

Review

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Review

# Conceptual Frameworks Linking Sexual Health to Physical, Mental, and Interpersonal Well-Being: A Comprehensive Review and Meta-Analysis

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**Abstract:** The current meta-analysis modified the Enduring Vulnerability Stress Adaptation model of relationship functioning and the Attachment System Activation model of individual functioning to incorporate various aspects of sexual health. This provided conceptual frameworks for integrating the findings on a wide range of correlates of sexual health into comprehensive models of individual and interpersonal functioning to guide future research. Drawing from the clinical psychology, social psychology, and medical literatures, 3,119 unique records were initially identified, resulting in a final set of 173 records, representing 205 independent (sub)samples and a final combined sample of 160,466 participants. A total of 930 effects were extracted, yielding 44 meta-analytic effects (using random effects modeling). Path analyses of meta-analytic correlation matrices revealed that key dimensions of sexual health (i.e., sexual satisfaction, orgasms, sexual desire, lack of sexual pain, vaginal lubrication) demonstrated unique links to greater health, interpersonal functioning, and individual functioning (i.e., higher psychological well-being, physical health, & relationship satisfaction; lower psychological distress, attachment anxiety, & attachment avoidance). Meta-regression moderation analyses revealed that the effect linking orgasms to higher sexual satisfaction was especially pronounced for women and for individuals in clinical (sub)samples. Moderation analyses also suggested that the link between orgasms and lower distress was especially pronounced for older individuals. The findings were limited by the cross-sectional nature of the vast majority of the findings (96% of the records), leaving the directions of causality unclear. Taken together, these results highlight the central role that sexual health and more specifically orgasms might play in individual and relationship health, supporting the proposed conceptual models and highlighting directions for future research.

**Keywords:** orgasm; well-being; psychological distress; physical health; relationship satisfaction

*Significance Statement:* This meta-analysis highlights the importance of individuals' sexual health. Sexual satisfaction, orgasms, and sexual desire demonstrated unique links to greater physical health, stronger senses of well-being, lower personal distress, and happier relationships, and were predicted by lower attachment insecurities, underscoring their importance across multiple domains of life.

Sexual behavior has long been discussed as one of the most basic human physical and psychological needs (Maslow, 1943). Consistent with this, previous work has emphasized the importance that sexual health plays in romantic relationships (e.g., Ellsworth & Bailey, 2013; Shaw & Rogge, 2016), as well as in other aspects of life in general (e.g., psychological and physical well-being; e.g., Fabre & Smith, 2012; Levin, 2007). This growing body of work has developed a multidimensional conceptualization of sexual health which includes not only sexual satisfaction, but also orgasmic functioning, sexual desire, vaginal lubrication, lack of sexual pain, and erectile functioning. Given the high value individuals place on orgasms (Opperman et al., 2014), one line of

research has focused specifically on links between orgasmic functioning and well-being, underscoring the importance of orgasms for sexual satisfaction, relationship satisfaction, physical health, mental health, and life satisfaction (e.g., Abramov, 1976; Brezsnayak & Whisman, 2004; Brody & Costa, 2009; Ellsworth & Bailey, 2013). The current review sought to synthesize and integrate this growing line of research on the salience of orgasms in the lives of individuals, by examining orgasmic functioning within the broader context of multiple aspects of sexual health, thereby highlighting the unique links between each aspect of sexual health and the well-being correlates examined. Although a broad array of studies spanning both the psychology and medical literatures have examined the correlates of sexual health (and more specifically orgasmic functioning, see Tables 1 and 2), the vast majority of this work was atheoretical in nature. In addition, the correlates of orgasms and other aspects of sexual health have generally taken a secondary or even tertiary role in the focus of the analyses presented (often appearing only as a handful of undiscussed correlations in a much larger correlation matrix). The current review therefore sought not only to synthesize this vast array of previous studies, but to also develop a theoretical framework to help conceptually integrate previous findings and guide future work in this area.

**Table 1.** Summary of (Sub)samples in Analysis.

Category	# subsamples	Category	# subsamples	Category/code	# subsamples
Subset (# reporting)	(# of effects)	Subset			
Summary		Clinical population <sup>2</sup>		Country	
Distinct samples	205	Addison's disease	1	Australia	2
Unique subjects	160,466	Ankylosing spondylitis	2	Belgium	2
Distinct effects	930	Brain or spinal cord injury	3	Brazil	7
Publication type		Cancer	3	Bulgaria	1
Peer-reviewed article	187	Chronic pain	3	Canada	10
Thesis/dissertation	18	Depression &/or anxiety	9	Chile	2
Publication year		Dialysis	2	China	8
1971-1990	7	Fertility treatment	3	Czech Republic	5
1991-2000	10	Gynecological disorders	11	Denmark	2
2001-2010	47	Heart disease / hypertension	3	Egypt	1
2011-2020	141	Heroin use	1	Finland	5
Sex Health <sup>1</sup>		Hyperthyroidism	1	Germany	4
Sexual Satisfaction	152 (322)	Incontinence	1	Greece	1
Orgasm	205 (398)	Lupus	1	Hungary	1
Desire	96 (227)	Metabolic syndrome	1	India	1
Lack of pain	60 (154)	Migraines	1	International	5
Lubrication	58 (167)	Multiple sclerosis	4	Iran	5
Erectile function	18 (38)	Nonspecific medical <sup>3</sup>	2	Israel	5
Correlate		Obesity &/or eating disorder	3	Italy	12
Psychological distress	88 (280)	Parkinson's disease	1	Japan	1
Psychological well-being	22 (66)	Pre-, post-, &/or menopausal	8	Malaysia	5
Physical health	9 (38)	Pregnant &/or postpartum	9	Mexico	1
Attachment anxiety	9 (25)	PTSD	1	Morocco	1
Attachment avoidance	9 (25)	Renal transplant	1	Netherlands	5
Relationship satisfaction	54 (110)	Rheumatoid arthritis	1	Norway	1
Type of population <sup>2</sup>		Schizophrenia	2	Poland	3
College students	26	Sexual abuse	2	Portugal	7
Community	87	Sexual dysfunction	12	Scotland	1
Clinical	97	Sjogren's syndrome	1	South Korea	1
Gender		Sleep apnea	2	Spain	3
Female only study	152	Stroke	1	Sweden	2
Male only study	40	Vitamin D3 deficiency	1	Switzerland	3
Both genders	13	Average age (k=199)		Taiwan	2
Weighted percent female	71%	Lowest	18.8	Tunisia	1
Relationship length (k=41)		Highest	73.5	Turkey	17
Lowest	1.4	Weighted mean	38.9	UK	5
Highest	34.1	Married / Cohabiting (k=96)		US	67
Weighted mean	13.8	Weighted %	75.2	Caucasian (k=182)	
				Weighted %	64.4

Note. The 205 unique subsamples presented in this table were drawn from the 173 unique records presented in the following table. <sup>1</sup>These numbers represent the number of subsamples providing at least one effect involving the construct listed. <sup>2</sup>These numbers sum to more than 205 as these are not mutually exclusive categories (e.g., some samples were made up of both students and people from the community). <sup>3</sup>These two studies were not focused on a specific clinical population but instead included samples of elderly individuals with a wide range of medical diagnoses.

**Table 2.** Characteristics of Individual Study Subsamples in Analysis.

Author (Year)	Recor d Type	N	Country	Subsample	Mea n Age	Perce nt Whit e	Sex Health Dimensio n(s)	Sex Health Scale(s)	Correlate Dimension	Correlate Scale	# effec ts
Abdel-Hamid & Saleh (2011)	PR	38	Egypt	Muslim males w/ lifelong delayed ejaculation	30.8	0	O	IIEF	depressive sx	SRADM	1
Abedi et al. (2015)	PR	228	Iran	Women w/ & w/out abnormal sexual function	30.4	0	SODPL	FSFI	perceived stress	PSS	5
Adam et al. (2020)	PR	65	Belgium	Women aged 18-58 w/ orgasm difficulties	32.7	100	SO	FSFI	only sex health*		1
Aerts et al. (2015)	PR	84	Belgium	Women w/ endometrial cancer	63.0	100	O	SSFS	relationship sat	DAS	1
Alvisi et al. (2014)	PR	204	Italy	Women w/ & w/out metabolic syndrome	40.0	100	O	FSFI	depressive sx	MHQ	2
Appa et al. (2014)	PR	199 7	US	Middle-aged women w/ multiple medical diagnoses	60.2	36	SODPL	1 item	depression diagnosis	medical diagnosis	5
Artune-Ulkumen et al. (2014)	PR	177	Turkey	Women in sexual relationships w/ & w/o sexual dysfunction	32.3	0	SODPL	FSFI	mental health, vitality, physical health	SF-36	15
Asselmann et al. (2016)	PR	149	Germany	Pregnant women w/ & w/o depression	28.9	100	SODL	MGH	depression diagnosis	CIDI	4
Assimakopoulos et al. (2006)	PR	110	Greece	Healthy women & obese women preparing for bariatric surgery	34.4	100	SODPL	FSFI	depressive sx	BDI	5
Atis et al. (2011)	PR	80	Turkey	Women w/ & w/o hyperthyroidism	36.8	0	SODPL	FSFI	depressive sx	BDI	5
Aubin et al. (2008)	PR	72	US	Men w/chronic pelvic pain syndrome	40.8	66	O	BSFQ	depressive sx	CESD	1
Bakjtari et al. (2016)	PR	236	Iran	Women in fertility treatment	26.4	0	SOD	DSM-IV	relationship sat	1 item	4
Barbara et al. (2016)	PR	269	Italy	Women who have given birth 6mo ago	34.4	100	SO	FSFI	only sex health*		1
Barrientos & Páez (2006)	PR	433 9	Chile	Women & men aged 18-69	39.7	0	SO	1 item	only sex health*		2
Battaglia et al. (2011)	PR	87	Italy	Menstruating women	28.7	100	O	1 item	depressive sx	BDI	1
Beaber & Werner (2009)	PR	120	US	Women in heterosexual & lesbian relationships	29.4	77	SODPL	FSFI	only sex health*		16
Berenguer et al. (2019)	PR	149	Portugal	Adult women	25.0	0	SO	FSFI	only sex health*		1
Blair et al. (2018)	PR	750	Canada	Women & men in same or opposite sex relationships	30.0	0	SO	IIEF	only sex health*		2
Borissova et al. (2001)	PR	627	Bulgaria	Middle-aged pre- & post-menopausal women w/ & w/o hormone replacement therapy	48.0	100	O	1 item	coping with life	1 item	1
Brody & Weiss (2011)	PR	157 0	Czech Republic	Women & men aged 35-65 in relationships	48.8	100	SO	1 item	life sat, relationship sat	LiSat	6
Burleson et al. (2007)	PR	58	US	Middle-aged women	47.6	0	O	1 item	Depressive sx, positive affect	1 item, 7 items	2
Burri et al. (2015)	PR	507	UK	Pre- & post-menopausal twin women	56.3	100	SODPL	FSFI	relationship sat	1 item	14
Burri et al. (2013)	PR	866	UK	Monozygotic twin women discordant for sexual dysfunction	55.0	100	SODPL	FSFI	relationship sat	1 item	5
Cagnacci et al. (2019)	PR	518	Italy	Sexually active women aged 40-55 at gynecological clinics	49.4	100	SO	FSFI	only sex health*		1
Canat et al. (2016)	PR	108	Turkey	Women aged 22-51 w/ vitamin D3 deficiency	34.9	0	SODPL	FSFI	depressive sx	BDI	5
Carmen (2014)	MT	145	US	Adult women	25.8	0	SODPL	FSFI	only sex health*		10
Carrobes et al. (2011)	PR	157	Spain	College women aged 20-45	22.8	0	SO	3 items	mental health	WHO-5	3
Castellini et al. (2010)	PR	309	Italy	Obese & not obese women w/ & w/o Binge ED	39.1	100	SODPL	FSFI	depressive sx	BDI	15
Ceyhan et al. (2019)	PR	102	Turkey	Married women in treatment for hypertension	55.1	0	SOD	ASEX	relationship sat	MAT	3
Chang et al. (2012)	PR	555	Taiwan	Pregnant women	33.0	0	SODPL	FSFI	depressive sx	CESD	5
Chang et al. (2019)	PR	102 6	Taiwan	Women aged 40-65	48.5	0	SODPL	FSFI	mental health, physical health	SF-12, SF-12	10



Cheng et al. (2007)	PR	160 China	Sexually active men aged 50+ from a primary care treatment center	55.0	0	SOE	IIEF	depressive sx	GDS	3
Chivers et al. (2011)	PR	57 Canada	Post-partum women w/ & w/o depression	0.0	0	SODPL	FSFI	depressive sx	EPDS	5
Cohen & Belsky (2008)	PR	323 UK	Adult women	24.4	70	O	4 items	attachment	ECR	2
Conroy (2018)	MT	158 US	Women w/ gynecologic or breast cancer	57.7	92	SO	DSFI; 1 item	depressive sx, relationship sat	CESD, single item?	3
Constantine (2017)	DD	531 US	Adult women	27.0	78	SO	ISS, 1 item	psychological sx, attachment, relationship sat	?, ECR, RAS	7
Costa & Brody (2007)	PR	30 Portugal	Women currently in sexual relationships	25.8	0	SO	1 item	relationship sat	PRQC	2
Costa & Brody (2011)	PR	70 Scotland	College sexually experienced women	25.7	100	O	1 item	attachment	ECR	2
Costa et al. (2016)	PR	116 Portugal	Adult women & men	24.9	0	SO	1 item	only sex health*		2
Dashti et al. (2016)	PR	16 Malaysia	Women aged 28-48 w/ PCOS	33.4	0	SODPL	FSFI	depressive sx	DASS-21	5
Davidson & Hoffman (1986)	PR	206 US	Married undergrad & graduate women	28.1	0	SO	1 item	only sex health*		1
de Jong (2016)	DD	220 US & Canada	Couples w/o current sexual, medical, or psychiatric diagnoses or treatments	26.5	86	SO	2 items	only sex health*		1
de Lucena & Abdo (2014)	PR	96 Brazil	Women attending routine gynecology checkup	38.5	0	SOD	FSQ	anxiety sx	BAI	3
de Olivera Ferro et al. (2019)	PR	46 Brazil	Men aged 18-60 w/ spinal cord injury	34.0	0	SO	IIEF	only sex health*		2
Demir et al. (2013)	PR	23 Turkey	Women w/ ankylosing spondylitis	39.3	0	SODPL	FSFI	depressive sx, vitality, physical health	BDI, SF-36, SF-36	15
Denes (2012)	PR	200 US	Undergrad women & men from U of California, Santa Barbara	19.6	59	O	1 item	relationship sat	MOQ	1
Denes (2018)	PR	206 US	Female & male college students	19.3	68	O	1 item	relationship sat	MOQ	2
Dettore et al. (2013)	PR	130 Italy	Women w/ & w/out anxiety diagnoses	29.5	100	SODPL	FSFI	anxiety sx	STAI	10
Dissiz (2018)	PR	57 Turkey	Women heroin users	26.2	0	SODPL	FSFI	depressive sx	BDI	7
Dogan et al. (2017)	PR	142 Turkey	Women w/ & w/o migraines	34.0	0	OL	FSFI	depressive sx	BDI	2
Duits et al. (2009)	PR	19 Netherlands	Men w/ history of strokes	58.8	100	SODE	IIEF	depressive sx	SCL	4
Dunkley et al. (2016)	PR	576 Canada	Undergrad women from U of British Columbia	20.8	37	SODPL	FSFI	attachment	ECR	10
Dunn et al. (1999)	PR	613 UK	Women aged 18-75	50.0	0	OL	?	depressive sx, marital difficulties	BDI, ?	4
Dyar et al. (2018)	PR	279 US	Young adult sexual & gender minorities assigned female at birth	21.2	19	SO	3 items, 2 items	relationship sat	RAS	3
Eaton et al. (2017)	PR	70 US	Women w/ gynecologic cancer	53.0	80	OP	WSIDI	depressive sx	PHQ	2
Eichel et al. (1988)	PR	86 US	Men & women who had or had not learned & practiced the coital alignment technique	41.1	0	SO	1 item	only sex health*		1
Ellero (2019)	MT	330 International	Portuguese or English speaking, sexually active women & men	28.4	0	SOD	1 item	only sex health*		4
Ellsworth & Bailey (2013)	PR	112 US	Female undergraduate students in relationships	18.8	0	O	1 item	relationship sat	RAS	1
Fabre & Smith (2012)	PR	281 US	Women w/ depression	38.3	88	OD	CSFQ	depressive sx	HAMD	2
Fabre et al. (2013)	PR	326 US	Men w/ major or atypical depression	39.5	80	OD	DISF	depressive sx	HAMD	2
Fan et al. (2007)	PR	64 US	Women & men w/ schizophrenia in outpatient treatment	43.5	70	SOD	CSFQ	depressive sx, quality of life	HAMD, QOL	12
Forbes et al. (2016)	PR	336 Australia	Sexually active women aged 19-65	29.5	100	SO	FSFI	depressive sx	DASS	2
Frederick et al. (2017)	PR	387 US	Heterosexual women & men in a relationship for at least 3 years	39.4	87	SO	1 item	only sex health*		4
Gallup et al. (2014)	PR	54 US	Heterosexual undergrad women in sexual relationships	19.0	0	SO	1 item	only sex health*		1
Garcia et al. (2007)	PR	311 US	Women enrolled in the Penn Ovarian Aging Study	48.0	51	SODL	FSFI	anxiety sx	ZAI	4
Gewirtz-Meydan (2017)	PR	256 Israel	Heterosexual couples (dyads)	34.4	87	SOD	ISS, ISBI	only sex health*		6

