Supporting Information for Adler et al., "What have we learned from empirical applications of modern coexistence theory?"

Supporting Tables

Table S1. Studies included in our literature review. For "Setting," "lab" includes greenhouse and mesocosm experiments, while "field" studies are conducted outdoors, without containers. Under "Design," "obs" refers to observational studies and "exp" refers to experimental studies. Under "MCT application," "mediators" indicates that the study evaluated factors that influence the strength of niche and fitness differences or specific mechanisms.

Source	Biome	Community	Setting	Design	MCT application
Adler et al. 2006	grassland	perennial grassland plants	field	obs	mechanism partitioning
Adler et al. 2009	sagebrush steppe	perennial grassland plants	field	obs	mechanism partitioning
Adler et al. 2010	sagebrush steppe	perennial grassland plants	field	obs	niche differences, fitness differences, mechanism partitioning
Albert and Reuman 2024	freshwater	algae	lab	exp	mechanism partitioning
Alexandrou et al. 2015	freshwater	algae	lab	exp	niche differences, fitness differences, mediators
Álvarez-Noriega et al. 2023	marine	coral	field	obs	mechanism partitioning
Angert et al. 2009	desert	annual plants	field	obs	mechanism partitioning, mediators
Aoyama et al. 2022	vernal pools	annual plants	field	exp	mechanism partitioning, mediators
Armitage and Jones 2019	freshwater	aquatic plants	lab	exp	niche differences, fitness differences, mechanism partitioning
Barber et al. 2022	lab microbes	microbes	lab	exp	niche differences, fitness differences, mediators

Bimler et al. 2018	woodland	annual plants	field	exp	niche differences, fitness differences, mediators
Blackford et al. 2020	grassland	annual plants	lab	exp	niche differences, fitness differences, mediators
Bowler et al. 2022	woodland	annual plants	field	obs	niche differences, fitness differences
Cardinaux et al. 2018	alpine grassland	perennial grassland plants	lab	exp	niche differences, fitness differences, mediators
Carroll 2022	grassland	annual plants	lab	exp	niche differences, fitness differences, mediators
Chu and Adler 2015	various (grassland, sagebrush steppe, desert)	perennial grassland species	field	obs	niche differences, fitness differences, mechanism partitioning
Descamps-Julien and Gonzalez 2005	freshwater	algae	lab	exp	mechanism partitioning, mediators
Dostál 2023	grassland	perennial grassland plants	field	exp	niche differences, fitness differences, mediators
Ellner et al. 2016	multiple	multiple	both	both	mechanism partitioning, mediators
Ellner et al. 2019	multiple	multiple	both	both	mechanism partitioning, mediators
Evans et al. 2021	tropical forest	insects	lab	exp	fitness differences, mediators
Feng et al. 2020	grassland	perennial grassland plants	both	both	fitness differences
Forbes 2023	freshwater	zooplankton	lab	exp	niche differences, fitness differences, mediators
Germain et al. 2016	grassland	annual plants	lab	exp	niche differences, fitness differences, mediators
Germain et al. 2018	grassland	annual plants	lab	exp	niche differences, fitness differences, mediators

Godoy and Levine 2014	grassland	annual plants	field	exp	niche differences, fitness differences, mediators
Godoy et al. 2014	grassland	annual plants	field	exp	niche differences, fitness differences, mediators
Godoy et al. 2020	grassland	annual plants	field	exp	niche differences, fitness differences, mediators
Grainger et al. 2019	lab microbes	microbes	lab	exp	niche differences, fitness differences, mediators
Hallett et al. 2019	grassland	annual plants	field	exp	mechanism partitioning
Hart et al. 2019	freshwater	aquatic plants	field	exp	niche differences, fitness differences, mediators
Johnson and Williams 2020	oak savanna	annual plants	lab	both	niche differences, fitness differences, mediators
Johnson et al. 2022	grassland	annual plants	field	exp	niche differences, fitness differences, mediators
Kandlikar et al. 2021	grassland	annual plants	lab	exp	niche differences, fitness differences, mediators
Ke and Wan 2020	agricultural	annual plants	lab	exp	niche differences, fitness differences, mediators
Kraft et al. 2015	grassland	annual plants	field	exp	niche differences, fitness differences, mediators
Lanuza et al. 2018	grassland	annual plants	field	obs	niche differences, fitness differences, mediators
Letten et al. 2018	lab microbes	microbes	lab	exp	fitness differences, mechanism partitioning
Levine and HilleRisLambers 2009	grassland	annual plants	field	exp	niche differences, fitness differences
Li 2016	desert	annual plants	field	exp	mechanism partitioning

