the log odds ratio was extracted. Full references are given in the reference list below (pages 15-22). *Species* gives the species that the information in the respective row is for. *Mating System* describes the mating system of the associated species (Promiscuous, Polygynous, and Monogamous). *% EPP* is the percentage of clutches exhibiting extra-pair paternity in “socially monogamous” bird species. *Reference for Mating System* lists the publication from which the mating system for a species was characterized, the full references are given below (pages 23-26). *Taxon* describes the broad taxonomic group of the species (Arthropod, Bird, Fish, or Mammal). *Age* describes the life stage of the individuals the associated data are from, *Juvenile* = pre-reproductive life stage, *Adult* = reproductive life stage. *Parasite type* gives the broad grouping of the parasite/parasites associated with a data set: *Bacteria* = micro-parasites within the domain Bacteria, *Fungi* = micro-parasites within the kingdom Fungi, *Ectoparasite* = external macro-parasites which include organisms belonging to Arthropoda and Monogenea, *Helminth* = internal macro-parasites which include organisms belonging to Nematoda, Cestoda, Trematoda, and Acanthocephala, *Protist* = micro-parasites within the phylum Apicomplexa, and *Virus* = viral micro-parasites. *Method* describes the methodology used in the associated study: *Exp.Inf* = experimental infections with the parasite, *Exp.Rem* = experimental removal of the parasite, *Nat.Var* = natural variation in parasite level. *LO M* is the log odds ratio of the survival cost of parasitism for males, *LO F* = the log odds ratio of the survival cost of parasitism for females, *Ave LO* = the weighted average log odds ratio of the survival cost of parasitism for males and females, *Diff (M-F)* = the difference in the log odds ratio of the survival cost of parasitism betetween males and females, *Diff var* = the sampling variance of the difference in the log odds ratio, *Ave Var* = the sampling variance of the average log odds ratio, *M Var* = the sampling variance of the male log odds ratio, *F Var* = the sampling variance of the female log odds ratio.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Study | Species | Mating System | Reference for mating system | Taxon | Age | Parasite type | Method | LO M | LO F | Ave LO | Diff  | Diff  | Ave  | M  | F |
| (M-F) | var | Var | Var | Var |
| Gray 1998 | *Acheta domesticus* | Promiscuous | Gray 1998 | Arthropod | Adult | Bacteria | Exp.Inf | 2.25 | 1.74 | 2.1 | 0.51 | 0.536 | 0.17 | 0.24 | 0.58 |
| Asghar 2015 | *Acrocephalus arundinaceus* | Monogamous | Griffith 2002 | Aves | Adult | Protist | Nat.Var | 0.71 | 1.17 | 1.02 | -0.46 | 0.672 | 0.23 | 0.71 | 0.33 |
| Webberley 2002 | *Adalia bipunctata* | Promiscuous | Haddrill 2008 | Arthropod | Adult | Ectoparasite | Nat.Var | 2.3 | 1.29 | 1.78 | 1.01 | 1.11 | 0.45 | 0.92 | 0.87 |
| Webberley 2002 | *Adalia bipunctata* | Promiscuous | Haddrill 2008 | Arthropod | Adult | Ectoparasite | Exp.Inf | 2.62 | 1.03 | 1.41 | 1.59 | 1.174 | 0.32 | 1.32 | 0.42 |
| Bedhomme 2004 | *Aedes aegypti* | Polygynous | Richardson 2015 | Arthropod | Adult | Fungi | Exp.Inf | 0.35 | 0.04 | 0.2 | 0.31 | 0.05 | 0.02 | 0.04 | 0.04 |