Gewirtz-Meydan & Finzi-Dottan (2018)	PR	256 Israel	Married or cohabitating couples, together 3+y & co-parenting 1+ children (dyads)	34.4	0	SOD	ISS, 3 items	attachment	ECR	18
Gomes & Nobre (2012)	PR	136 3 Portugal	Sexually active men w/ & w/o erectile dysfunction	37.7	0	SODE	IIEF	only sex health*		6
Goodman (2011)	DD	157 6 US	Adult women & men collected online	32.0	79	O	1 item	attachment, relationship sat	ECR, PRQC	3
Granata et al. (2013)	PR	12 Italy	Men aged 21-59 w/ Addison's disease	40.5	100	SOD	IIEF	only sex health*		2
Grose (2016)	DD	430 US	Heterosexual undergrad women w/ a sex partner in the last year	19.9	38	SO	MSSCQ-S, FSFI	only sex health*		2
Gunst et al. (2017)	PR	217 3 Finland	Twin women	25.5	100	SODPL	FSFI	only sex health*		10
Guo et al. (2004)	PR	134 98 China	Newlywed women & men in Shanghai (dyads)	27.8	0	SO	1 item	relationship sat	1 item	4
Gutsche & Burri (2017)	PR	159 Switzerland	Adult women	31.8	100	SODPL	FSFI	relationship sat,	RAS	15
Haavio-Mannila & Kontula (1997)	PR	225 0 Finland	Women & men aged 18-74	42.2	100	SO	2 items	only sex health*		2
Harte & Meston (2012)	PR	120 7 US	Undergrad sexually active men using & not using ED meds	21.9	73	SODE	IIEF	only sex health*		6
Hassan et al. (2008)	PR	354 Turkey	Men w/ erectile dysfunction	37.9	0	SO	IIEF	only sex health*		1
Havesi et al. (2017)	PR	508 Hungary	Undergrad women & patients w/ endometriosis or PCOS	27.9	100	SODPL	FSFI	only sex health*		10
Hazewinkel et al. (2012)	PR	76 Netherlands	Women w/ history of vulvar cancer & radiotherapy	68.0	100	SOD	FSFI	physical health	SF-36	3
Hevesi et al. (2019)	PR	184 US & 3 Hungary	Adult women	28.8	0	SO	1 item	relationship sat	1 item	2
Horton (1982)	DD	99 US	Women in relationships	27.5	97	SO	SII 1 item	only sex health*		1
Hoyer et al. (2009)	PR	451 Germany	CBT outpatients w/ anxiety or depression diagnosis	36.0	100	SODLE	MGH	only sex health*		9
Hoyer et al. (2009)	PR	451 Germany	Women & men at an outpatient mental health clinic	36.0	100	SODLE	MGH	only sex health*		9
Hurlbert et al. (1993)	PR	98 US	Fort Hood, TX military wives	26.7	68	SOD	ISS, 1 item	only sex health*		3
Hwang et al. (2019)	PR	32 South Korea	Women w/ & w/o stress urinary incontinence	41.7	0	SO	FSFI	only sex health*		1
Jensen et al. (2004)	PR	75 Denmark	Gynecological cancer patients (cervical, endometrial, ovarian) aged 28-77	58.0	100	SOL	SVQ	only sex health*		2
Jones et al. (2017)	PR	284 US	Heterosexual couples (dyads)	32.4	90	SO	NSSS-S, 1 item	only sex health*		2
Kahn (2001)	DD	104 US	Married women aged 25-40	31.7	0	SO	ISS, 1 item	only sex health*		1
Kalambach & Pillai (2014)	PR	136 US	Adult women	20.7	82	OP	FSDS-R	depressive sx	CESD	2
Kalambach et al. (2012)	PR	125 8 US	Undergrad women & men from Kent State U w/ depression &/or anxiety	19.6	0	SODPLE	FSFI/ MSFI, PFSF	general distress	MASQ	3
Kalambach et al. (2015)	PR	171 US	College women free of antidepressants	20.1	81	ODL	FSFI	depressive sx	CESD	22
Kalmbach et al. (2019)	PR	150 US	Postmenopausal women w/ chronic insomnia	56.4	52	SODPL	FSFI	depressive sx	BDI	5
Karabulutlu et al. (2011)	PR	33 Turkey	Women getting hemodialysis	41.0	0	SODPL	FSFI	depressive sx	BDI	5
Kelley & Gidycz (2017)	PR	501 US	Undergrad women from Ohio U w/ & w/o history of sexual assault	18.9	88	ODPL	FSFI	depressive sx	TSC-D	10
Keskin et al. (2019)	PR	225 Turkey	Dialysis patients	43.0	0	SOE	GRISS	depressive sx	BSI	3
Khajehei et al. (2015)	PR	295 Australia	Postpartum women	29.7	0	SO	FSFI	depressive sx, relationship sat	PHQ, RAS	3
Khnaba et al. (2016)	PR	60 Morocco	Women w/ rheumatoid arthritis	45.2	0	SODPL	FSFI	depressive sx, vitality, physical health	HADS-D, SF-36, SF-36	15

Klapilova et al. (2015)	PR	170	Czech Republic	Heterosexual couples (dyads)	27.1	100	SO	1 item	relationship sat	DAS	4
Kracun et al. (2018)	PR	200	Israel	Women aged 21-44 attending antenatal classes	30.5	0	SODPL	FSFI	relationship sat	EMS	10
Kreuter et al. (1998)	PR	84	Sweden	Women & men post traumatic brain injury	40.0	100	SO	SIS, 1 item	only sex health*		4
Leeners et al. (2014)	PR	299	Switzerland	Adult women	50.0	100	O	1 item	depressive sx	SCL	1
Leonhardt et al. (2018)	PR	336	US	Heterosexual newlywed couples (dyads)	28.6	62	SO	GRISS, 1 item	relationship sat	CSI	4
Lew-Starowicz & Rola (2014)	PR	204	Poland	Women & men w/ multiple sclerosis	50.3	100	SODPLE	SFQ	depressive sx	BDI	9
Llaneza et al. (2011)	PR	117	Spain	Post-menopausal women	57.0	0	OD	CSFQ	depressive sx	CESD	2
Madewell (2013)	DD	243	US	Undergrad women from Oklahoma State U	19.6	69	SODP	GSF	only sex health*		6
Maes (2017)	DD	92	US	Men enrolled in Osher Lifelong Learning Institute at U of Nevada, Las Vegas	73.5	89	SOE	MSHQ	perceived stress	PSSI	3
Masmoudi et al. (2018)	PR	52	Tunisia	Women aged 27-57 w/ & w/out multiple sclerosis	37.7	0	SODPL	FSFI	depressive sx	BDI	5
McNicoll et al. (2017)	PR	137	Canada	Women reporting pain during sex	32.2	0	SO	FSFI	only sex health*		1
Meadow (1982)	DD	95	US	Arizona married female community college students	38.5	0	SO	SIS	relationship sat	MAT	3
Mendes et al. (2008)	PR	90	Brazil	Men w/ spinal cord injury - retroactive pre-injury report	33.5	0	SODE	1 item	only sex health*		3
Mernone et al. (2019)	PR	93	Switzerland	Women aged 40-73	52.5	100	SODPL	FSFI	life sat, relationship sat	SWLS, RAS	10
Monga et al. (1998)	PR	82	US	Women & men aged 29-74 in treatment for chronic pain	49.9	67	O	DISF	depressive sx	CESD	1
Morales et al. (2013)	PR	65	Spain	Women w/ lupus	39.0	0	SODPL	FSFI	depressive sx, vitality, physical health	SCL, SF-36, SF-36	15
Moshfeghy et al. (2019)	PR	100	Iran	Sexually active married women w/ & w/out recurrent vulvovaginal candidiasis	31.5	0	SODPL	FSFI	depressive sx	DASS-21	5
Najafabady et al. (2011)	PR	120	Iran	Reproductive aged women	29.9	0	SO	FSFI	anxiety	?	2
Nascimento et al. (2015)	PR	157	Brazil	Hypertensive women	56.4	0	SODPL	FSFI	depressive sx	HADS-D	15
Norhayati & Jacob (2017)	PR	321	Malaysia	Women w/ & w/out severe delivery complications	30.2	0	SO	FSFI	only sex health*		1
Onem et al. (2008)	PR	26	Turkey	Patients w/ obstructive sleep apnea-hypopnea	45.8	0	SODPL	FSFI	depressive sx	BDI	5
Opperman et al. (2013)	PR	85	Canada	Undergrad women in relationship	20.8	100	SODPL	FSFI	only sex health*		10
Ozcan et al. (2015)	PR	89	Turkey	Adults w/ Parkinson's disease	67.7	0	ODLE	ASEX	depressive sx	HAMD	4
Ozdemir et al. (2007)	PR	98	Turkey	Women & men w/ renal transplants	36.1	0	OD	ASEX	depressive sx	BDI	3
Pakpour et al. (2015)	PR	131	Iran	Peri-menopausal women at a health center	55.8	0	SODPL	FSFI	stress, relationship sat	?, ?	20
Papini et al. (2013)	PR	44	Italy	College women aged 21-47	26.1	100	SODPL	FSFI	depressive sx	SCL	5
Parish et al. (2007)	PR	241	China	Sexually active women & men aged 20-64yo in long-term relationships	40.4	0	SO	1 item	only sex health*		2
Pascoal (2018)	PR	248	Portugal	Women & men in heterosexual couples	29.5	0	SODLE	GMSEX, FSFI	only sex health*		12
Peixoto et al. (2019)	PR	36	Brazil	Postmenopausal women aged 45-65 at a climacteric clinic	55.4	0	SODPL	FSFI	mental health, vitality, physical health	SF-36	15
Philippsohn & Hartmann (2009)	PR	102	Germany	Adult women	36.7	100	SO	4 items, 1 item	only sex health*		1
Pinney et al. (1987)	PR	275	US	College aged sexually active heterosexual women	20.5	97	SO	PSSI, 1 item	only sex health*		1
Pinsky (2016)	MT	248	US	Male combat veterans w/ PTSD aged over 18y	0.0	85	SODE	IIEF	attachment	ECR	19
Powers (2012)	DD	835	US	Undergrad sexually active women from U of North Texas	21.2	60	O	1 item	depressive sx	QIDS	1
Randolph (2002)	DD	63	US	Women w/ endometriosis & suffering from chronic pelvic pain	33.3	87	OD	DISF	depressive sx	CESD	3
Rosen et al. (2000)	PR	259	US	Women w/ & w/o sexual arousal disorder	40.1	76	SODPL	FSFI	only sex health*		20



Rosen et al. (2019)	PR	193 Canada	Women w/ sexual arousal disorder & their male partners (dyads)	31.2	86	SO	FSFI	depressive sx's, relationship sat	BDI, CSI	10
Rottman et al. (2017)	PR	574 Denmark	Heterosexual, sexually active couples dealing w/ breast cancer (dyads)	55.8	100	SO	PROMIS	only sex health*		2
Rowland & Kolba (2019)	PR	206 US & 8 Hungary	Adult women	29.1	0	O	1 item	relationship sat	1 item	1
Rowland et al (2018)	PR	230 US & 4 Hungary	Adult women	28.8	0	SO	1 item	depression diagnosis; relationship sat	1 item each	3
Sakinci et al. (2016)	PR	159 Turkey	Sexually active women at routine gynecology visits	33.7	0	SODPL	FSFI	depressive sx's	BDI	15
Sariyildiz et al. (2012)	PR	70 Turkey	Men aged 20-50 w/ ankylosing spondylitis	36.4	0	SODE	IIEF	depressive sx's	HADS-D	4
Sarti et al. (2010)	PR	208 7 Italy	Women at menopausal clinics	54.0	100	O	1 item	mental health, physical health	SF-12	2
Scott et al. (2018)	PR	206 US	Women in lesbian couples	33.7	73	SO	1 item	only sex health*		1
Seldin et al. (2001)	PR	493 US	Adult women	0.0	0	O	1 item	mental adjustment	1 item	1
Shifren et al. (2008)	PR	315 81 US	Women from a nationally representative sample	49.5	81	O	3 items	depressive sx's	CSFQ	1
Skoczynski et al. (2019)	PR	129 Poland	Men aged 31-76 w/ & w/out obstructive sleep apnea	57.9	100	SO	IIEF	depressive sx's, relationship sat	HADS-D, ?	5
Speer et al. (2005)	PR	55 US	Women aged 41-69 surviving breast cancer	53.4	100	SOD	FSFI	relationship distress	MSI-R	5
Stephenson & Meston (2010)	PR	319 US	Women in sexually active heterosexual relationships w/ & w/o sexual arousal disorder	22.8	63	SODPL	FSFI	relationship sat	DAS	28
Stephenson et al. (2012)	PR	176 US	Women w/ & w/out history of childhood sexual abuse	33.3	71	SODPL	SSS-W, FSFI	only sex health*		10
Stoerber & Harvey (2016)	PR	289 UK	College women & internet users aged 17-69	23.5	73	SO	FSFI	only sex health*		1
Takahashi et al. (2011)	PR	126 Japan	Women in partnered relationships	38.1	0	SODPL	FSFI	only sex health*		10
Tao & Brody (2011)	PR	158 China	Women & men industrial workers	40.2	0	SO	MSQ, 1 item	only sex health*		1
Tavares et al. (2017)	PR	926 Portugal	Sexually active heterosexual premenopausal women	25.2	0	O	1 item	depressive sx's, positive affect, relationship sat	?, PANAS, ?	3
Thakurdesai & Sawant (2018)	PR	116 India	Men w/ & w/o depression	32.4	0	SODE	IIEF	depressive sx's	BDI	4
Therrien & Brotto (2016)	PR	255 Canada	Women w/ sexual dysfunction	0.0	82	O	FSFI	depressive sx's, relationship sat	BDI, ?	2
Tracy & Junginger (2007)	PR	350 US	Lesbian women	35.5	86	SODPL	FSFI	psychological sx's, relationship sat	BSI, DAS	20
Træen (2007)	PR	42 Norway	Heart disease patients	58.8	0	SOD	1 item	only sex health*		3
Tuinman et al. (2010)	PR	93 Netherlands	Testicular cancer patients	29.4	100	OE	IIEF	depressive sx's	CESD	2
Tutino et al. (2017)	PR	311 Canada	College women aged 17-38	19.2	81	ODPL	FSFI	depressive sx's	DASS	10
Uddenberg (1974)	PR	94 Sweden	Pregnant women & their mothers	0.0	100	SO	1 item	only sex health*		1
van der Brink et al. (2016)	PR	399 Netherlands	Undergrad women	21.7	100	SODPL	FSFI	attachment	ECR	13
van Nimwegen et al. (2015)	PR	85 Netherlands	Women w/ & w/out Sjogren's syndrome	45.4	100	SO	FSFI	depressive sx's	HADS-D	2
Villeda Sandoval et al. (2014)	PR	200 Mexico	Young adult women from Mexico City	26.3	0	O	FSFI	depression diagnosis	1 item	1
Waite & Joyner (2001)	PR	219 5 US	Women & men in national sample	36.8	87	SO	1 item	relationship sat	2 items	4
Wallace & Barbach (1974)	PR	15 US	Treatment of preorgasmic women	27.5	88	SO	1 item	only sex health*		1
Weiss & Brody (2011)	PR	720 Czech Republic	Women in relationships aged 35-65	47.6	100	SO	1 item	life sat, relationship sat	1 item each	3
Witting et al. (2008)	PR	208 1 Finland	Women aged 33-43	37.5	100	SODPL	FSFI	only sex health*		10
Witting et al. (2008)	PR	208 1 Finland	Pregnant women, & women w/ children	37.5	100	SOD	FSFI	relationship sat	PRQC	5