Li et al. 2019	lab microbes	microbes	lab	exp	niche differences, fitness differences, mediators
Luo et al. 2022	rocky intertidal	zooplankton	field	obs	niche differences, fitness differences, mediators
Lyu and Alexander 2022	alpine plants	perennial grassland plants	field	exp	niche differences, fitness differences, mediators
Matías et al. 2018	grassland	annual plants	field	exp	niche differences, fitness differences, mediators
Miller and Rudgers 2014	grassland	annual plants	lab	exp	niche differences, fitness differences
Narwani et al. 2013	lab microcosm	algae	lab	exp	niche differences, fitness differences, mediators
Ocampo-Ariza et al. 2018	freshwater	microbes	lab	exp	niche differences, fitness differences
Otake et al. 2024	freshwater	zooplankton	lab	exp	mechanism partitioning
Ou et al. 2024	grassland	perennial grassland plants	lab	exp	niche differences, fitness differences, mediators
Pastore 2017	freshwater	microbes	lab	exp	niche differences, fitness differences, mediators
Perez-Ramos 2019	grassland	annual plants	field	exp	niche differences, fitness differences, mediators
Pérez-Romero et al. 2023	grassland	annual plants	lab	exp	niche differences, fitness differences
Petry et al. 2018	grassland	annual plants	field	exp	niche differences, fitness differences, mediators
Rey et al. 2017	grassland	annual plants	field	exp	niche differences, fitness differences, mediators
Ryan 2010	freshwater	amphibians	lab	exp	mechanism partitioning
Saavedra et al. 2017	grassland	annual plants	field	exp	niche differences, fitness differences

Schreiber et al. 2023	grassland	annual plants	field	exp	niche differences, fitness differences
Shoemaker et al. 2020	marine intertidal	intertidal species	field	exp	mechanism partitioning, mediators
Siefert et al. 2019	grassland	perennial grassland plants	lab	both	niche differences, fitness differences, mediators
Song and Spaak 2024	multiple	multiple	field	obs	niche differences, fitness differences, mediators
Spaak and De Laender 2020	lab microbes	microbes	lab	exp	niche differences, fitness differences
Spaak and Schreiber 2023	multiple	multiple	both	exp	niche differences, fitness differences
Spaak et al. 2021	multiple	multiple	both	both	niche differences, fitness differences, mediators
Stouffer et al. 2018	woodland	annual plants	field	exp	none
Tan et al. 2016	lab microbes	microbes	lab	exp	niche differences, fitness differences, mediators
Tan et al. 2017	lab microbes	microbes	lab	exp	niche differences, fitness differences, mediators
Tan et al. 2017	lab microbes	microbes	lab	exp	niche differences, fitness differences, mediators
Terry 2024	lab mesocosm	insects	lab	exp	niche differences, fitness differences, mechanism partitioning mediators
Terry et al. 2021	lab mesocosm	insects	lab	exp	niche differences, fitness differences, mediators
Towers et al. 2020	woodland	annual plants	field	exp	mechanism partitioning
Usinowicz et al. 2012	tropical forest	trees	field	obs	mechanism partitioning
Usinowicz et al. 2017	forests	trees	field	obs	mechanism partitioning

Usui 2023	lab microcosm	aquatic plants	lab	exp	niche differences, fitness differences, mediators
Van Dyke et al. 2022	grassland	annual plants	field	exp	niche differences, fitness differences, mediators
Van Nuland et al. 2023	forests	trees	lab	exp	niche differences, fitness differences, mediators
Veresoglou et al. 2018	grassland	perennial grassland plants	field	exp	niche differences, fitness differences, mediators
Wagg and McKenzie-Gopsill 2023	agriculture	annual plants	lab	exp	niche differences, fitness differences, mediators
Wainwright et al. 2019	woodland	annual plants	field	exp	niche differences, fitness differences, mediators
Yan et al. 2022	meta-analysis	multiple	lab	exp	niche differences, fitness differences, mediators
Yao and Feng 2022	grassland	perennial grassland plants	field	obs	niche differences, fitness differences, mediators
Zepeda and Martorell 2019	grassland	perennial grassland plants	field	obs	fitness differences, mechanism partitioning
Zepeda and Martorell 2021	grassland	perennial grassland plants	field	obs	mechanism partitioning, mediators
Zhao et al. 2016	lab microbes	microbes	lab	exp	niche differences, fitness differences, mediators
Zuo et al. 2024	freshwater	algae	lab	exp	niche differences, fitness differences, mediators

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Table S2. The summary of the generalized linear mixed-effects model used to estimate the probability that temporal storage effects have a positive effect on invasion growth rates.

Parametric coefficients:

	Estimate	Std. Error	z value	Pr(>|z|)	
(Intercept)	0.8147	0.4318	1.887	0.0592	.

Approximate significance of smooth terms:

	edf	Ref.df	Chi.sq	p-value	
Study	8.551	17	20.08	0.003	**

R-sq.(adj) = 0.217 Deviance explained = 24%

UBRE = 0.21427 Scale est. = 1 n = 94

Significance codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Table S3. The summary of the generalized linear mixed-effects model used to estimate the probability that temporal relative nonlinearities in competition have a positive effect on invasion growth rates.

Parametric coefficients:

	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-0.05716	0.33820	-0.169	0.866

Approximate significance of smooth terms:

	edf	Ref.df	Chi.sq	p-value
Study	1.82e-05	3	0	0.748

R-sq.(adj) = -2.14e-07 Deviance explained = 2.32e-05%

UBRE = 0.44262 Scale est. = 1 n = 35

Significance codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Table S4. The summary of the generalized linear mixed-effects model used to estimate the probability that variation-independent mechanisms have a positive effect on invasion growth rates.

Parametric coefficients:

	Estimate	Std. Error	z value	Pr(>|z|)	
(Intercept)	1.3335	0.4226	3.155	0.0016	**

Approximate significance of smooth terms:

	edf	Ref.df	Chi.sq	p-value	
s(studyFactor)	2.723	11	4.529	0.0923	.

R-sq.(adj) = 0.0849 Deviance explained = 12.9%

UBRE = -0.065815 Scale est. = 1 n = 62

Significance codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1