| Rau 1991 | *Aedes provocans* | Polygynous | Yuval 2006 | Arthropod | Adult | Helminth | Exp.Inf | 1.02 | -0.1 | 0.46 | 1.12 | 0.087 | 0.04 | 0.07 | 0.07 |
| Souchay 2013 | *Anser caerulescens* | Monogamous | Griffith 2002 | Aves | Juvenile | Helminth | Exp.Rem | 0.04 | 0.27 | 0.16 | -0.23 | 0.012 | 0.001 | 0.01 | 0.01 |
| Jhan-Wei 2014 | *Apodemus semotus* | Promiscuous | Shaner 2018 | Mammal | Adult | Ectoparasite | Nat.Var | 1.1 | 1.49 | 1.23 | -0.39 | 0.354 | 0.12 | 0.18 | 0.37 |
| Lo 2015 | *Apodemus semotus* | Promiscuous | Shaner 2018 | Mammal | Adult | Helminth | Exp.Rem | -0.26 | -0.69 | -0.39 | 0.43 | 0.261 | 0.08 | 0.12 | 0.28 |
| Córdoba-Aguilar 2013 | *Argia anceps* | Promiscuous | Caesar 2012 | Arthropod | Adult | Protist | Exp.Inf | 1.65 | 1.87 | 1.76 | -0.22 | 0.149 | 0.06 | 0.12 | 0.12 |
| Córdoba-Aguilar 2013 | *Argia extranea* | Promiscuous | Caesar 2012 | Arthropod | Adult | Protist | Exp.Inf | 2 | 1.66 | 1.83 | 0.34 | 0.149 | 0.06 | 0.12 | 0.12 |
| Benesh 2007 | *Asellus aquaticus* | Polygynous | Jormalainen 1998 | Arthropod | Adult | Helminth | Exp.Inf | 1.74 | 0.85 | 1.28 | 0.89 | 0.104 | 0.06 | 0.12 | 0.01 |
| Lanciani 1982 | *Buenoa scimitra* | Promiscuous | Rowe 1994 | Arthropod | Adult | Ectoparasite | Exp.Inf | 1.01 | 1.89 | 1.33 | -0.88 | 0.407 | 0.15 | 0.23 | 0.41 |
| Morton 2009 | *Capnodis tenebrionis* | Promiscuous | Bonsignore 2014 | Arthropod | Adult | Helminth | Exp.Inf | 3.26 | 1.18 | 1.74 | 2.08 | 0.954 | 0.28 | 1.05 | 0.39 |
| Morton 2013 | *Capnodis tenebrionis* | Promiscuous | Bonsignore 2014 | Arthropod | Adult | Helminth | Exp.Inf | 6.89 | 3.35 | 4.35 | 3.54 | 1.413 | 0.44 | 1.54 | 0.61 |
| Weiberg 1997 | *Chironomus tentans* | Polygynous | Eberhard 2004 | Arthropod | Adult | Ecotoparasite | Exp.Inf | 0.65 | 0.19 | 0.41 | 0.46 | 0.143 | 0.06 | 0.12 | 0.11 |
| Braune 2001 | *Coenagrion puella* | Promiscuous | Thompson 2011 | Arthropod | Adult | Ecotoparasite | Exp.Rem | 0.02 | 0.08 | 0.05 | -0.06 | 0.106 | 0.04 | 0.09 | 0.08 |
| Joop 2006 | *Coenagrion puella* | Promiscuous | Thompson 2011 | Arthropod | Adult | Fungi | Exp.Inf | 0.79 | 0.37 | 0.58 | 0.42 | 0.087 | 0.04 | 0.07 | 0.07 |
| Marescot 2018 | *Crocuta crocuta* | Promiscuous | East 2003 | Mammal | Juvenile | Virus | Nat.Var | 1.21 | 1.21 | 1.21 | 0 | 0.267 | 0.11 | 0.21 | 0.22 |
| Marescot 2018 | *Crocuta crocuta* | Promiscuous | East 2003 | Mammal | Adult | Virus | Nat.Var | 1.23 | 1.99 | 1.44 | -0.76 | 0.988 | 0.3 | 0.42 | 1.08 |
| Podmokla 2016 | *Cyanistes caeruleus* | Monogamous | Griffith 2002 | Aves | Adult | Protist | Nat.Var | 0.15 | 0.21 | 0.18 | -0.05 | 0.112 | 0.04 | 0.08 | 0.1 |
| de Roode 2006 | *Danaus plexippus* | Promiscuous | Svard 1988 | Arthropod | Adult | Protist | Exp.Inf | 4.27 | 4.15 | 4.21 | 0.12 | 0.155 | 0.06 | 0.12 | 0.13 |
| Lindsey 2009  | *Danaus plexippus* | Promiscuous | Svard 1988 | Arthropod | Adult | Protist | Exp.Inf | 5.11 | 4.45 | 4.8 | 0.66 | 0.794 | 0.32 | 0.61 | 0.67 |
| Magallanes 2017 | *Delichon urbicum* | Polygynous | Griffith 2002 | Aves | Adult | Protist | Nat.Var | 0.79 | 0.25 | 0.5 | 0.54 | 0.528 | 0.21 | 0.45 | 0.4 |
| Leonard 1999 | *Enallagma ebrium* | Promiscuous | Fincke 1982 | Arthropod | Adult | Ectoparasite | Exp.Inf | 0.76 | 0.48 | 0.59 | 0.28 | 0.253 | 0.09 | 0.25 | 0.15 |