Wongsomboon et al. (2019)	PR	131 5	US	Women reporting committed or casual sex	23.7	0	SO	SSS-W, FSFI	only sex health*		2
Yangin et al. (2008)	PR	300	Turkey	Menopausal women	53.6	100	SODPL	FSFI	depressive sxs	BDI	5
Yanikkerem et al. (2016)	PR	298	Turkey	Pregnant married women	27.5	0	SO	GRISS	relationship sat	MAS	3
Yela et al. (2018)	PR	80	Brazil	Women w/ premature ovarian insufficiency	38.4	0	SODPL	FSFI	mental health, physical health	WHOQoL	10
Yeoh et al. (2014)	PR	269	Malaysia	Married heterosexual couples in fertility treatments (dyads)	33.2	0	SODPLE	FSFI	only sex health*		16
Young et al. (1998)	PR	797	US	Married women	0.0	0	SO	3 items, 1 item	relationship sat	1 item	3
Zhang et al. (2015)	PR	151 8	China	Married women	38.9	0	SODPL	1 item	life sat, relationship sat	1 item each	11
Zhou (1993)	PR	178 9	China	Adult women	37.2	0	SO	1 item	only sex health*	1 item	1

*Note.* PR = peer reviewed article; DD = doctoral dissertation; MT = master's thesis; sxs = symptoms; sat = satisfaction; S = sexual satisfaction; O = orgasm; D = sexual desire; P = lack of pain; L = vaginal lubrication; E = erectile function. Sexual health scales: ASEX = Arizona Sexual Experience Scale; BSFQ = Brief Sexual Functioning Questionnaire; CSFQ = Changes in Sexual Functioning Questionnaire; DISF = Derogatis Interview for Sexual Functioning; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders – 4th edition; FSDS-R = Female Sexual Distress Scale – Revised; FSFI = Female Sexual Function Index; FSQ = Female Sexual Quotient; GMSEX = Global Measure of Sexual Satisfaction; GRISS = Golombok-Rust Inventory of Sexual Satisfaction; GSF = Global Sexual Functioning; IIEF = International Index of Erectile Function; ISBI = Israeli Sexual Behaviour Inventory; ISS = Index of Sexual Satisfaction; MGH = Massachusetts General Hospital Sexual Functioning; MSFI = Male Sexual Function Index; MSHQ = Male Sexual Health Questionnaire; MSQ = Multidimensional Sexuality Questionnaire; MSSCQ-S = Multidimensional Sexual Self-Concept Questionnaire – Sexual Satisfaction; NSSS-S = New Sexual Satisfaction Scale – Short; PFSF = Profile of Female Sexual Function; PROMIS = Patient-Reported Outcomes Measurement Information System; PSSI = Pinnes Sexual Satisfaction Inventory; SFQ = Female Sexual Function Questionnaire; SII = Sexual Interaction Inventory; SIS = Sexual Interest and Satisfaction; SSFS = Short Sexual Functioning Scale; SSS-W = Sexual Satisfaction Scale for Women; SVQ = Sexual function-Vaginal changes Questionnaire – Sexual Functioning; WSIDI = Women's Sexual Interest Diagnostic Interview. Correlate scales: BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; BSI = Brief Symptom Inventory; CESD = Center for Epidemiologic Studies Depression Scale; CIDI = World Health Organization's Composite International Diagnostic Interview; CSI = Couples Satisfaction Index; DAS = Dyadic Adjustment Scale; DASS = Depression Anxiety Stress Scales; DASS-21 = 21-item Depression Anxiety Stress Scales; ECR = Experiences in Close Relationships; EMS = ENRICH Marital Satisfaction Scale; EPDS = Edinburgh Postnatal Depression Scale; GDS = Geriatric Depression Scale; GHQ = General Health Questionnaire; GMREL = Global Measure of Relationship Satisfaction; HADS-D = Hospital Anxiety and Depression Scale; HAMD = Hamilton Rating Scale for Depression;; LiSat = Life Satisfaction – life, relationship, & sexual satisfaction items; MAS = Marital Adjustment Scale; MASQ = Mood and Anxiety Symptom Questionnaire; MAT = Marital Adjustment Test; MHQ = Middlesex Hospital Questionnaire; MOQ = Marital Opinion Questionnaire; MSI-R = Marital Satisfaction Inventory – Revised; PANAS = Positive and Negative Affect Schedule; PHQ = Patient Health Questionnaire; PROMIS = Patient-Reported Outcomes Measurement Information System; PRQC = Perceived Relationship Quality Components – Global Relationship Quality; PRQC-S = Perceived Relationship Quality Components – Satisfaction; PSS = Perceived Stress Scale; QOL = Heinrichs Quality of Life Scale; RAS = Relationship Adjustment Scale; SCL = 90-item Symptom Check List; SF-12 = 12-item Short-Form Health Survey; SF-36 = 36-item Short-Form Health Survey; SRADM = Shaheen-Rakhawy Anxiety & Depression Measure; STAI = State and Trait Anxiety Inventory; = Satisfaction with Life Scale; TSC-D = Trauma Symptom Checklist – Depression; WHO-5 = The World Health Organization-Five Well-Being Index; WHOQoL = The World Health Organization Quality of Life; ZAI = Zung Anxiety Index.

## Conceptualizing Sexual Health

**Sexual Health as a Central Process.** Defining sexual health is a complex task, as it encompasses physical, emotional, mental, and social well-being (World Health Organization, 2002). As sexual health is not merely the absence of dysfunction, but a holistic experience of well-being, it remains imperative to investigate sexual functioning in its scope beyond dysfunctionality. As such, pleasurable sexual experiences do not focus only on achieving orgasms or other physiological factors such as vaginal lubrication, erectile function, or lack of pain, but also include emotional components such as sexual desire, sexual arousal, and sexual satisfaction. Consistent with this, internationally validated sexual health measurement scales such as the Derogatis Sexual Functioning Inventory (DSFI; Derogatis & Melisaratos, 1979; Derogatis, 1997), Female Sexual Function Index (FSFI; Rosen et al., 2000), or International Index of Erectile Function (IIEF; Rosen et al., 1997) provide the tools for researchers to embrace a more diverse and multivariate conceptualization of sexual health (i.e., including sexual satisfaction, orgasmic functioning, sexual desire, vaginal lubrication, lack of pain, and erectile functioning). Thus, although a large body of work has incidentally examined sexual dysfunctions as secondary symptoms of physical health issues (such as cancer, obesity, or psychiatric diagnoses; e.g., Castellini et al., 2010; Conroy, 2018; Hoyer et al., 2009), the current review applies a novel lens to this literature by examining sexual health as a critical aspect of individual and interpersonal well-being that spans a wide range of populations (both clinical and non-clinical) as well as a wide range of contexts (representing a set of dynamic processes rather than just secondary symptoms).

**Orgasms as One Component of Sexual Health.** A growing body of work has more specifically focused on orgasmic functioning as a key aspect of sexual health (e.g., Abramov, 1976; Breznsnyak & Whisman, 2004; Brody & Costa, 2009; Ellsworth & Bailey, 2013). In fact, there is evidence suggesting that orgasms are still widely perceived as the ultimate goal of sexual activity (e.g., Opperman et al., 2014), supporting their use as a key marker of sexual health. As a counterpoint to those findings, an emerging area of research has also noted limitations of placing too much weight on orgasms alone, pointing out that: (1) not all orgasms are pleasurable (e.g., Chadwick et al., 2019), (2) sexual pleasure consists of other crucial elements as well (e.g., Chadwick et al., 2019), (3) satiating sexual pleasure can be achieved without orgasming (e.g., Opperman et al., 2014), and (4) some individuals even experience orgasms despite engaging in unpleasurable or coerced sexual activity (e.g., Chadwick et al., 2019). Thus, to integrate these perspectives, when reviewing the literature on how orgasms are linked to physical, mental, and relationship functioning, it is critical to examine orgasmic functioning within the broader multivariate context of sexual health. Thus, the current review examined orgasmic functioning alongside the other key aspects of sexual health, including sexual satisfaction, desire, lack of pain, vaginal lubrication, and erectile function. This allowed us to uncover the unique links between each aspect of sexual health and various aspects of individual functioning.

**Modeling Sexual Health.** Although scales like the FSFI and IIEF served to operationalize as many as eight distinct facets of sexual health across men and women, those aspects of sexual health are fundamentally interrelated and therefore notably correlated with one another. Thus, in examining the links between components of sexual health and various aspects of well-being, the current review sought to incorporate those interrelations within multivariate path models. Specifically, the current review conceptualized sexual satisfaction as an overarching construct and the other components of sexual health as key contributors to that global evaluation.

## Overview of Research on Orgasms

To ground the current review within a broader perspective of the diversity of studies that have examined orgasmic functioning, the following sections provide a brief overview of the broader orgasmic functioning literature. The following overview also allows us to briefly review many of the studies that helped to shape the various fields of research on orgasms but did not meet the criteria to

be included in the current meta-analysis. Finally, it allows us to describe some specific studies to provide a deeper sense of the methods commonly used across these studies. Within the literature, experiencing orgasms has been assessed and quantified in three main ways: (1) frequency of orgasms within a recent time frame (e.g., in the last month), (2) consistency of achieving orgasms from sexual activity (e.g., proportion of sexual encounters or activity that results in orgasms), or (3) a group contrast between individuals experiencing orgasms and those not experiencing orgasms (either at a lifetime level or from recent sexual activity). Given these differing operationalizations, we will use the terms “orgasmic functioning,” “orgasms,” and “experiencing orgasms” as umbrella terms to represent all three conceptualizations.

**Orgasm Gender Gap.** When examining the salience of orgasms in the lives of men and women, the first issue that needs to be acknowledged is that the ability to achieve orgasms is quite different across the sexes. For example, a nationally representative sample of Australians suggested that 95% of men achieved orgasm in their most recent sexual encounter, compared to only 69% of women (Richters et al., 2006). Consistent with this, data from a national probability sample of 3,159 individuals in the United States (the National Health and Social Life Survey) suggested that although 75% of men reported “always” having an orgasm during sexual activity with a partner, only 29% of women reported the same level of consistency (Laumann et al., 2000). These findings were echoed in a sample of 833 college students with 28% of women and only 3% of men reporting never orgasming with partners, and another 23% of women and only 3% of men reporting only “sometimes” orgasming (Wade et al., 2005). In fact, estimates from a national sample of over 52,000 adults suggest that 95% of heterosexual men in the United States are able to experience orgasms from sexual activity compared to only 65% of heterosexual women (Frederick et al., 2018). Women experience orgasms significantly less frequently than men in casual sexual encounters as well as in committed relationships (e.g., Armstrong et al., 2012; Blair et al., 2018; Frederick et al., 2018). Although they have triggered debate within the field (e.g., Brody et al. 2018; Levin, 2007, 2012a, 2012b; Prause, 2012a; Prause, 2012b), a number of studies have even suggested that gender differences might appear most pronounced (and show particularly strong associations) for specific types of orgasms from specific forms of sexual activity (e.g. penile-vaginal intercourse—PVI—without clitoral stimulation; e.g., Blair et al., 2018; Brody & Costa, 2008, 2009; Brody et al., 2010; Costa & Brody, 2007; see Brody, 2006, 2010 for reviews). Despite results suggesting that men and women report comparable levels of overall satisfaction with their sex lives (e.g., Shaw & Rogge, 2016), similar gender differences to those observed with orgasms have emerged for reports of sexual desire (e.g., Regan & Atkins, 2006) and sexual pain (e.g., Rosen, 2000; Stephenson et al., 2011).

**Orgasms as Health Correlates.** In the medical and treatment literature, the frequency and the ability to achieve orgasms has often been conceptualized as a health correlate. For example, in depression and depression treatment research, difficulty or inability to achieve orgasms has often been studied as a correlate of depressive symptoms (e.g., Chang et al., 2012; Kuffel & Heiman, 2006; Laurent & Simons, 2009), as well as a side effect of antidepressant medication (especially selective serotonin reuptake inhibitors; e.g., Berman et al., 2011; Khazaie et al., 2015; Krishna et al., 2011). Orgasmic functioning has also been examined as a secondary symptom in studies of Parkinson’s disease (e.g., Celikel et al., 2008; Lipe et al., 1990), multiple sclerosis (e.g., Fragla et al., 2014; Sahay et al., 2012), cancer (e.g., Brotto et al., 2008; Flynn et al., 2013), chronic pain (e.g., Aubin et al., 2008; Ciftci et al., 2011), and other medical disorders that may impact sexual functioning (e.g., Atarodi-Kashani et al., 2017; Bouhlef et al., 2017; Caruso et al., 2012; Strizzi et al., 2015). Although not the primary focus of these studies, this has yielded a body of work linking the symptom of orgasmic difficulties to depressive symptoms.

**Difficulty with Orgasms as a Disorder.** In addition to exploring orgasm difficulties as a secondary dysfunction associated with existing medical disorders, they have also been investigated as primary sexual dysfunctions (e.g., Meston et al., 2004a). The 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2013) lists a number of sexual dysfunctions, including those of arousal, drive, and pain. It specifically includes three

disorders of orgasm functions: Female Orgasmic Disorder, Delayed Ejaculation, and Premature (Early) Ejaculation (American Psychiatric Association, 2013). While there is some literature exploring the nature, presentation, and etiology of specific sexual dysfunctions (e.g., Brody, 2017; Feldman & Larsen, 2014; Graham, 2014; Hunter & Goodie, 2017; Laan & Rellini, 2012), most research in this area aggregates sexual dysfunctions when examining their correlates (e.g., Du et al., 2016; Galinsky, 2012) rather than examining specific (e.g., orgasmic) sexual dysfunctions separately. That literature has robustly demonstrated the negative correlates of such disorders for individual and interpersonal functioning, highlighting importance of healthy sexual functioning in daily life (e.g., Amicis et al., 1984; Fisher et al., 2005; Jiann et al., 2013).

**Orgasms as a Relationship Process.** A small but growing body of literature has begun to examine sexual behavior as a key process in romantic relationships. Findings across this body of work suggest that frequency of orgasms is positively linked to other aspects of sexual health (e.g., greater sexual desire and satisfaction, less time needed to achieve sexual arousal; e.g., Brody, 2007; Hurlbert & Whittaker, 1991). Studies have also linked orgasms to greater relationship quality and marital satisfaction (e.g., Brody & Weiss, 2011; Costa & Brody, 2007; Guo et al., 2004; Hurlbert & Whittaker, 1991; Rowland & Kolba, 2019) and to greater relationship investment (e.g., Ellsworth & Bailey, 2013). Although a majority of these studies have focused specifically on the importance of women's orgasms, a handful of studies have linked higher rates of orgasm consistency and frequency in men to higher levels of sexual satisfaction (e.g., Brody & Costa, 2009; Morokqff & Gilliland, 1993), relationship satisfaction (e.g., Brody & Costa, 2009; Frederick et al., 2018), and even lower mortality (e.g., Abramov, 1976; Persson, 1981).

**Orgasms as a Source of Well-Being.** A promising vein of research focused primarily on orgasms in the lives of women has begun to examine links between sexual activity and individual well-being. For example, women who reported greater frequency of orgasms reported higher self-esteem (e.g., Hurlbert & Whittaker, 1991), lower subjective stress (e.g., Bodenmann et al., 2010; Pakpour et al., 2015), more effective life coping skills (and lower use of maladaptive coping strategies; e.g., Borissova et al., 2001; Brody et al., 2010). Inability to achieve orgasms on the other hand has been linked to higher attachment anxiety and lower overall satisfaction with life, health, and romantic relationships (e.g., Costa & Brody, 2011). The vast majority of the studies examining these links have been cross-sectional in nature, leaving potential directions of causality unclear. Results from one of the few studies to have employed a longitudinal design suggested that women's enjoyment of sexual intercourse and men's frequency of sexual intercourse was linked to greater longevity (i.e., longer life spans; Palmore, 1982).

## Sexual Health Correlates

Extending the review of research focused on orgasmic functioning, the remaining aspects of sexual health have demonstrated similar links to physical and mental health as well as interpersonal functioning. For example, due in large part to the widespread adoption of the FSFI and IIEF within the medical literature, sexual satisfaction, sexual desire, a lack of sexual pain, and vaginal lubrication have each demonstrated links to lower psychological distress (e.g., Lew-Starowicz & Rola, 2014; Onem et al., 2008), lower attachment anxiety and attachment avoidance (e.g., Pinsky, 2016; van der Brink et al., 2016), greater well-being (e.g., Artune-Ulkumen et al., 2014; Demir et al., 2013), greater physical health (e.g., Khnaba et al., 2016; Morales et al., 2013), and greater relationship satisfaction (e.g., Stephenson & Meston, 2015; Witting et al., 2008a). This large body of predominantly cross-sectional findings therefore highlights the importance of examining the correlates of orgasms within the broader context of multiple forms of sexual health.