| Leonard 1999 | *Enallagma ebrium* | Promiscuous | Forbes 1991 | Arthropod | Juvenile | Ecotoparasite | Exp.Inf | 0.97 | 0.45 | 0.73 | 0.52 | 0.211 | 0.08 | 0.16 | 0.18 |
| Bergallo 2000 | *Euryoryzomys russatus* | Monogamous | Bergallo 2004 | Mammal | Adult | Ectoparasite | Nat.Var | -0.05 | 1.31 | 0.63 | -1.36 | 0.149 | 0.06 | 0.12 | 0.12 |
| Kulma 2013 | *Ficedula albicollis* | Polygynous | Griffith 2002 | Aves | Adult | Protist | Nat.Var | -0.39 | -0.35 | -0.37 | -0.04 | 0.068 | 0.03 | 0.06 | 0.05 |
| Kulma 2013 | *Ficedula hypoleuca* | Monogamous | Griffith 2002 | Aves | Adult | Protist | Nat.Var | 0.48 | 0.87 | 0.7 | -0.39 | 0.131 | 0.05 | 0.12 | 0.09 |
| Arcila 2020 | *Forficula auricularia* | Promiscuous | Sandrin 2015 | Arthropod | Adult | Fungi | Exp.Inf | 1.74 | 2.3 | 1.89 | -0.56 | 0.578 | 0.17 | 0.23 | 0.64 |
| Arundell 2019 | *Gammarus zaddachi* | Polygynous | Jormalainen 1998 | Arthropod | Adult | Helminth | Nat.Var | 0.65 | 0.41 | 0.5 | 0.24 | 0.183 | 0.07 | 0.18 | 0.11 |
| Granroth-Wilding 2015 | *Gulosus aristotelis* | Monogamous | Griffith 2002 | Aves | Adult | Helminth | Exp.Rem | -1.51 | 0.03 | -0.43 | -1.54 | 1.223 | 0.4 | 1.31 | 0.57 |
| Gegner 2018 | *Harmonia axyridis* | Promiscuous | Awad 2015 | Arthropod | Adult | Bacteria | Exp.Inf | 3.61 | 4.27 | 3.93 | -0.66 | 0.36 | 1.06 | 0.28 | 0.3 |
| Riddick 2010 | *Harmonia axyridis* | Promiscuous | Awad 2015 | Arthropod | Adult | Fungi | Nat.Var | 1.98 | 0.39 | 1.23 | 1.6 | 1.843 | 0.74 | 1.4 | 1.57 |
| Atkinson 2000 | *Hemignathus virens* | Monogamous | Ripper 1987 | Aves | Adult | Protist | Exp.Inf | 2.08 | 2.23 | 2.16 | -0.15 | 1.978 | 0.79 | 1.75 | 1.43 |
| Córdoba-Aguilar 2013 | *Hetaerina americana* | Polygynous | Córdoba-Aguilar 2011 | Arthropod | Adult | Protist | Exp.Inf | 1.94 | 1.02 | 1.45 | 0.92 | 0.143 | 0.06 | 0.12 | 0.11 |
| Duclos 2006 | *Hyalella azteca* | Polygynous | Wen 1993 | Arthropod | Adult | Helminth | Exp.Inf | 0.55 | 0.68 | 0.62 | -0.13 | 0.186 | 0.08 | 0.15 | 0.15 |
| Kokkotis 2005 | *Hyalella azteca* | Polygynous | Wen 1993 | Arthropod | Adult | Helminth | Exp.Inf | 1.46 | 1.05 | 1.26 | 0.41 | 0.124 | 0.05 | 0.1 | 0.1 |
| Samish 2000 | *Hyalomma excavatum* | Promiscuous | Cutulle 2010 | Arthropod | Adult | Helminth | Exp.Inf | 3.45 | 1.62 | 1.97 | 1.83 | 0.902 | 0.2 | 1.04 | 0.25 |
| Bustnes 2006 | *Larus hyperboreus* | Monogamous | Brouwer 2019 | Aves | Adult | Helminth | Exp.Rem | -0.53 | 0.26 | -0.12 | -0.8 | 0.323 | 0.13 | 0.27 | 0.25 |
| Gagnon 2018 | *Listronotus oregonensis* | Unknown |   | Arthropod | Adult | Helminth | Exp.Inf | 0.78 | 0.79 | 0.78 | -0.01 | 0.236 | 0.1 | 0.18 | 0.2 |
| Musser 2012 | *Lygus lineolaris* | Promiscuous | Brent 2010 | Arthropod | Adult | Fungi | Exp.Rem | 1.52 | 1.22 | 1.37 | 0.3 | 0.353 | 0.14 | 0.29 | 0.28 |
| Martinez-Sanchez 2007 | *Meccus pallidipennis* | Promiscuous | Vitta 2009 | Arthropod | Adult | Ectoparasite | Exp.Inf | 1.07 | 1.16 | 1.12 | -0.09 | 0.136 | 0.06 | 0.11 | 0.11 |
| Schrader 2003 | *Melanerpes carolinus* | Monogamous | Griffith 2002 | Aves | Adult | Protist | Nat.Var | 0.87 | -0.11 | 0.34 | 0.98 | 1.274 | 0.51 | 1.11 | 0.94 |
| McDonald 2014 | *Meles meles* | Promiscuous | Dugdale 2007 | Mammal | Adult | Bacteria | Nat.Var | 1.18 | 0.95 | 1.07 | 0.23 | 0.081 | 0.03 | 0.06 | 0.07 |
| Wilkinson 1999 | *Meles meles* | Promiscuous | Dugdale 2007 | Mammal | Adult | Bacteria | Nat.Var | 1.56 | 0.06 | 0.73 | 1.5 | 0.168 | 0.07 | 0.15 | 0.12 |
| Boonstra 1980 | *Microtus townsendii* | Monogamous | Lambin 1991 | Mammal | Adult | Ectoparasite | Nat.Var | 0.29 | 0.42 | 0.36 | -0.13 | 0.004 | 0.002 | 0.003 | 0.003 |
| Boonstra 1980 | *Microtus townsendii* | Monogamous | Lambin 1991 | Mammal | Juvenile | Ectoparasite | Nat.Var | 0.15 | 0.2 | 0.17 | -0.05 | 0.024 | 0.01 | 0.02 | 0.018 |
| Steen 2002 | *Microtus townsendii* | Monogamous | Wolff 2007 | Mammal | Adult | Ectoparasite | Exp.Rem | 0.42 | 0.59 | 0.51 | -0.17 | 0.472 | 0.19 | 0.41 | 0.35 |
| Arimoto 2012 | *Musca autumnalis* | Polygynous | Mansour 1987 | Arthropod | Adult | Helminth | Nat.Var | 1.05 | 0.7 | 0.87 | 0.35 | 0.106 | 0.04 | 0.09 | 0.08 |
| Lemaitre 2009 | *Myodes gapperi* | Polygynous | Tisell 2019 | Mammal | Adult | Ectoparasite | Nat.Var | 1.96 | 0.95 | 1.41 | 1.01 | 0.28 | 0.11 | 0.25 | 0.2 |
| Cayol 2018 | *Myodes glareolus* | Polygynous | Garcia-Navas 2015 | Mammal | Adult | Bacteria | Exp.Inf | 0 | 0 | 0 | 0 | 0.323 | 0.13 | 0.24 | 0.28 |
| Kallio 2007 | *Myodes glareolus* | Polygynous | Garcia-Navas 2015 | Mammal | Adult | Virus | Nat.Var | 0.95 | 1.58 | 1.34 | -0.63 | 0.385 | 0.14 | 0.38 | 0.23 |
| Miller 2018 | *Nicrophorus vespilloides* | Promiscuous | Scott 1998 | Arthropod | Adult | Bacteria | Exp.Inf | 5.64 | 3.97 | 4.54 | 1.67 | 1.164 | 0.41 | 1.2 | 0.62 |
| Botto-Mahan 2012 | *Octodon degus* | Promiscuous | Ebensperger 2019 | Mammal | Adult | Protist | Nat.Var | -0.07 | 0.5 | 0.25 | -0.57 | 0.673 | 0.27 | 0.61 | 0.47 |
| Currie 2007 | *Oncorhynchus mykiss* | Promiscuous | Seamons 2004 | Fish | Adult | Protist | Exp.Inf | 0.09 | 2.34 | 1.47 | -2.26 | 2.284 | 0.86 | 2.21 | 1.42 |
| Craig 2009 | *Ovis aries* | Promiscuous | Soulsbur 2010 | Mammal | Adult | Helminth | Exp.Rem | 0.4 | 0.18 | 0.28 | 0.22 | 0.838 | 0.34 | 0.71 | 0.64 |
| Gulland 1992 | *Ovis aries* | Promiscuous | Soulsbur 2010 | Mammal | Adult | Helminth | Exp.Rem | 0.47 | 1.79 | 1.36 | -1.32 | 1.861 | 0.63 | 1.95 | 0.94 |
| Gulland 1992 | *Ovis aries* | Promiscuous | Soulsbur 2010 | Mammal | Juvenile | Helminth | Exp.Rem | 2.17 | 1.28 | 1.04 | 1.84 | 1.043 | 0.35 | 0.9 | 0.78 |
| Gulland 1993 | *Ovis aries* | Promiscuous | Soulsbur 2010 | Mammal | Juvenile | Helminth | Exp.Rem | 2.66 | 0.33 | 1.8 | 1.38 | 1.201 | 0.48 | 1.28 | 0.57 |
| Lachish 2012 | *Parus major* | Monogamous | Griffith 2002 | Aves | Adult | Virus | Nat.Var | 1.05 | 1.38 | 1.23 | -0.33 | 0.279 | 0.11 | 0.24 | 0.21 |
| Morton 2013 | *Periplaneta americana* | Polygynous | Bell 2007 | Arthropod | Adult | Helminth | Exp.Inf | 7.61 | 3.8 | 5.14 | 3.81 | 2.006 | 0.72 | 2.04 | 1.11 |
| Vandergrift 2008 | *Peromyscus leucopus* | Promiscuous | Xia 1991 | Mammal | Adult | Helminth | Exp.Rem | 1.5 | 0.81 | 1.1 | 0.69 | 0.831 | 0.32 | 0.77 | 0.56 |
| Fuller 1996 | *Peromyscus maniculatus* | Promiscuous | Xia 1991 | Mammal | Adult | Protist | Exp.Inf | 1.44 | -0.33 | 0.73 | 1.77 | 0.671 | 0.26 | 0.43 | 0.64 |
| Luis 2012 | *Peromyscus maniculatus* | Promiscuous | Xia 1991 | Mammal | Adult | Virus | Nat.Var | 0.34 | -0.09 | 0.06 | 0.43 | 0.128 | 0.05 | 0.13 | 0.07 |