## Organizing Conceptual Framework

Much of the work examining orgasms has adopted a more clinical or practical approach, examining the correlates of orgasms to inform the treatment of medical and/or sexual disorders. The



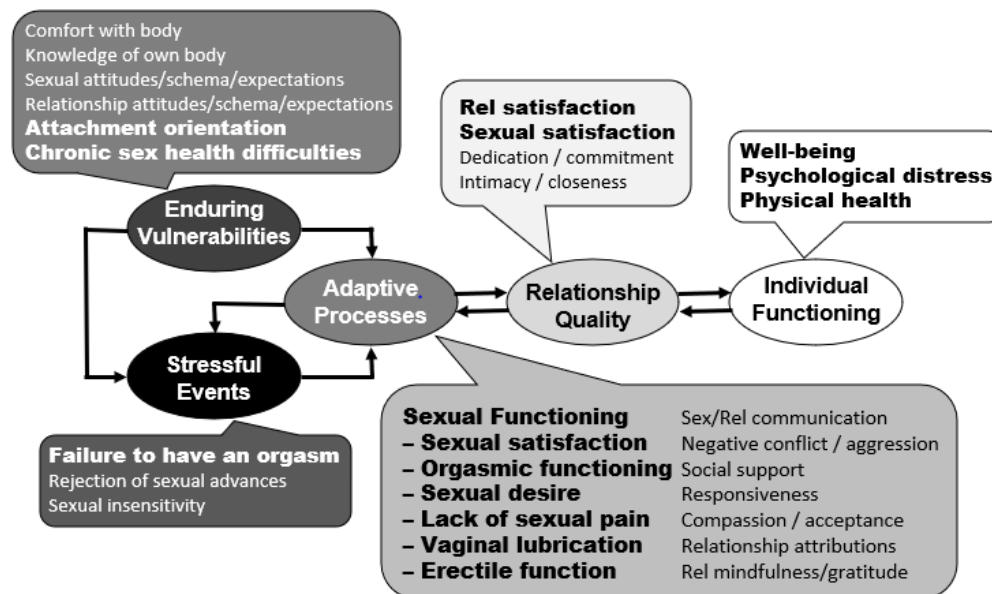
bulk of the work in this area has therefore been atheoretical by design. To begin to integrate this growing body of work into a coherent theoretical framework of both individual and relationship functioning, the current review drew upon the Enduring-Vulnerability Stress-Adaptation model of relationship functioning (EVSA; Karney & Bradbury, 1995) as well as the Attachment System Activation model (ASA; Shaver & Mikulincer, 2002). These models therefore informed the selection of correlates to be examined within the meta-analysis.

**Enduring-Vulnerability Stress-Adaptation Model.** In their EVSA model, Karney and Bradbury (1995) highlight three key sets of processes that interact to shape the course of relationships over time: (1) enduring vulnerabilities (i.e., jagged edges of their personalities that individuals bring with them into relationships such as personality traits and attachment orientations), (2) stressful events (i.e., external events that could impact a relationship such as getting fired, illness, and conflict with family), and (3) adaptive processes (i.e., the adaptive and maladaptive dyadic processes that couples engage in response to life stressors, including constructs such as emotional support, negative conflict, and forgiveness; see Figure 1A for the full EVSA model). Within the EVSA model, enduring vulnerabilities can directly affect how partners interact with one another within the relationship (influencing dyadic adaptive processes), how the partners adapt in stressful situations (potentially interacting with life stress to exacerbate its impact on relationships), and can even serve to generate stressful life events for the couples to navigate. Stressful events are conceptualized as potentiating events that exert pressure on couples, forcing them to engage their emotion regulation and dyadic coping skills in response. Finally, the dyadic adaptive processes are viewed as most proximally linked to relationship quality, with healthy patterns of interaction helping to buffer relationships from the adverse effects of stress and enduring vulnerabilities, whereas maladaptive patterns are posited to exacerbate those negative effects. Notably, within the EVSA model, enduring vulnerabilities and maladaptive dyadic processes are presumed to require triggering by stressful life events to exert their full influence on relationship quality.

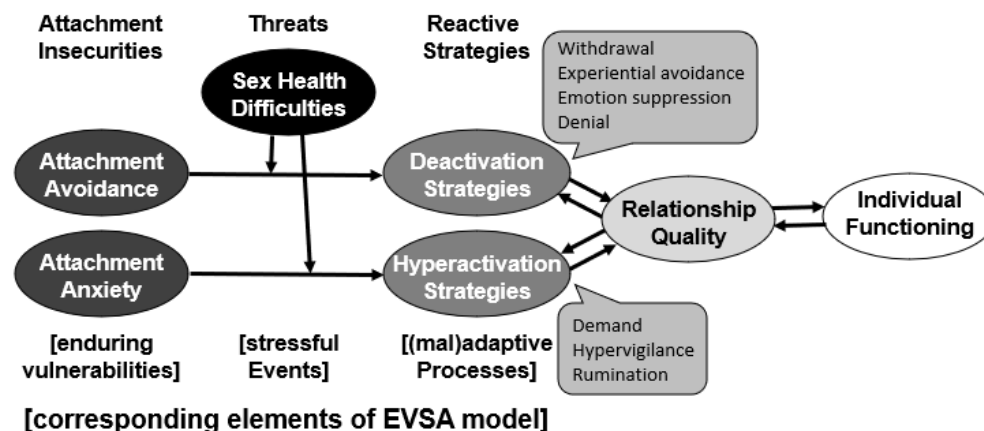
Extending this model to focus specifically on sexual functioning (see Figure 1A), enduring vulnerabilities would likely include a diverse array of constructs such as comfort and knowledge of own body, biological difficulty in achieving orgasms, attitudes toward sex, and attachment orientation, as those trait-like qualities could not only influence dyadic behavior (e.g., affecting how individuals approach sexual activity and sexual communication), but could also serve to generate stress within the relationship (e.g., generating tension over differing views and expectations surrounding the sexual component of their relationships, generating disappointing sexual/intimate encounters). In the context of the EVSA model, failure to have an orgasm within a specific sexual encounter could be conceptualized as a stressful event, potentially interacting with enduring vulnerabilities like sexual expectations, and triggering the need for adaptive processes like greater sexual responsiveness, sexual communication, as well as compassion and empathy. The EVSA model would therefore suggest that adaptive processes like strong emotional support and healthy sexual communication would likely buffer relationships from any possible adverse effects of difficulties with orgasms, whereas maladaptive processes (e.g., withdrawal, avoidance, hostile behavior) would likely exacerbate those adverse effects. In fact, within the context of the EVSA model, the ability to consistently achieve orgasms during sexual activity with a partner could also be modeled as another adaptive process, thereby serving to buffer the relationship from stressful events or the jagged edges of both partners' personalities. As the need for feeling connected to others has been conceptualized as a fundamental human need (Deci & Ryan, 2000), we conceptualized romantic relationship quality as a key marker of this basic need. As a result, we posited that relationship quality would serve as the most proximal factor (and therefore likely the main mechanism) linking sexual relationship processes to individual well-being.



### A) An Enduring-Vulnerability Stress-Adaptation (EVSA) Model of Sexual Functioning



### B) An EVSA Informed Attachment System Activation (ASA) Model of Sexual Functioning



**Figure 1.** Conceptual Models Integrating Sexual Health into Models of Relationship and Individual Functioning. Note. Bolded constructs in panel A correspond to search terms used to identify potential correlates.

**Attachment System Activation Model.** To link the current investigation to another robust model in the field of couples research, the current study also conceptualized the ASA (Shaver & Mikulincer, 2002) as a more fine-grained model informed by the EVSA model. The ASA model (Figure 1B) expands upon Bowlby's (1969/1982, 1973, 1980, 1988) attachment theory by applying it to adult romantic relationships. Specifically, the ASA model highlights three main components: (1) appraisal of a threat (i.e., something causing stress to a relationship or triggering attachment insecurities), (2) individual attachment insecurities (most commonly conceptualized as attachment avoidance and attachment anxiety), and (3) reactive strategies (i.e., behavioral responses to a threat). Thus, within the ASA model, attachment insecurities are not conceptualized as directly impacting relationship quality. Instead, some sort of threat is required to activate the attachment system, triggering specific behavioral reactions involving either deactivating (e.g., withdrawal, emotion suppression) or hyperactivating (e.g., hypervigilance, rumination) strategies. Given this conceptualization, we see clear links between the ASA model and the EVSA model, as the ASA model

takes a specific enduring vulnerability of attachment, concentrates on a specific subset of (mal)adaptive processes (i.e., deactivation and hyperactivation strategies), and conceptualizes threats as potentiating the activation of that system in a manner similar to the role of life stress in the EVSA model. Although sexual functioning could be considered an independent system from the attachment system, we assert that the ASA model could be meaningfully applied to sexual functioning. From a sexual functioning perspective, orgasm difficulties and a failure to achieve an orgasm during a sexual encounter with a partner could be conceptualized as a clear threat, activating the attachment system, and thereby promoting deactivation and hyperactivation strategies. Thus, a partner with high levels of attachment avoidance (i.e., feeling uncomfortable with emotional disclosure and intimacy) might withdraw when faced with orgasm difficulties, avoiding communication as well as avoiding further sexual intimacy. Such deactivation strategies would in turn impact relationship quality and eventually individual functioning over time. In contrast, a partner with high levels of attachment anxiety (i.e., a general tendency to feel that partners do not love you as much as you love them leading to excessive preoccupation and worry) might hyper-engage their partner when faced with orgasm difficulties, ruminating over the issue, and possibly becoming demanding and requiring excessive validation. Given this conceptual framework, the current review focused on examining an array of correlates of orgasms spanning the various components of these models (see bolded examples in Figure 1).

## Previous Reviews

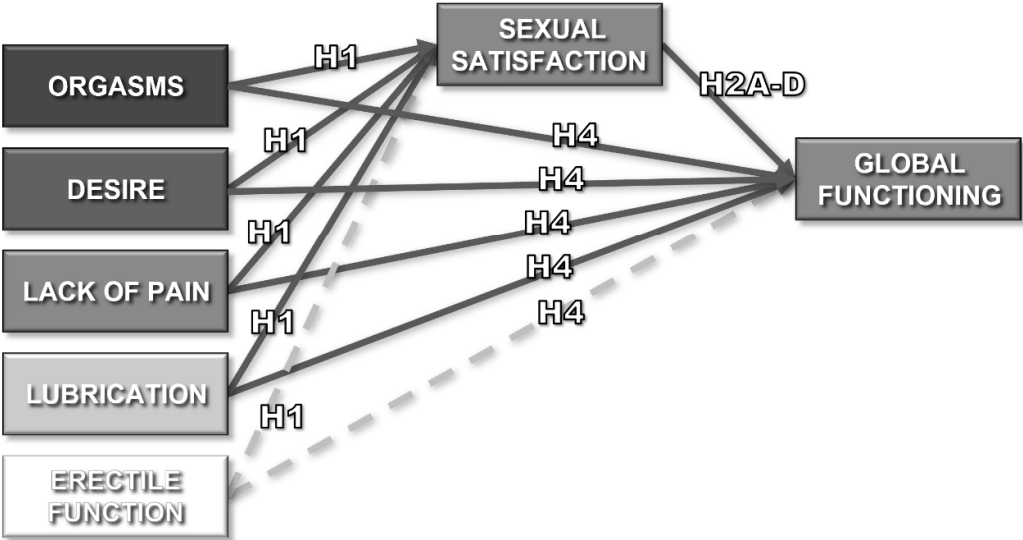
The current comprehensive literature search (described below) failed to identify any published systematic reviews or meta-analyses focused on examining the correlates of orgasms. However, the current literature search did uncover a number of published narrative and systematic reviews that focused on distinct but related topics. For example, White and Reamy (1982) published a review of 74 articles examining sex during pregnancy, however none of their articles overlapped with the current sample of 173 records. Similarly, narrative reviews of female sexual functioning in old age (Wood et al., 2012; 3 of its 58 articles overlapped with the current review), the health benefits of various sexual activities (Brody, 2010; 9 of its 174 studies overlapped), the psychological and interpersonal correlates of sexual dysfunction (Brotto et al., 2016; 1 of its 364 articles overlapped), and links between sexual activity and both physical and mental health (Levin, 2007; 5 of its 74 articles overlapped) demonstrated similar low levels of overlap with the current review. Finally, although Meston and colleagues (2004b) published a narrative review of 323 articles examining women's orgasms, the extremely broad scope of that review represented such a distinct focus that none of its articles overlapped with those in the current meta-analysis. Thus, the current review offers a unique quantitative contribution to the current literature, integrating findings across a wide range of disparate fields and then testing novel path models to evaluate unique (i.e., incremental) links from the various aspects of sexual health to the correlates examine. It also represents the first review to systematically examine the correlates of orgasmic functioning within the broader context of a multivariate conceptualization of sexual health, evaluating the unique links between orgasms and both individual and interpersonal functioning after controlling for other key aspects of sexual health.

## Present Meta-Analysis

With the aim of integrating and summarizing research across various domains of functioning, the current study draws from literature in social psychology, clinical psychology, and the medical literature to provide a meta-analytic review of associations between orgasms, and individual and relationship functioning. Based on the previous literature, we anticipated that all six of the sexual health dimensions (i.e., sexual satisfaction, orgasms, sexual desire, lack of pain, lubrication, erectile function) would show significant bivariate meta-analytic correlations to lower distress, greater well-being, better physical health, higher relationship satisfaction/quality, lower attachment anxiety, and lower attachment avoidance. To extend that bivariate literature, our hypotheses focused on a set of

multivariate path analyses examining unique links between aspects of sexual health and the correlates. Notably, the multivariate question of unique or incremental predictive validity among aspects of sexual health (when examining links to correlates) represents an entirely novel contribution to the field, as it had not been explored across the 1,012 full-text records screened for the current meta-analysis, nor within the 173 records within the current meta-analysis. As seen in Figure 2, we conceptualized the more focused indicators of sexual health (orgasms, sexual desire, lack of pain, lubrication, & erectile function) as individual components feeding into sexual satisfaction. Thus, higher levels of functioning on each of those key components were hypothesized to uniquely promote greater sexual satisfaction (i.e., incrementally contributing to greater positive global evaluations; Hypothesis 1). As seen in Figure 2A, for four of the correlates examined (i.e., distress, well-being, physical health, relationship satisfaction), we hypothesized that sexual satisfaction would demonstrate strong proximal links to those more global forms of functioning. Thus, we hypothesized that even after controlling for the other forms of sexual health, higher sexual satisfaction would predict lower distress (Hypothesis 2A), greater well-being (Hypothesis 2B), better physical health (Hypothesis 2C), and higher relationship satisfaction/quality (Hypothesis 2D). Those hypotheses thereby propose that the more specific indicators of sexual health would be indirectly linked to the individual global functioning correlates via their links with sexual satisfaction (Hypothesis 3). After controlling for those indirect links, we further hypothesized that those more specific components of sexual health (including orgasmic functioning) would show unique predictive links to this set of correlates, further highlighting the central nature of sexual health in the lives of individuals (Hypothesis 4). As attachment avoidance and anxiety reflect more stable characteristics that individuals bring into sexual relationships and encounters (consistent with the EVSA and ASA models), we used a different model to examine associations between those correlates and sexual health. As shown in Figure 2B, we hypothesized that greater attachment insecurities would be linked to lower levels of sexual functioning on the more focused indicators (Hypothesis 5), thereby showing indirect links to lower sexual satisfaction (Hypothesis 6). Even after controlling for those indirect paths involving the more focused aspects of sexual health, we finally hypothesized that greater attachment insecurities would be uniquely linked to lower sexual satisfaction (Hypothesis 7).