| Wilde 2019 | *Peromyscus maniculatus* | Promiscuous | Xia 1991 | Mammal | Adult | Ectoparasite | Nat.Var | 1.43 | 0.36 | 0.64 | 1.07 | 1.145 | 0.33 | 1.27 | 0.45 |
| Lantova 2011 | *Phlebotomus sergenti* | Polygynous | Yuval 2006 | Arthropod | Adult | Protist | Exp.Inf | 1.43 | 0.75 | 1.07 | 0.68 | 0.41 | 0.17 | 0.35 | 0.31 |
| Chilvers 2009 | *Phocarctos hookeri* | Polygynous | Foote 2018 | Mammal | Juvenile | Helminth | Exp.Rem | 0.86 | 0.74 | 0.83 | 0.12 | 1.455 | 0.44 | 0.62 | 1.59 |
| Dargent 2015 | *Poecilia reticulata* | Promiscuous | Neff 2008 | Fish | Adult | Ectoparasite | Exp.Inf | 3.21 | 2.09 | 2.59 | 1.12 | 1.798 | 0.71 | 1.6 | 1.29 |
| Cordoba-aguilar 2013 | *Protoneura cara* | Promiscuous | Nava Bolanos 2011 | Arthropod | Adult | Protist | Exp.Inf | 2.74 | 1.67 | 2.16 | 1.07 | 0.161 | 0.06 | 0.14 | 0.12 |
| Waite 2012 | *Pseudolynchia canariensis* | Promiscuous | Bonomi 2011 | Arthropod | Adult | Protist | Exp.Inf | 0.39 | 0.79 | 0.57 | -0.4 | 0.1 | 0.04 | 0.07 | 0.09 |
| Samish 2000 | *Rhipicephalus annulatus* | Promiscuous | Cutulle 2010 | Arthropod | Adult | Helminth | Exp.Inf | 3.42 | 4.56 | 3.75 | -1.14 | 1.023 | 0.32 | 0.45 | 1.11 |
| Samish 2000 | *Rhipicephalus bursa* | Promiscuous | Cutulle 2010 | Arthropod | Adult | Helminth | Exp.Inf | 2.33 | 2 | 2.13 | 0.33 | 0.396 | 0.15 | 0.38 | 0.25 |
| Samish 2000 | *Rhipicephalus sanguineus* | Promiscuous | Cutulle 2010 | Arthropod | Adult | Helminth | Exp.Inf | 2.52 | 1.56 | 1.93 | 0.96 | 0.39 | 0.15 | 0.38 | 0.24 |
| Simmons 1994 | *Spodoptera frugiperda* | Promiscuous | Murua 2008 | Arthropod | Adult | Helminth | Exp.Inf | 1.29 | 0.85 | 1 | 0.44 | 0.101 | 0.04 | 0.1 | 0.06 |
| Bize 2005 | *Tachymarptis melba* | Monogamous | Martins 2002 | Aves | Juvenile | Ectoparasite | Exp.Inf | 0.04 | 0.84 | 0.44 | -0.8 | 0.124 | 0.05 | 0.1 | 0.1 |
| Hurd 2001 | *Tenebrio molitor* | Promiscuous | Drnevich 2003 | Arthropod | Adult | Helminth | Exp.Inf | -0.46 | -1.79 | -1.04 | 1.33 | 0.199 | 0.08 | 0.14 | 0.18 |
| Nguyen 2015 | *Theropithecus gelada* | Polygynous | Mitani 1996 | Mammal | Adult | Helminth | Nat.Var | 1.61 | 1.45 | 1.5 | 0.16 | 0.479 | 0.15 | 0.52 | 0.21 |
| Hangartner 2015 | *Tribolium castaneum* | Promiscuous | Pai & Bernasconi 2008  | Arthropod | Adult | Fungi | Exp.Inf | 0.7 | 0.2 | 0.44 | 0.5 | 0.081 | 0.03 | 0.07 | 0.06 |
| Kramarz 2014 | *Tribolium castaneum* | Promiscuous | Pai & Bernasconi 2008  | Arthropod | Adult | Helminth | Exp.Inf | 2.8 | 2.1 | 2.27 | 0.7 | 0.48 | 0.13 | 0.54 | 0.17 |
| Kramarz 2016 | *Tribolium castaneum* | Promiscuous | Pai & Bernasconi 2008  | Arthropod | Adult | Helminth | Exp.Inf | 1.79 | 2.18 | 1.95 | -0.39 | 0.931 | 0.36 | 0.63 | 0.86 |
| Shostak 2015 | *Tribolium castaneum* | Promiscuous | Pai & Bernasconi 2008  | Arthropod | Adult | Helminth | Exp.Inf | 2.1 | 0.94 | 1.42 | 1.15 | 0.106 | 0.29 | 0.1 | 0.07 |
| Atkinson 1995 | *Vestiaria coccinea* | Monogamous | Kuntz 2008 | Aves | Adult | Protist | Exp.Inf | 3.04 | 4.24 | 3.57 | -1.2 | 2.539 | 1.01 | 1.81 | 2.27 |
| Zylberberg 2015 | *Zonotrichia leucophrys* | Polygynous | Poesel 2011 | Aves | Adult | Protist | Nat.Var | 0.06 | -0.64 | -0.18 | 0.69 | 0.09 | 0.03 | 0.05 | 0.09 |
| Rosengaus 2000 | *Zootermopsis angusticollis* | Monogamous | Nalepa & Jones 1991 | Arthropod | Adult | Fungi | Exp.Inf | 0.76 | 1.54 | 1.22 | -0.78 | 0.295 | 0.11 | 0.28 | 0.19 |

**Table S2.** The top ten models by AICc value for the survival cost of parasitism. *Model structure* gives the set of factors included in the meta-analytic model, the value “1” indicates an intercpet, all models also include study and species as random effects. The intercept only model included a correction for phylogenetic signal, details of the phylogenetic correction are given in the Methods section of the main manuscript, this was not done for the other models because there was no evidence of phylogenetic signal for them, Table S7 below. Further, the relative ranking of the models is the same when including a phylogenetic correction for all models. Descriptions of the factors and their levels can be found in the legend of Table S1. *AICc* gives the small sample corrected Akaike information criterion value for the respective model.

|  |  |
| --- | --- |
| **Model structure** | **AICc** |
| ~1 + Method + Age + Mating System | 241.03 |
| ~1 +Method + Age | 241.14 |
| ~1 + Method + Mating System | 241.31 |
| ~1 + Method | 241.37 |
| ~1 + Age + Taxon | 244.05 |
| ~1  | 244.10 |
| ~1 + Taxon | 244.17 |
| ~1 + Age + Mating System | 245.40 |
| ~1 + Method + Taxon | 245.53 |
| ~1 + Method + Age + Taxon | 245.64 |
| ~1 + Age + Mating System + Taxon | 246.07 |

**Table S3.** Moderators for the survival cost of parasitism and their model averaged importance, calculated as the sum of the weights of the models they appear in.