A) Sexual health predicting global functioning



B) Attachment predicting sexual health

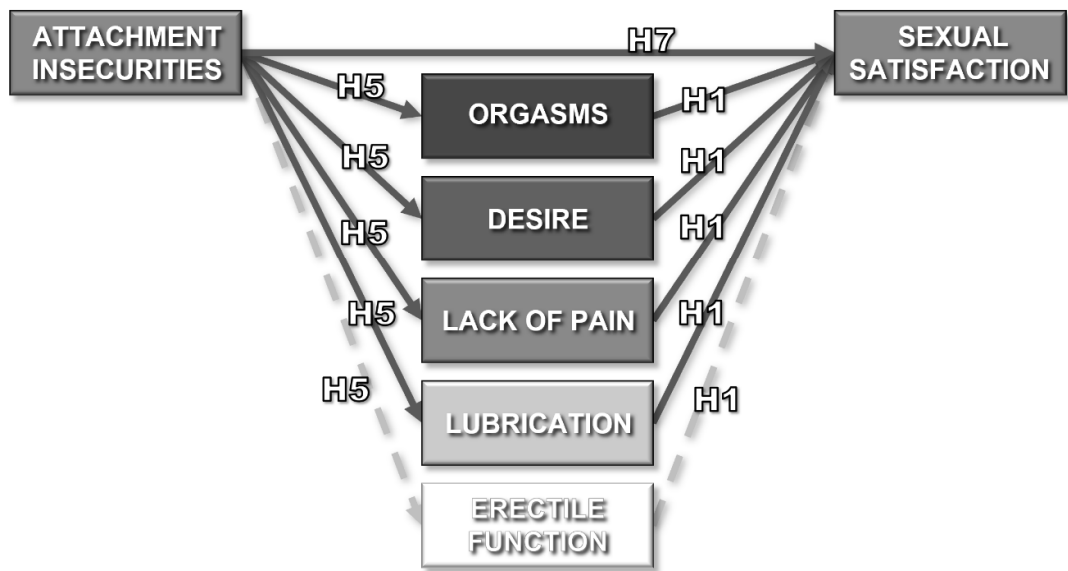


Figure 2. Hypotheses to be Tested in Path Models.

**Potential Moderators.** Drawing from previous research, the current study examined a set of moderators primarily focused on identifying subpopulations more likely to experience difficulties achieving orgasms, hypothesizing that the associations with experiencing orgasms would be stronger in those challenged populations. Given the marked gender disparities already uncovered in this field of research (e.g., Armstrong et al., 2012; Blair et al., 2018), gender of participants was used as the primary moderator, anticipating that the correlations might be stronger in women given their lower rates of achieving orgasms. To allow the analyses to be sensitive to the demographic differences across samples, a number of study-level moderating variables were also extracted and examined. As sex drive and sexual performance vary with age (e.g., Gades et al., 2008; Twenge et al., 2017), orgasms might take on substantively different levels of salience for psychological and relationship health across the lifespan. Consequently, the average age within each sample was tested as a possible moderator, anticipating that orgasms might show stronger associations in older individuals. In addition, given the lower levels of sexual health found among individuals suffering from mental or physical disorders (e.g., Atarodi-Kashani et al., 2017; Chang et al., 2012), the type of population sampled within each study (i.e., clinical or nonclinical) was also examined as a moderator, anticipating that the associations would be stronger within clinical populations. Finally, to directly examine any potential publication bias, the publication status of each study (i.e., published or unpublished research) was examined as a possible moderator. If publication bias was present, we hypothesized that the association biases would therefore be stronger within the published literature.

Method

Selection of Records

A systematic literature search was conducted in accordance with PRISMA guidelines (Moher et al., 2009), using *PsychINFO* via *OVID*, *PubMed*, and *Web of Science* for records available through the end of February 2020. As the primary goal of the current review was to synthesize the research on orgasmic functioning, we specifically searched for records containing appropriate orgasm variables. As such, keywords representing orgasms included: *orgasm*, *orgasm/ic frequency*, *orgasm/ic consistency*, or *orgasm/ic ability*. To ensure that broader forms of sexual health were also represented, we also included the keyword of *sexual satisfaction*. Keywords representing individual functioning included:

*attachment, depression, distress, life satisfaction, loneliness, positive affect, negative affect, stress, well-being, or vitality.* Keywords representing relationship functioning included: *maintenance behavior, relationship conflict, relationship longevity, relationship quality, relationship satisfaction, relationship stability, and support.* Records were evaluated if they contained at least one of the orgasm terms and at least one of the terms from the other search categories.

#### *Inclusion and Exclusion Criteria*

Records were eligible for inclusion in analyses based on the following criteria:

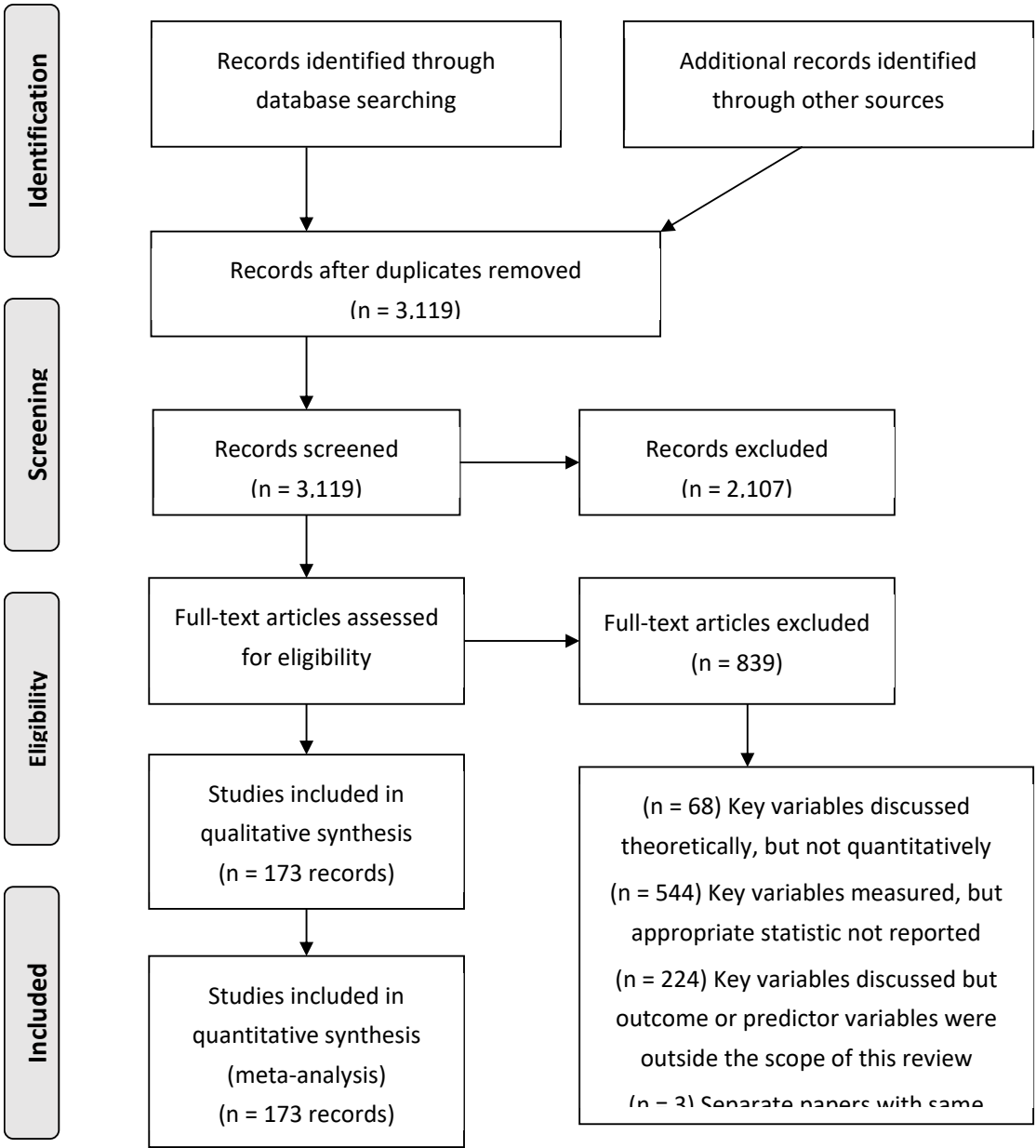
- (1) written in English, Spanish, or Polish;
- (2) consisted of human participants only;
- (3) contained independent samples (i.e., providing effects within a group of participants that have not been previously published in other articles out of that sample);
- (4) included a measure of orgasms (i.e., orgasm consistency, difficulty, frequency, or general ability/inability to have an orgasm) resulting from sexual intercourse;
- (5) included a measure of individual functioning (i.e., attachment, depression, distress, life satisfaction, loneliness, psychological well-being, negative affect, stress, well-being, vitality) or relationship functioning (i.e., maintenance behavior, relationship conflict, relationship longevity, relationship quality, relationship satisfaction, relationship stability, sexual satisfaction, support);
- (6) provided statistical indices of the association between orgasms and individual or relationship functioning within the record (if relevant variables were measured but an effect of their association was not reported, authors of the record were contacted via repeated emails in an attempt to collect the relevant statistic);
- (7) reported an effect size specifically either in the form of a Pearson's  $r$  correlation coefficient, a standardized regression coefficient, or other statistical value from which a Pearson's  $r$  correlation coefficient or standardized regression coefficient could be computed (e.g., a 2 by 2 chi-squared, a Cohen's  $d$ ; see Method Statistical Analyses for transformation formulas used).

Following these criteria, the initial database searches (of *PsychINFO* via *OVID*, *PubMed*, and *Web of Science*) yielded a total of 2,464 unique records that were screened for eligibility based on their titles and abstracts (see Figure 3 for a PRISMA diagram). In order to maximize inclusion of unpublished records, *Google Scholar* was used to conduct a comprehensive reverse citation on some of the most relevant and highly cited articles (included in the current meta-analysis) and on 3 relevant review articles (Brody, 2010; Levin, 2007; Meston et al., 2004b). This yielded another 750 records for a total of 3,119 unique records. Screening of the titles and abstracts of those records yielded 1,012 full-text articles that were screened by both authors, yielding a final set of 173 unique records representing 205 independently analyzed (sub)samples.

#### *Data Extraction and Coding Procedure*

A coding procedure was developed to extract relevant information from each study, including record level- and sample level-characteristics. Record level-characteristics included: record authors, year of publication, record title, journal, and record type (i.e., published and peer-reviewed article, dissertation, thesis, or book chapter). Sample level-characteristics included: sample size for each specific effect extracted, mean age of participants, percentage of male participants, percentage of Caucasian participants, percentage of married participants, country of sample population, and whether the sample was clinical or community based. Effects representing bi-variate associations among the six dimensions of sexual health were extracted whenever possible, as were bi-variate associations between the dimensions of sexual health and the six correlates (psychological distress, psychological well-being, physical health, relationship satisfaction, attachment avoidance, and attachment anxiety). Given the possibility that gender might moderate the associations between aspects of sexual health and well-being, we extracted separate effects for men and women whenever

possible, thereby treating male and female respondents as distinct subsamples within the records presenting results by gender. Similarly, as the links between sexual health and individual functioning might differ within clinical and nonclinical populations, we extracted separate effects for those two populations whenever possible. We therefore use the term (sub)samples to refer to the resulting 205 distinct samples identified within the 173 records as some of those represent the full sample of a record and others represent subsamples. For a comprehensive overview of (sub)sample characteristics, see Table 1.



**Figure 3.** Flowchart detailing record search, record screening, data inclusions, and data exclusions. Note. The PsycINFO search was set up to automatically remove duplicate records.

All extracted effects were evaluated for directionality to ensure that they were coded in appropriate directions. In the two records that offered similar correlational effects for two separate orgasm dimensions (orgasm consistency and frequency; Hurlbert et al., 1993; Klapilova et al., 2015), the two effects were averaged to prevent overrepresentation of those samples in the resulting meta-analyzed effects. The data extraction process was conducted and checked independently by both



authors. Discrepancies were rare (< 1%) and were resolved through discussion until a consensus could be reached. A total of 930 relevant effects were extracted from the 205 (sub)samples.

### *Classification of Variable Domains*

**Classification of Sexual Health.** Sexual health dimensions consisted of sexual satisfaction, orgasms, sexual desire, lack of pain, lubrication, and erectile function, and were most commonly measured using (1) the Female Sexual Function Index (FSFI-S; Rosen et al., 2000; used in 40% of the records), (2) single items developed for each study (used in 23% of the records), or (3) the International Index of Erectile Function (IIEF; Rosen et al., 1997; used in 8% of the records) with the remaining 29% of studies using a method of assessment unique to each study.

Sexual satisfaction was defined as a general satisfaction with sexual activity and overall sexual life (e.g., *"How satisfied have you been with your sexual relationship with your partner?"*). Orgasms were operationalized as a general ability to experience orgasms (i.e., group contrast between people who have had at least one orgasm from people who have not; e.g., *"Within the past 12 months, have you been unable to achieve orgasms?"*), consistency of orgasms (i.e., percentage or proportion of sexual encounters resulting in orgasms; e.g., *"When you had sexual stimulation or intercourse, how often did you reach orgasm (climax)?"*), or orgasm frequency (i.e., count of orgasms experienced during sexual encounters over a specific time frame; e.g., *"On how many days in the last month did you orgasm during sexual activity?"*). Sexual desire was conceptualized as a desire or interest in sexual activity (e.g., *"How would you rate your level / degree of sexual desire or interest?"*). Lack of pain was defined as lack of discomfort or pain during or following vaginal penetration (e.g., *"How would you rate your level / degree of discomfort or pain during or following vaginal penetration?"*). Lubrication was defined as the ease and ability to become lubricated or maintain lubrication during sexual activity or intercourse (e.g., *"How difficult was it to become lubricated ("wet") during sexual activity or intercourse?"*). Erectile function was conceptualized as the ability to become erect or maintain an erection during sexual activity or intercourse (e.g., *"How often were you able to get an erection during sexual activity?"*).

**Classification of Correlates.** As represented in Figure 1, the current literature review aimed to extract correlates representing key components of the EVSA and ASA models. Although we attempted to assess a broader range of correlates (including the relationship factors of negative conflict, social/emotional support, and relationship stability), only seven distinct correlate domains emerged as having been examined within the previous literature: (1) psychological distress, (2) psychological well-being, (3) physical health, (4) attachment anxiety, (5) attachment avoidance, (6) relationship satisfaction, and (7) sexual satisfaction. Although a majority of the (sub)samples used well-validated measures (see the most commonly used measures listed below), 26% of the (sub)samples used single items to assess these correlates.

**Relationship Satisfaction.** Relationship satisfaction was defined as a general satisfaction or happiness within a romantic relationship, reflecting its overall quality. This domain included a variety of variables fitting this definition, including relationship satisfaction, marital satisfaction, relationship quality, marital adjustment, and dyadic adjustment. Despite the range of construct names, these scales contained extremely similar item content (e.g., *"How satisfied are you with your relationship?"* *"How rewarding was your relationship?"* *"How warm and comfortable was your relationship?"*). The most common measure used to assess relationship satisfaction was the Relationship Assessment Scale (RAS; Hendrick et al., 1998).

**Psychological Distress.** Psychological distress was defined as a difficult or negative psychological experience. This domain therefore included the more specific constructs of: depressive symptoms (e.g., the Beck Depression Inventory; BDI; Beck, et al., 1996), psychological distress (e.g., the Mood and Anxiety Symptom Questionnaire; MASQ; Watson & Clark, 1991), anxiety (e.g., Hospital Anxiety and Depression Scale; HADS; Zigmond & Snaith, 1983), negative affect (e.g., the Positive and Negative Affect Schedule; PANAS; Watson et al., 1988), and stress (e.g., the Perceived Stress Scale; PSS; Cohen et al., 1983).

**Psychological Well-Being.** Psychological well-being was defined as an adaptive or positive psychological experience and therefore included the constructs of: vitality (e.g., the Short-Form Health Survey; SF-36; Ware & Sherbourne, 1992), positive affect (e.g., the PANAS; Watson et al., 1988), well-being or mental adjustment (e.g., Martin et al., 1995), quality of life (e.g., the Quality of Life scale; QOL; Heinrichs et al., 1984), and life satisfaction (e.g., the Satisfaction With Life Scale; SWLS; Diener et al., 1985).

**Physical Health.** Physical health was defined as the perceived overall quality of physical health (e.g., “My health is excellent”). Eight of the nine records reporting physical health as an orgasm correlate used the Short-Form Health Survey (6 records used the SF-36; Ware & Sherbourne, 1992; 2 records used the SF-12; Ware et al., 1996). The remaining records used the World Health Organization Quality of Life Assessment (WHOQoL; WHOQoL Group, 1998).

**Attachment Anxiety and Avoidance.** All records reporting attachment anxiety and avoidance as orgasm correlates used the Experiences in Close Relationships Questionnaire—Revised (ECR; Fraley et al., 2000).

### Statistical Analyses

**Transforming Effects.** A majority of the records presented effects as correlations (75%). When both the orgasm experience and correlates were converted into group contrasts (creating an effect in the form of a chi-squared, 7% of effects), that effect was first converted into a 2x2 chi-squared with one degree of freedom (collapsing groups if necessary). That allowed the use of the following formula to transform those values into Pearson’s  $r$  correlations (see Rosenberg, 2010 for the  $k$  correction to the typical formula):  $r = \sqrt{c^2/nk}$ , in which  $\chi^2$  represents the chi-squared value,  $n$  represents the total number of participants used in the analysis, and  $k$  represents the ratio of proportions between groups (i.e., individuals able to achieve orgasms vs. individuals unable to achieve orgasms). When an odds ratio value was provided (4% of effects), the following formula was used to transform this value to a standardized regression coefficient:  $b = \ln(OR)$ . All effects presented as regression coefficients (11%) were transformed into correlations:  $r_{xy} = b_x \cdot (SD_x/SD_y)$ . When group means, standard deviations, and numbers of participants were provided (3% of effects), we computed a Cohen’s  $d$  and then transformed that into a Pearson’s  $r$  correlation coefficient:  $r = d/(d^2 + a)$  where  $a = (n_1 + n_2)^2/(n_1 n_2)$ .

**Meta-Analytic Effect Analyses.** Analyses were conducted using Rstudio v.1.1.453 (R Core Team, 2018) using the *foreign* and *metafor* packages (R Core Team, 2017; Viechtbauer, 2010). Given the wide variety of sample populations, sample sizes, measurement instruments, and study designs, we used random-effects models to estimate our meta-analytic effects (Borenstein et al., 2009; Cooper et al., 2009).  $I^2$  estimates were used to estimate levels of heterogeneity among effect sizes. Cochran’s  $Q$  estimates were used to quantify each sample’s weighted contribution to the meta-analysis (Cochran, 1954). All extracted effects in their forms as correlations were transformed to Fisher’s  $Z$  values and weighted by sample size before analysis. These effects were then meta-analyzed, and the results were subsequently transformed back into correlations for ease of interpretation (Lipsey & Wilson, 2001). Meta-analytic effects were interpreted using Cohen’s (1992) correlational effect size guidelines, with  $r = .10$  indicating a small effect,  $r = .30$  indicating a moderate effect, and  $r = .50$  indicating a large effect. The presence of potential outliers was assessed using the *influence.measures* function, which calculates outlier diagnostics (e.g., studentized residuals, Cook’s distances, covariance ratios), and identifies individual effects that are disproportionately influential to the overall effect. These analyses identified a handful of outlying effects. However, as results from analyses with and without the outliers remained relatively unchanged and excluding outliers could introduce additional biases, all reported results were from analyses conducted including that handful of outlying effects.

**Publication Bias.** Funnel plot asymmetry tests were conducted to evaluate the possibility of publication bias in this set of records. Funnel plots were visually inspected for asymmetrical distribution of effects around the funnel plot. This distribution was further tested using Egger’s regression tests (Egger et al., 1997). If asymmetry was present, Duval and Tweedie’s trim and fill analyses were conducted to estimate the effect sizes that might have emerged without that bias.

(Duval & Tweedie, 2000). Publication bias was further examined using selection method analyses conducted in Rstudio with functions developed and validated by McShane and colleagues (2016). These analyses estimate the relative probability of a contradictory finding (i.e., non-significant or in the opposite direction) being included in the analysis in comparison to the probability of a consistent and significant finding being included. Thus, relative probabilities close to a value of 1.0 would suggest the presence of very little publication bias within the current sample, whereas relative probabilities much lower than 1.0 would suggest publication bias.

**Incremental Prediction Analyses.** To examine the unique links between the various aspects of sexual health and each correlate, path analyses were run on meta-analytic correlation matrices within Mplus 7.11. Although we had planned on including erectile function as a dimension of sexual health in these analyses, there were insufficient studies providing correlations with erectile functioning to create the necessary meta-analytic correlation matrices. This restricted our path analyses to sexual satisfaction and the four remaining sexual health components (orgasms, desire, lack of pain, and lubrication). Sexual satisfaction was typically assessed as a global positive evaluation of individuals' sex lives, and therefore represents an overarching construct to which the other aspects of sexual health contribute. To recognize this within our path models, we allowed the other dimensions of sexual health to predict levels of sexual satisfaction (Figure 2). The correlates representing global functioning (distress, well-being, physical health, and relationship satisfaction) were then modeled as outcomes (Figure 2A), treating global sexual satisfaction as a mechanism linking the more specific components of sexual health to each correlate). The four more specific aspects of sexual health were also allowed to directly predict levels of the correlate, after controlling for: (1) their links to sexual satisfaction, (2) the link between sexual satisfaction and the correlate being examined, (3) the associations among those four more specific indices of sexual health, and (4) the unique predictive links of each of those four indices to the outcome. This allowed our models to estimate the unique predictive associations of each of those indices of sexual health. In contrast, the correlates of attachment anxiety and attachment avoidance were treated as predictors of both the four more focused aspects of sexual health as well as sexual satisfaction (which served as the outcome; Figure 2B). As the path models tested were fully saturated, they yielded perfect fit.

**Moderator Analyses.** Meta-regression (using mixed effects models to accommodate the heterogeneity of the records) was used to assess the degree to which participant gender, participant age, (sub)sample population (i.e., clinical vs. nonclinical), and publication type moderated the associations between aspects of sexual health and the individual and relationship functioning correlates examined. More specifically, we focused our moderation on associations between aspects of sexual health and the correlates with sufficient numbers of (sub)samples to support the analyses: (1) sexual satisfaction (to examine moderation of the contribution of more specific sexual health factors to overall evaluations of sexual well-being;  $k = 118$ ), (2) psychological distress ( $k = 84$ ), (3) psychological well-being ( $k = 20$ ), and (4) relationship satisfaction ( $k = 51$ ). The moderators were entered into the meta-regressions simultaneously, thereby serving as controls for one another so that the analysis evaluated their unique moderation of the meta-analytic effects.

## Results

### *Overview of Records*

Table 1 presents an overarching summary of the 205 (sub)samples yielding the effects for this meta-analysis. Table 2 then presents details on each of the 173 records yielding those (sub)samples to ground the systematic review.

**Participant Characteristics.** Given the orgasm gender gap (e.g., Frederick et al., 2018; Lomann et al., 2000), 70% (121) of the records and 65% (134) of the resulting (sub)samples were focused exclusively on examining sexual functioning within women (Table 1). This general trend was balanced by some large-scale records collecting data from both genders or exclusively from men, yielding data from 46,535 men (29% of the comprehensive sample of 160,466 unique respondents) for

the current meta-analysis. The 205 (sub)samples included in the current meta-analysis were notably international in their scope as the (sub)samples represented 36 different countries (e.g., China, Italy, Poland, Portugal, Turkey). Thus, likely due to the international adoption of scales like the FSFI and the IIEF, the meta-analytic sample is reasonably globally representative, allowing the results to potentially generalize beyond just the United States and Western Europe. The sample was also reasonably diverse with 64% of respondents (within the 89% of the (sub)samples reporting ethnicity) identifying as Caucasian. Sample average ages ranged from 18 to 74 years old with a weighted average age of 38.9, suggesting that a majority of the respondents were in their 20s, 30s, 40s and 50s. Although 26 of the (sub)samples (13%) collected data from college students, the vast majority of the (sub)samples were drawn from community adults or clinical populations. Consistent with this, 75% of participants were cohabiting or married (within the 95 records reporting these statistics) and the sample average relationship lengths ranged from 1.4 to 34.1 years with a weighted mean of 13.8 years (within the 40 records reporting). Taken together, these results highlight a diverse international sample made up largely of young and middle-aged adults typically in long-term romantic relationships.

**Record/Manuscript Characteristics.** Although the 173 records primarily included articles published in peer-reviewed journals ( $k = 158$ , 91%), the comprehensive literature search also uncovered relevant unpublished doctoral dissertations ( $k = 11$ ) and unpublished master's theses ( $k = 4$ ), which were included in the current meta-analyses to help defray the impact of possible publication bias (Table 2). Those records yielded 187 distinct (sub)samples from peer-reviewed articles and 18 (sub)samples from unpublished dissertations and theses (Table 1). In addition, for a majority of the records identified (80%), the correlations between orgasm constructs and well-being were incidental to the main focus of the papers, with the relevant correlations simply showing up in a study-wide correlation matrix without any associated results narrative. In fact, only 45 records (26%) had the words orgasm or sexual satisfaction in the title. Thus, for the vast majority of the records in this meta-analytic sample, the significance of the relevant correlations would likely have had little impact on the publication of those manuscripts.

The (sub)samples had been published across a 49-year span, with a majority of the (sub)samples (69%) having been published in the last 10 years (Table 1). The (sub)samples were a fairly even mix of community adults and adults within specific clinical populations. As seen in Table 1, the clinical (sub)samples represented a large variety of different clinical diagnoses (i.e., 33 distinct diagnoses, including: depression or anxiety, sexual dysfunction, cancer, menopause, and pregnancy). Most of the records included in this meta-analysis were cross-sectional in design (96%; see Table 2), and although eight records contained longitudinal designs, only two reported longitudinal effects between orgasms and relevant correlates such as sexual satisfaction or positive affect (i.e., Burleson et al., 2007; Gunst et al., 2017). Similarly, only five records collected data from both partners within a romantic relationship, and only three of those records (Gewirtz-Meydan & Finzi-Dottan, 2018; Jones et al., 2014; Klapilova, et al., 2015) analyzed the partner data dyadically with approaches like actor-partner interdependence modeling (APIM; e.g., Cook & Kenny, 2005).

**Data Characteristics.** A total of 930 distinct effects were extracted from the 205 (sub)samples, yielding large numbers of effects (ranging from 110 to 280) for the correlates of psychological distress and relationship satisfaction, and smaller numbers of effects (ranging from 25 to 66) for the correlates of well-being, physical health, attachment anxiety and avoidance (Table 1). Although the comprehensive search screened for the relationship processes of negative conflict behavior and social support as possible orgasm correlates, the searches failed to uncover any records having examined those associations. Given the lower rate of studies examining men's sexual health, the literature search only uncovered 9 records demonstrating links between erectile functioning and the correlates examined. Finally, a majority of the subsamples (73%) operationalized orgasm experiences as orgasm consistency (e.g., proportion of times that sexual activity with a partner resulted in achieving an orgasm) due in large part to the widespread use of the FSFI and the IIEF across these literatures.

### *Meta-Analytic Correlations*

The dimensions of sexual health (i.e., sexual satisfaction, orgasms, sexual desire, lack of pain, lubrication, erectile function) were positively associated with one another ( $r = .246$  to  $.551$ ,  $k = 8$  to  $115$ ; see bottom of Table 3 for full results). As anticipated, higher levels on each of the dimensions of sexual health were associated with lower levels of psychological distress ( $r = -.248$  to  $-.135$ ,  $k = 9$  to  $84$ ), higher psychological well-being ( $r = .212$  to  $.376$ ,  $k = 10$  to  $20$ ), higher physical health ( $r = .269$  to  $.370$ ,  $k = 2$  to  $9$ ), lower levels of attachment anxiety ( $r = -.242$  to  $-.145$ ,  $k = 2$  to  $9$ ), lower levels of attachment avoidance ( $r = -.351$  to  $-.124$ ,  $k = 2$  to  $9$ ), and higher relationship satisfaction. ( $r = .141$  to  $.529$ ,  $k = 10$  to  $51$ ).

### *Meta-Analytic Path Analyses*

The meta-analytic estimates of the bivariate associations among the constructs being examined (from Table 3) were submitted as correlation matrices to Mplus to evaluate the unique predictive links between each aspect of sexual health and the individual and interpersonal correlates examined. Table 4 and Figure 4 present the standardized path coefficients generated by these models for each of the correlates. Offering partial support for Hypothesis 1, orgasms, sexual desire, and vaginal lubrication were each uniquely predictive of greater sexual satisfaction (Figure 4A-D) after controlling for their associations with one another. In contrast, lack of sexual pain yielded only a very weak and often non-significant association with sexual satisfaction after controlling for the other dimensions of sexual health. Consistent with Hypothesis 2, sexual satisfaction in turn, uniquely predicted lower psychological distress (Hypothesis 2A, Figure 4A), greater well-being (Hypothesis 2B, Figure 4B), better physical health (Hypothesis 2C, Figure 4C), and higher relationship satisfaction (Hypothesis 2D, Figure 4D), suggesting proximal associations with those indices of global functioning. Asymmetric confidence interval tests suggested significant indirect paths linking more focused components of sexual health to the correlates via higher sexual satisfaction (see Table 4), thereby offering partial support for Hypothesis 3. Thus, greater orgasms, sexual desire, and vaginal lubrication were indirectly linked to better functioning (lower distress and greater well-being, physical health, & relationship satisfaction) through their links to greater sexual satisfaction.



**Table 3.** Associations between Sexual Health and both Individual and Relationship Functioning Correlates.

Category of Results								SM Rel- Prob	Funnel Plot Asym Trim and Fill adj. est.		
Correlate variable									Z	r	k
Sexual health variables		k	N	r	SE	95% CI	Q	I <sup>2</sup>			
Sexual health links to correlates											
Psychological distress											
Sexual satisfaction		53	9851	<b>-.248****</b>	.021	[-.290, -.207]	246.59****	76.19	0.98	0.74	
Orgasms		84	51914	<b>-.244****</b>	.024	[-.292, -.197]	10453.85****	97.11	2.26	0.89	
Desire		54	9875	<b>-.135****</b>	.034	[-.201, -.069]	976.01****	91.41	1.18	-0.95	
Lack of pain		38	7651	<b>-.153**</b>	.047	[-.245, -.061]	1355.70****	94.73	4.22	-0.63	
Lubrication		42	8920	<b>-.143**</b>	.046	[-.233, -.053]	2897.01****	96.26	1.90	-0.48	
Erectile function		9	1087	<b>-.226*</b>	.096	[-.412, -.037]	204.26****	92.42	0.91	0.28	
Psychological well-being											
Sexual satisfaction		14	2141	<b>.376****</b>	.056	[.266, .486]	283.96****	86.84	0.11	-2.17*	<b>.464****</b> 19
Orgasms		20	9260	<b>.258****</b>	.040	[.179, .337]	577.42****	93.68	0.33	-0.75	
Desire		12	3342	<b>.333****</b>	.083	[.170, .496]	318.07****	98.00	2.10	-2.35*	<b>.353****</b> 13
Lack of pain		10	3278	<b>.282****</b>	.074	[.138, .427]	193.68****	95.20	27.33	-2.65***	<b>.332****</b> 12
Lubrication		10	3278	<b>.212**</b>	.066	[.083, .341]	248.39****	91.32	4.65	-0.23	
Erectile function		0	0								
Physical health											
Sexual satisfaction		7	1467	<b>.370**</b>	.121	[.133, .608]	223.23****	93.96	0.56	-2.24*	<b>.428***</b> 8
Orgasms		9	3630	<b>.323***</b>	.083	[.160, .486]	625.69****	96.34	0.03	-1.02	
Desire		8	1543	<b>.336***</b>	.098	[.144, .529]	194.70****	91.31	1.35	-1.57	
Lack of pain		7	1467	<b>.261***</b>	.086	[.093, .430]	74.01****	84.45	43.83	-1.72	
Lubrication		7	1467	<b>.269***</b>	.104	[.065, .473]	112.49****	90.29	4.76	-1.36	
Erectile function		0	0								
Attachment anxiety											
Sexual satisfaction		6	1536	<b>-.242****</b>	.035	[-.310, -.174]	11.74*	59.36	0.88	-0.15	
Orgasms		9	3979	<b>-.149****</b>	.022	[-.193, -.105]	10.43*	64.31	0.91	-2.58**	<b>-.127****</b> 12
Desire		5	1479	-.043	.046	[-.133, .048]	9.43	59.61	0.86	-1.90	
Lack of pain		2	975	<b>-.145****</b>	.031	[-.207, -.083]	0.89	0.00	0.75		
Lubrication		2	975	<b>-.128****</b>	.032	[-.190, -.067]	0.22	0.00	0.75		
Erectile function		1	248								