|  |  |
| --- | --- |
| **Moderator** | **Importance** |
| Method | 0.81 |
| Age | 0.53 |
| Mating System | 0.47 |
| Taxon | 0.19 |
| Parasite type | 0.01 |

**Table S4.** The top ten models by AICc value for the sex-difference in the survival cost of parasitism. *Model structure* gives the set of factors included in the meta-analytic model, the term “1” indicates an intercept, all models also include study and species as random effects. *AICc* gives the small sample corrected Akaike information criterion value for the respective model.

|  |  |
| --- | --- |
| **Model structure** | **AICc** |
| ~1 + Mating System  | 187.34 |
| ~1 + Mating System + Age | 189.23 |
| ~1 + Mating System + Method | 191.54 |
| ~1 + Mating System + Method + Age | 193.53 |
| ~1 + Mating System + Taxon | 193.71 |
| ~1 + Mating Sytem + Parasite | 194.43 |
| ~1 + Mating System + Age + Taxon | 195.73 |
| ~1 + Mating System + Age + Parasite | 196.85 |
| ~1 + Mating System + Method + Parasite | 198.12 |
| ~1 + Mating System + Method + Taxon | 198.47 |
| ~1 | 206.35 |

**Table S5.** Moderators for the sex difference in the survival cost of parasitism and their model averaged importance, calculated as the sum of the weights of the models they appear in.

|  |  |
| --- | --- |
| **Moderator** | **Importance** |
| Mating System | 1.00 |
| Age | 0.28 |
| Method | 0.11 |
| Taxon | 0.04 |
| Parasite | 0.03 |

**Table S6.**

List of the twenty three species used in our meta-analysis that were not represented on TimeTree [1], alongside the closest related species on TimeTree that was used to place the focal species on the phylogenies depicted in Figs. 1-2.

|  |  |
| --- | --- |
| **Focal species in original study** | **Closest related species on TimeTree** |
| *Ageneotettix deorum* | *Ceracris kiangsu* |
| *Aedes sierrensis* | *Ochlerotatus triseriatus* |
| *Paracalliope novizealandiae* | *Paralicella caperesca* |
| *Paracalliope novizealandiae* | *Paralicella caperesca* |
| *Pseudolynchia canariensis* | *Glossina morsitans* |
| *Capnodis tenebrionis* | *Anthaxia hungarica* |
| *Hyalella Azteca* | *Caprella mutica* |
| *Gammarus zadachi* | *Gammarus fossarum* |
| *Listronotus oregonensis* | *Listronotus cryptops* |
| *Musca autumnalis* | *Musca domestica* |
| *Lygus lineolaris* | *Lygus rugulipennis* |
| *Meccus pallidipennis* | *Rhodnius prolixus* |
| *Phlebotomus\_sergenti* | *Phlebotomus\_papatasi* |
| *Aedes provocans* | *Ochlerotatus triseriatus* |
| *Buenoa scimitra* | *Enithares tibialis* |
| *Protoneura cara* | *Neoneura maria* |
| *Hyalomma excavatum* | *Amblyomma triguttatum* |
| *Rhipicephalus annulatus* | *Rhipicephalus sanguineus* |
| *Rhipicephalus bursa* | *Amblyomma triguttatum* |
| *Argia anceps* | *Coenagrion scitulum* |
| *Argia extranea* | *Coenagrion caerulescens* |
| *Capnodis tenebrionis* | *Anthaxia hungarica* |
| *Adalia bipunctata* | *Psyllobora vigintiduopunctata* |

**Table S7.** Test statistics and *P*-values of tests for phylogenetic signal. Residuals are from the regression of species average log odds ratios (LOR, Table S1) on the moderators, or from the regression of sex differences in LOR (male LOR – female LOR, Table S1) on the moderators.