Attachment avoidance											
Sexual satisfaction	6	1536	<b>-.351****</b>	.064	[-.477, -.225]	40.76****	90.69	0.89	2.25****	<b>-.351****</b>	6
Orgasms	9	3979	<b>-.241****</b>	.029	[-.270, -.158]	24.02**	63.99	0.91	-0.19		
Desire	5	1479	<b>-.124**</b>	.046	[-.213, -.034]	9.71*	64.27	0.86	2.03*	<b>-.124*</b>	5
Lack of pain	2	975	<b>-.165****</b>	.040	[-.243, -.088]	1.58	36.82	0.75			
Lubrication	2	975	<b>-.279****</b>	.070	[-.416, -.142]	5.56*	82.02	0.75			
Erectile function	1	248									
Relationship satisfaction											
Sexual satisfaction	22	45945	<b>.529****</b>	.042	[.447, .611]	6393.69****	99.31	0.04	-2.96**	<b>.589****</b>	27
Orgasms	51	41547	<b>.271****</b>	.033	[.207, .335]	25110.64****	99.14	0.25	-2.02*	<b>.338****</b>	64
Desire	14	6810	<b>.225*</b>	.059	[.110, .339]	907.31****	96.64	3.68	-2.21*	<b>.285****</b>	17
Lack of pain	10	3895	<b>.163**</b>	.057	[.052, .273]	53.01****	89.54	1.38	0.12		
Lubrication	12	6026	<b>.141***</b>	.038	[.066, .216]	69.20****	85.83	1.43	-0.01		
Erectile function	1	248									
Links among sexual health dimensions											
Sexual satisfaction correlating with											
Orgasms	118	103,458	<b>.416****</b>	0.021	[.376, .456]	62950.63****	99.36	0.11	<b>-2.38**</b>	<b>.482****</b>	140
Desire	41	15974	<b>.418****</b>	.033	[.353, .4831]	3243.58****	97.74	4.61	-2.34*	<b>.493****</b>	50
Lack of pain	21	9950	<b>.349****</b>	.057	[.237, .461]	1095.71****	98.13	0.65	-2.98***	<b>.349****</b>	21
Lubrication	24	10852	<b>.459****</b>	.044	[.372, .549]	937.17****	97.79	0.13	<b>-4.24****</b>	<b>.532****</b>	30
Erectile function	10	4605	<b>.461****</b>	.040	[.383, .538]	93.79****	89.65	0.36	0.45		
Orgasms correlating with											
Desire	44	15557	<b>.335****</b>	.027	[.282, .387]	791.52****	92.94	0.32	-2.32*	<b>.381****</b>	52
Lack of pain	22	9244	<b>.372***</b>	.048	[.277, .467]	1233.55****	97.14	0.13	-2.11*	<b>.396****</b>	24
Lubrication	24	10071	<b>.551****</b>	.047	[.460, .643]	1872.90****	99.09	0.04	<b>-5.58****</b>	<b>.563****</b>	25
Erectile function	8	4473	<b>.537****</b>	.039	[.461, .613]	105.00****	91.80	0.10	-1.36		
Desire correlating with											
Lack of pain	22	9244	<b>.246****</b>	.030	[.186, .305]	142.90****	87.74	1.00	0.70		
Lubrication	24	10071	<b>.408****</b>	.028	[.354, .462]	245.57****	90.12	0.04	-1.50		
Erectile function	8	4473	<b>.423****</b>	.076	[.273, .570]	268.43****	97.58	0.10	-1.166		
Lack of pain correlating with											
Lubrication	20	8538	<b>.533****</b>	.041	[.452, .614]	962.50****	97.41	0.05	<b>-3.11**</b>	<b>.572****</b>	23
Erectile function	0										
Lubrication correlating with											
Erectile function	0										

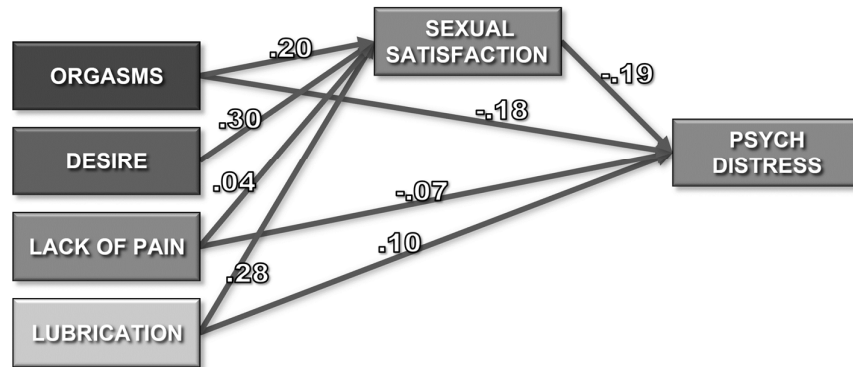
*Note.* SM Rel-Prob = the relative probability of finding a contradictory finding (i.e., non-significant or in the opposite direction to a majority of the other effects for that pair of variables) compared to finding a consistent finding (estimated using the selection method analyses of McShane et al., 2016). Numbers close to 1 suggest no publication bias and numbers over 1 suggest a greater relative likelihood of non-significant or counter-intuitive findings getting published. Funnel Plot Asym Z = Eggers test of funnel plot asymmetry, another test of possible publication bias. Trim and fill methods were used to adjust the estimates of effects showing significant asymmetry. Significant effects have been bolded for ease of interpretation. N/A = These correlations are between constructs measured only in women or men but not in both genders (i.e., unique to either the FSFI or the IIEF but not common to both). \*\*\*\*  $p < .0001$ , \*\*\*  $p < .001$ , \*\*  $p < .01$ , \*  $p < .05$ .

**Table 4.** Results of Path Models on Meta-Analytic Correlation Matrices.

MODEL					MODEL				
Correlate being predicted		99% CIs			Correlate being predicted		99% CIs		
Predictors	b	p	LL	UL	Predictors	b	p	LL	UL
<b>PSYCH DISTRESS MODEL</b>					<b>WELL-BEING MODEL</b>				
SexH → psychological distress					SexH → well-being				
Sexual satisfaction	<b>-.191</b>	<.001	-.227	-.155	Sexual satisfaction	<b>.396</b>	<.001	.336	.457
Orgasms	<b>-.182</b>	<.001	-.217	-.146	Orgasms	.027	.242	-.032	.086
Desire	.005	.678	-.028	.039	Desire	<b>.179</b>	<.001	.124	.235
Lack of pain	<b>-.073</b>	<.001	-.108	-.039	Lack of pain	<b>.281</b>	<.001	.223	.338
Lubrication	<b>.101</b>	<.001	.060	.141	Lubrication	<b>-.248</b>	<.001	-.315	-.180
SexH → sex satisfaction					SexH → sex satisfaction				
Orgasms	<b>.198</b>	<.001	.169	.226	Orgasms	<b>.198</b>	<.001	.144	.251
Desire	<b>.295</b>	<.001	.269	.320	Desire	<b>.295</b>	<.001	.246	.343
Lack of pain	<b>.039</b>	<.001	.011	.067	Lack of pain	.039	.056	-.014	.092
Lubrication	<b>.278</b>	<.001	.246	.310	Lubrication	<b>.278</b>	<.001	.218	.338
Indirect paths					Indirect paths				
Orgasm à SexSat à Distress	<b>-.038</b>		-.047	-.029	Orgasm à SexSat à Well-being	<b>.078</b>		.054	.103
Desire à SexSat à Distress	<b>-.056</b>		-.068	-.045	Desire à SexSat à Well-being	<b>.117</b>		.091	.143
L-pain à SexSat à Distress	<b>-.007</b>		-.013	-.002	L-pain à SexSat à Well-being	.016		-.006	.037
Lube à SexSat à Distress	<b>-.053</b>		-.065	-.041	Lube à SexSat à Well-being	<b>.110</b>		.081	.139
<b>PHYSICAL HEALTH MODEL</b>					<b>REL SATISFACTION MODEL</b>				
SexH → perceived health					SexH → rel satisfaction				
Sexual satisfaction	<b>.301</b>	<.001	.225	.378	Sexual satisfaction	<b>.657</b>	<.001	.616	.697
Orgasms	<b>.125</b>	<.001	.050	.200	Orgasms	<b>.193</b>	<.001	.153	.233
Desire	<b>.147</b>	<.001	.077	.217	Desire	.020	.174	-.018	.057
Lack of pain	<b>.123</b>	<.001	.050	.195	Lack of pain	<b>.057</b>	<.001	.019	.096
Lubrication	<b>-.092</b>	.006	-.177	-.006	Lubrication	<b>-.358</b>	<.001	-.403	-.312
SexH → sex satisfaction					SexH → sex satisfaction				
Orgasms	<b>.198</b>	<.001	.133	.262	Orgasms	<b>.198</b>	<.001	.158	.237
Desire	<b>.295</b>	<.001	.236	.353	Desire	<b>.295</b>	<.001	.259	.330
Lack of pain	.039	.114	-.025	.103	Lack of pain	.039	.010	.000	.078
Lubrication	<b>.278</b>	<.001	.205	.351	Lubrication	<b>.278</b>	<.001	.233	.323
Indirect paths					Indirect paths				
Orgasm à SexSat à Health	<b>.060</b>		.035	.084	Orgasm à SexSat à RelSat	<b>.130</b>		.103	.157
Desire à SexSat à Health	<b>.089</b>		.060	.117	Desire à SexSat à RelSat	<b>.193</b>		.167	.220
L-pain à SexSat à Health	.012		-.008	.031	L-pain à SexSat à RelSat	.026		.000	.051
Lube à SexSat à Health	<b>.084</b>		.053	.114	Lube à SexSat à RelSat	<b>.183</b>		.151	.214
<b>ATTCH AVOIDANCE MODEL</b>					<b>ATTCH ANXIETY MODEL</b>				
Attch avoidance → SexH					Attch anxiety → SexH				
Sexual satisfaction	<b>-.200</b>	<.001	-.265	-.136	Sexual satisfaction	<b>-.168</b>	<.001	-.231	-.104
Orgasms	<b>-.241</b>	<.001	-.321	-.161	Orgasms	<b>-.127</b>	<.001	.107	.263
Desire	<b>-.124</b>	<.001	-.206	-.042	Desire	-.043	.179	-.125	.039
Lack of pain	<b>-.165</b>	<.001	-.246	-.084	Lack of pain	<b>-.145</b>	<.001	-.227	-.063
Lubrication	<b>-.279</b>	<.001	-.358	-.200	Lubrication	<b>-.128</b>	<.001	-.210	-.046
SexH → sex satisfaction					SexH → sex satisfaction				
Orgasms	<b>.172</b>	<.001	.095	.250	Orgasms	<b>.185</b>	<.001	.107	.263
Desire	<b>.297</b>	<.001	.228	.366	Desire	<b>.299</b>	<.001	.229	.369
Lack of pain	.040	.171	-.036	.116	Lack of pain	.023	.448	-.054	.099
Lubrication	<b>.235</b>	<.001	.147	.322	Lubrication	<b>.271</b>	<.001	.184	.359
Indirect paths					Indirect paths				
Avoid à Orgasm à SexSat	<b>-.042</b>		-.065	-.018	Anxiety à Orgasm à SexSat	<b>-.023</b>		-.042	-.005
Avoid à Desire à SexSat	<b>-.037</b>		-.063	-.011	Anxiety à Desire à SexSat	-.013		-.038	.012
Avoid à L-pain à SexSat	-.007		-.020	.006	Anxiety à L-pain à SexSat	-.003		-.015	.008
Avoid à Lube à SexSat	<b>-.066</b>		-.096	-.035	Anxiety à Lube à SexSat	<b>-.035</b>		-.060	-.010

*Note:* Consistent with the EVSA and ASA conceptual models, sexual health was treated as a predictor for the correlates of psychological distress, well-being, physical health, and relationship satisfaction whereas attachment avoidance and anxiety were treated as predictors of sexual health. SexH = sexual health; SexSat = sexual satisfaction; L-pain = lack of pain; RelSat = relationship satisfaction; Attch = attachment; Avoid = attachment avoidance; Anxiety = attachment anxiety. All path models were run on correlation matrices of meta-analytic estimates using Mplus 7.11. The models were fully saturated and therefore gave perfect fit. Path coefficients significant at  $p < .01$  have been bolded for ease of interpretation.

### A) Unique links to psychological distress



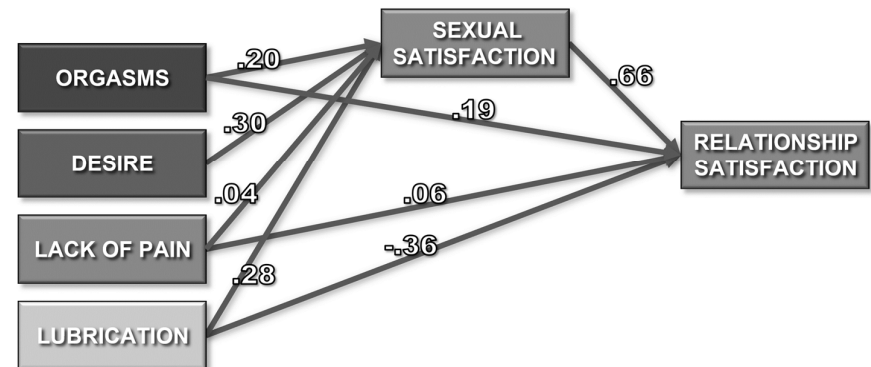
### C) Unique links to physical health



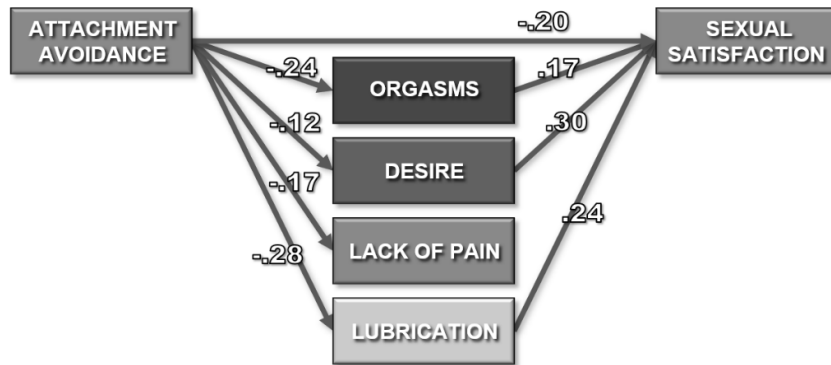
### B) Unique links to psychological well-being



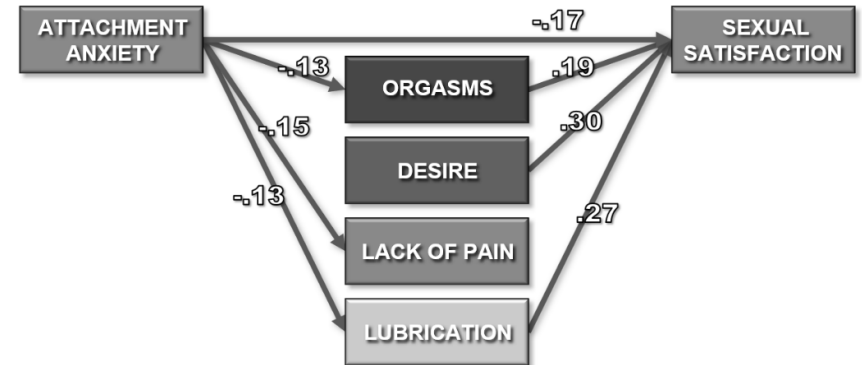
### D) Unique links to relationship satisfaction



### E) Unique links to attachment avoidance



### F) Unique links to attachment anxiety



**Figure 4.** Results of Path Models Examining the Unique Predictive Links of the Dimensions of Sexual Health. Note. Only paths significant at  $p < .01$  are shown.

After controlling for those indirect associations, three of the specific aspects of sexual health (orgasms, desire, and lack of pain) demonstrated additional direct links to individual and relationship functioning in the expected directions, offering partial support for Hypothesis 4. Thus, even after controlling for sexual satisfaction and the other aspects of sexual health, greater orgasmic functioning was uniquely linked to three of those four correlates (lower psychological distress, greater physical health, and greater relationship satisfaction) further augmenting its indirect links to those outcomes via higher sexual satisfaction. Similarly, a lack of sexual pain was uniquely linked to slightly lower psychological distress, greater well-being, greater physical health, and slightly higher relationship satisfaction. Finally, sexual desire was uniquely linked to greater well-being and physical health. After controlling for the other aspects of sexual health as well as indirect links to functioning via sexual satisfaction, multivariate suppressor effects emerged for vaginal lubrication. Thus, higher levels of the residual aspects of vaginal lubrication that were completely independent of levels of orgasms, desire, and sexual satisfaction were linked to slightly greater psychological distress, and to slightly lower well-being, physical health, and relationship satisfaction.

Turning to the path models examining attachment insecurities as predictors of sexual health, attachment avoidance was linked to lower levels of all four specific aspects of sexual health (Figure 4E) and attachment anxiety was linked to lower orgasms, greater sexual pain, and lower vaginal lubrication (Figure 4F), offering partial support for Hypothesis 5. As seen in Table 4, asymmetric confidence interval tests revealed significant indirect links between attachment insecurities and lower sexual satisfaction via their links to lower levels of the more specific aspects of sexual health, offering partial support for Hypothesis 6. Even after controlling for those indirect links through specific aspects of sexual health, both attachment avoidance (Figure 4E) and attachment anxiety (Figure 4F) demonstrated additional direct links to lower sexual satisfaction, supporting Hypothesis 7. Taken as a set, these path analysis findings highlight the unique roles that various aspects of sexual health play in the lives of individuals.