|  |  |  |
| --- | --- | --- |
| **Trait** | **Pagel’s lambda** | ***P*** |
| Average LOR | 0.68 | 0.04 |
| Residuals of LOR on Mating System  | 0.03 | 0.67 |
| Residuals of LOR on Method | 0.000 | 1 |
| Residuals of LOR on Age | 0.22 | 0.12 |
| Residuals of LOR on Taxon | 0.000 | 1 |
| Residuals of LOR on Parasite type | 0.28 | 0.053 |
| Average Sex Difference in LOR | 0.11 | 0.10 |
| Residuals of Sex Difference on Mating System  | 0.001 | 1 |
| Residuals of Sex Difference on Method | 0.04 | 0.47 |
| Residuals of Sex Difference on Age  | 0.000 | 1 |
| Residuals of Sex Difference on Taxon  | 0.000 | 1 |
| Residuals of Sex Difference on Parasite type | 0.099 | 0.14 |

**Table S8.** Between-study heterogeneity statisitcs for models of the survival cost of parasitisim.

|  |  |  |  |
| --- | --- | --- | --- |
| **Model** | σ2 Species (95%CI) | σ2 Study (95%CI) | *I*2 |
| Intercept only | 0.79 (0.22 to 1.68) | 0.45 (0.18 to 0.95) | 96.04 |
| Mating System + Method + Age | 0.32 (0.01 to 0.79) | 0.50 (0.20 to 1.06) | 91.31 |

**Table S9.**

Survival cost of parasitism (LOR) as a function of *Method*, which is a significant modifier of the survival cost of parasitism (QM2 = 9.03, *P* = 0.01). LOR estimates are derived from a meta-analytic mixed-effects model with *Species* and *Study* as random effects and *Method*, *Mating System*, and *Age* as main effects, while confidence intervals are derived from smoothed-cases boothstraping.

|  |  |  |  |
| --- | --- | --- | --- |
| **Comparison** | **Estimate** | **95%CI** | ***P*** |
| Experimental Infection - 0 | 1.48 | (0.80, 2.10) | < 0.0001 |
| Experimental Removal - 0 | 0.51 | (-0.39, 1.36) | = 0.27 |
| Natural Variation - 0 | 0.97 | (0.16, 1.71) | = 0.02 |
| Exp.Rem - Exp.Inf | -0.97 | (-1.65, -0.34) | = 0.002 |
| Nat.Var - Exp.Inf | -0.51 | (-0.97, -0.07) | = 0.04 |
| Exp.Rem - Nat.Var | -0.46 | (-1.14, 0.14) | = 0.15 |

**Table S10.** Between-study heterogeneity statisitcs for models of the sex difference in the survival cost of parasitisim.

|  |  |  |  |
| --- | --- | --- | --- |
| **Model** | σ2 Species (95%CI) | σ2 Study (95%CI) | *I*2 |
| Intercept only | 0.12 (0.00 to 0.35) | 0.09 (0.00 to 0.35) | 63.70 |
| Mating System  | 0.06 (0.00 to 0.20) | 0.03 (0.00 to 0.18) | 40.03 |

***Supplementary Figures***

**Figure S1**. A PRISMA flow diagram describing the selection of the pool of potential studies and the filtering of these studies down to the final set used in the meta-analysis.



 **PRISMA Flow Diagram**

## Identification

Records identified through database searching
(n = 18694 )

Additional records identified through the reference lists of identified studies
(n = 163 )

Records after duplicates removed
(n = 13975)

Records screened: title and abstract
(n = 13975 )

Records excluded
(n = 12841 )

Full-text articles assessed for eligibility
(n = 1134)

Full-text articles excluded
(n = 1062 )

Studies included in quantitative synthesis (meta-analysis)
(n = 72 )

## Screening

## Eligibility

## Included

**Figure S2**. Funnel plot for the survival cost of parasitim. Black points are observed studies while white points are estimated missing studies from a trim-and-fill analysis.



**Figure S3**. Funnel plot for the sex difference in the survival cost of parasitim. Black points are observed studies while white points are estimated missing studies from a trim-and-fill analysis.



**Figure S4**. QQplot from the base meta-analytic model for the survival cost of parasitism. Due to non-normality indicated by this plot we used smoothed-cases bootstrapping to estimate standard errors and confidence intervals for models estimating the survival cost of parasitism.



**Figure S5**. QQplot from the base meta-analytic model for the sex difference in the survival cost of parasitism. This plot did not indicate any departure from normality.



**Figure S6.** Moderators for the survival cost of parasitism and their model-averaged importance, which is calculated as the sum of the weights of the models they appear in.

****

**Figure S7.** Moderators for the sex difference in the survival cost of parasitism and their model-averaged importance, which is calculated as the sum of the weights of the models they appear in.

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