### *Moderation Effects*

Moderation analyses were conducted to estimate the moderating effects of gender, (sub)sample population (i.e., clinical vs. nonclinical), age, and publication type on the bivariate associations between specific aspects of sexual health and the three correlates to which sexual health was linked across at least 20 studies (offering sufficient numbers of effects to support these analyses): psychological distress, well-being, and relationship satisfaction. As the specific components of sexual health were conceptualized as contributing to overall sexual satisfaction, moderation analyses were also conducted on those predictive links. Given the broad range of samples, methods, and measures employed across the 205 (sub)samples, the  $Q$  statistics for the effects examined were significant, suggesting meaningful amounts of heterogeneity to support moderation analyses. Weighted random-effects *meta-regression* models were run using the *metafor* package in Rstudio to simultaneously test the unique effects of these four moderators on the links between orgasms and each of the outcomes. As shown in Table 5, when tested simultaneously, only a handful of significant moderation effects emerged from these analyses, thereby suggesting that a majority of the meta-analytic effects generalized across these moderators.

**Moderation by Gender.** Despite notable gender differences on orgasmic functioning and sexual desire between the primary genders, gender largely failed to emerge as a significant moderator for all but one of the effects tested. Gender only emerged as a unique moderator of links between orgasms and sexual satisfaction ( $b = -.172, p = .001$ ). Thus, although orgasms are linked to higher satisfaction across both primary genders, this effect was predicted to be significantly stronger in women ( $b = .444$ ) than in men ( $b = .444 - .172 = .272$ ), suggesting that orgasmic functioning might be more salient for sexual satisfaction in women.



**Table 5.** Examining Moderation of Links between Orgasms and Correlates.

Correlate being predicted Moderators tested	Sexual Health Indicator									
	Sexual Satisfaction		Orgasms		Desire		Lack of Pain		Lubrication	
	estimate	<i>p</i>	estimate	<i>p</i>	estimate	<i>p</i>	estimate	<i>p</i>	estimate	<i>p</i>
Predicting sexual satisfaction										
intercept	---	---	<b>.444</b>	<b>&lt;.0001</b>	<b>.340</b>	<b>.009</b>	<b>.580</b>	<b>.004</b>	<b>.829</b>	<b>&lt;.0001</b>
Male contrast	---	---	<b>-.172</b>	<b>.000</b>	-.046	.548	---	---	---	---
Age (centered at 38.9yrs)	---	---	.001	.701	<b>.007</b>	<b>.040</b>	.010	.071	.004	.383
Clinical population contrast	---	---	<b>.145</b>	<b>.001</b>	.036	.595	.043	.726	.064	.505
Peer-reviewed contrast	---	---	-.025	.670	.131	.293	-.224	.275	-.404	.068
Predicting psychological distress										
intercept	<b>-.345</b>	<b>.001</b>	-.138	.151	-.207	.439	<b>-.229</b>	<b>.030</b>	-.089	.338
Male contrast	.037	.520	.064	.314	.119	.233	---	---	---	---
Age (centered at 38.9yrs)	-.001	.783	<b>-.006</b>	<b>.006</b>	.002	.487	.003	.511	-.003	.573
Clinical population contrast	.020	.744	-.018	.732	-.172	.065	.101	.415	-.088	.426
Peer-reviewed contrast	.077	.509	-.115	.247	.196	.438	---	---	---	---
Predicting psychological well-being										
intercept	<b>.501</b>	<b>&lt;.0001</b>	<b>.291</b>	<b>&lt;.0001</b>	<b>.513</b>	<b>.003</b>	<b>.524</b>	<b>&lt;.0001</b>	.129	.366
Male contrast	-.307	.073	-.153	.291	-.244	.436	---	---	---	---
Age (centered at 38.9yrs)	.007	.075	-.001	.766	.004	.747	-.006	.492	.005	.637
Clinical population contrast	-.152	.150	-.026	.764	-.241	.219	<b>-.344</b>	<b>.011</b>	.106	.527
Predicting relationship satisfaction										
intercept	.742	<b>&lt;.0001</b>	<b>.276</b>	<b>.015</b>	<b>.229</b>	<b>.027</b>	.125	.074	.079	.080
Male contrast	-.030	.781	-.106	.203	-.056	.816	---	---	---	---
Age (centered at 38.9yrs)	.005	.303	.001	.808	.007	.196	<b>.009</b>	<b>.010</b>	.003	.380
Clinical population contrast	-.040	.665	.010	.890	-.013	.925	.047	.615	.123	.066
Peer-reviewed contrast	-.224	.074	.018	.870	---	---	---	---	---	---

*Note.* Weighted mixed-effects linear meta-regression models were run with the *rma* function of the *metafor* package in Rstudio to simultaneously test the unique contributions of the potential moderators in predicting links between orgasms and each of the 4 outcome variables with sufficient numbers of studies to support these analyses. Significant effects have been bolded for ease of interpretation. --- indicates effects not possible to estimate (i.e., sexual satisfaction predicting sexual satisfaction or male gender moderating lack of vaginal pain or vaginal lubrication) or effects with too few studies to estimate (which was often the case for the peer-reviewed moderator).

**Moderation by Age.** After controlling for the other moderators, average sample age emerged as a significant moderator of the links between orgasms and psychological distress ( $b = -.006, p = .007$ ). As that predictor was centered at 38.9 years (the weighted mean across all samples), these results predict only a nominal association for samples with average ages of 18.9 ( $b = -.138 + (-20)*(-.006) = -.018$ ) but a notably stronger association for samples with average ages of 58.9 ( $b = -.138 + (20)*(-.006) = -.258$ ). Similarly, age significantly intensified the positive links between sexual desire and sexual satisfaction ( $b = .007, p = .040$ ) as well as the positive links between lack of pain during sex and relationship satisfaction ( $b = .009, p = .010$ ).

**Moderation by Clinical vs. Non-Clinical Population.** Population type emerged as a unique moderator of the links between orgasms and sexual satisfaction ( $b = .145, p = .001$ ), such that the association was significantly stronger in samples drawn from clinical populations ( $b = .444 + .145 = .589$ ) than from nonclinical populations ( $b = .444$ ). This suggests that orgasmic functioning might take on particular salience for well-being in clinical populations. Population type also moderated the positive link between lack of pain during sex and well-being ( $b = -.344, p = .011$ ), markedly reducing that positive association within a clinical population ( $b = .524 + -.344 = .180$ ) in comparison to the effect in a non-clinical population ( $b = .524$ ). This suggests that lack of pain during sex might be less directly related to well-being in a clinical population (potentially struggling with pain due to other medical conditions).

#### *Publication Bias*

As seen in Table 5, after controlling for the other moderators, publication status failed to emerge as a significant moderator of the links between specific aspects of sexual health and the constructs with sufficient numbers of effects to support meta-analytic regressions. This suggests that the 9 effects tested (for which publication status could be tested as a moderator) did not significantly differ between published peer-reviewed and unpublished research (sub)samples. Consistent with this, *Egger's regression tests* only identified significant funnel plot asymmetry for 18 of the 44 effects (see Table 3) and the resulting shifts in meta-analytic effect sizes from *trim and fill* analyses were largely minimal. In fact, the trim and fill analyses yielded unchanged estimates for 3 of those 18 effects and stronger estimates for 14 of them. This is likely a consequence of 8.8% of the (sub)samples being drawn from unpublished sources. It is also likely due in part to the fact that in roughly 80% of the records, the relevant effects being extracted were incidental to the main focus of those manuscripts (typically appearing within a study-wide correlation matrix without ever being discussed). As a result, the significance of those effects would have had no effect on the publishing decisions for those articles. Taken together, these findings converge to suggest that minimal levels of publication bias were present in the meta-analyzed effects.

In contrast, the relative probabilities estimated by selection method analyses (e.g., McShane et al., 2016) provide a note of caution to those broader publication bias findings. The relative probability of a contradictory finding (e.g., non-significant or in the opposite direction) being included in the current review was roughly equivalent (if not greater) than the probability of a consistent finding being included for the correlates of psychological distress, attachment anxiety, and attachment avoidance (i.e., relative probabilities close to 1 or greater). However, the probabilities of contradictory findings being included for the remaining correlates were occasionally lower, suggesting that current meta-analytic effect estimates might have been slightly inflated by the publication (or inclusion) biases.

## **Discussion**

As research studies from diverse fields have explored the potential benefits of experiencing orgasms and sexual health on physical, emotional, and interpersonal well-being across the last 49 years (often incidentally to the primary foci of those studies), this meta-analysis drew from clinical psychology, social psychology, and medical literatures to integrate that vast body of work. Thus, the current literature review resulted in a set of 173 records, yielding 205 (sub)samples and 930 effects,

representing a combined total sample of 160,466 participants. Given the importance that individuals continue to place on orgasms (e.g., Opperman et al., 2014), our primary focus was to examine the links between orgasmic functioning and various indices of well-being. However, given the multivariate perspective on sexual functioning that has developed within the literature (e.g., Rosen et al., 2000), we took a broad perspective and examined orgasmic functioning as one component within the greater context of sexual health. Consistent with our modified EVSA and ASA models, the meta-analytic findings and subsequent path analyses revealed unique links from the various aspects of sexual health (i.e., sexual satisfaction, orgasms, sexual desire, lack of pain, vaginal lubrication, erectile function) to physical health, individual well-being and relationship well-being. Meta-analytic moderation results further revealed stronger links between orgasms and specific forms of well-being for: (1) women, (2) individuals from clinical populations, and (3) older individuals. As the first published meta-analysis in this area, the review sought to integrate findings from diverse fields of study within the EVSA and ASA conceptual frameworks, providing a clear focus to the review and frameworks to guide future work. The current study further offered a quantitative synthesis of the correlates of orgasms, which enabled us to markedly advance the literature by quantifying the unique associations of various aspects of sexual health with a range of individual and interpersonal correlates.

### *Implications*

**Promising Conceptual Frameworks.** The focus of the current review was conceptually grounded in the EVSA and ASA models (i.e., seeking model-consistent correlates). Although the meta-analytic path models tested fell short of truly testing those more complex models, the current findings demonstrated robust links between sexual health and key constructs from those two models. Thus, the current findings offer a compelling foundation to support using the EVSA and ASA models as conceptual frameworks to guide future work in this area. For example, future studies of romantic relationships would likely benefit from modeling aspects of sexual health as adaptive processes, chronic sexual difficulties as enduring vulnerabilities, and/or failure to achieve orgasm as a stressor within the context of the EVSA model. Similarly, studies focused on the role of adult attachment insecurities could potentially benefit from modeling sexual health difficulties as possible threats that could trigger the activation of the attachment system within the context of the ASA model.

**Sexual Health Benefits Relationships.** Consistent with previous literature, current findings demonstrate that sexual health is linked to overall relationship quality (e.g., Brezsnayak & Whisman, 2004; Costa & Brody, 2007; Ellsworth & Bailey, 2013; Peixoto & Nobre, 2015; Therrien & Brotto, 2016; Witting et al., 2008), highlighting the potential importance of sexual health within romantic relationships for both men and women. Although these findings provide a solid foundation for examining sexual health as a distinct relationship process that could influence relationship quality over time, given the cross-sectional nature of the vast majority of the studies reviewed, future work is needed to explore the direction of those associations. In fact, the EVSA and ASA models highlight a myriad of more specific relationship processes that have yet to be examined and modeled with sexual health (e.g., sexual communication, relationship conflict, partner responsiveness, social support, attributions for partner behavior, mindfulness, psychological flexibility, gratitude, demand-withdrawal, and hypervigilance). Although those relationship processes have yet to be examined in the context of sexual health, they are likely to interact with sexual health to shape the course of relationships. Thus, the conceptual frameworks organizing this review further highlight an array of promising directions for future work.

**Sexual Health Benefits Individuals.** Although sexual behavior is often a dyadic experience, current findings and previous literature suggest that the benefits of sexual health extend far beyond relationship functioning (e.g., Levin, 2007). For both men and women, sexual health appears to have important implications for individual functioning (e.g., Brody, 2007; Costa & Brody, 2012; Fabre & Smith, 2012; Mernone et al., 2019; Stephenson and Meston, 2015). The current findings suggest that all six dimensions of sexual health are linked to lower psychological distress, higher psychological

well-being, and greater physical health. In the case of the correlates of orgasmic functioning, this could be explained in part by findings that sexual activities, and orgasms even more so, release prolactin and oxytocin (e.g., Carmichael et al., 1987; Krüger et al., 2002; Leeners et al., 2013; Magon & Kalra, 2011; Meston et al., 2004a), hormones which have been shown to demonstrate calming satiation and stress relieving features in both men and women (e.g., Kikusui et al., 2006; Krüger et al., 2005; Levin, 2007; Smith & Wang, 2014; Uynas-Mober, 1998). Thus, it may be interesting and useful to explore the potential stress-buffering benefits of orgasms and other sexual health dimensions in future studies. In the context of the ASA model, healthy sexual functioning, as well as consistent and high-quality experiences of orgasms might also serve as buffers to prevent perceived threats from triggering the attachment system, thereby lowering the stress experienced by individuals with attachment anxieties. Similarly, within the EVSA model, pleasurable sexual experiences might actually serve as an adaptive relationship process that buffers relationships from the jagged edges of individuals' personalities and from the adverse impact of stressful events, thereby promoting individual well-being by bolstering relationship quality. Future work could explore these various mechanisms linking sexual health and experiences of orgasms to greater individual health.

**Orgasms Matter—Particularly to Women.** Although positive links to orgasms are found for both men and women, it appears that they are especially salient for women. As existing literature highlights, women experience orgasms at notably lower rates than do men (e.g., Armstrong et al., 2012; Blair et al., 2018; Frederick et al., 2018; Wade, 2015; Wade et al., 2005). Furthermore, although both men and women experience orgasm sexual dysfunctions, men more typically experience premature or delayed orgasms, in contrast to the complete absence of orgasms that many women experience (e.g., Delavierre, 2008; Jannini & Lenzi, 2005). Such findings, in combination with the results of the current meta-analysis, suggest that as women experience less frequent orgasms, the links between orgasms and positive correlates might become especially crucial for them. Although not a focus of the current review, a related line of study has demonstrated that greater frequency of women's orgasms is linked to pleasure focused sexual education received in childhood or adolescence (e.g., Brody & Weiss, 2010), highlighting possible points of intervention. Thus, future work could examine the more developmental predictors of both women and men developing the skills to have consistent and high-quality experiences of orgasms from pleasurable sexual activity.

**Understanding Vaginal Lubrication.** Consistent with our hypotheses, vaginal lubrication demonstrated: (1) positive bi-variate associations with the other aspects of sexual health, (2) adaptive bi-variate associations with the correlates (e.g., greater well-being, lower distress), (3) unique positive links to sexual satisfaction in the path models, and (3) corresponding indirect associations with lower distress, and with greater well-being, physical health, and relationship satisfaction in those same path models. However, after controlling for those indirect links, suppressor effects (see Maassen & Bakker, 2001) emerged in the remaining direct links from vaginal lubrication to those four correlates in the path models. Thus, the aspects of vaginal lubrication that were completely unrelated to orgasms, sexual desire, lack of pain during sex, and sexual satisfaction were associated with greater psychological distress, lower well-being, lower physical health, and lower relationship satisfaction. As these suppressor effects are based on residual variance, they should be interpreted with caution as they tend to be less stable and might not continue to emerge with a slightly different set of covariates (see Maassen & Bakker, 2001 for a discussion of suppressor effects). Having said that, these results suggest that being able to lubricate in the absence of sexual satisfaction or desire might serve as a marker for less traditional sexual attitudes (possibly reflecting a greater comfort and proclivity toward casual sex). Although links between vaginal lubrication and sociosexual orientation are yet to be investigated, having an unrestricted sociosexual orientation (i.e., being more embracing of casual sex) has been linked to lower relationship satisfaction and quality (e.g., Lamela et al., 2020; Urganci et al., 2021) whereas it has been linked to greater psychological well-being and lower psychological distress after engaging in casual sex (Vrangalova & Ong, 2014). Given that most effects were drawn from samples of individuals in romantic relationships, it may be possible that having unrestricted sociosexual orientation might have a negative effect on individual and relationship

functioning as those individuals found themselves constrained by what were likely to be predominantly monogamous relationships. Thus, future research could explore this phenomenon and examine potential links between vaginal lubrication (and other aspects of sexual health) and sociosexual orientation.

### *Future Directions*

While the current systematic review has unified findings from a diverse set of literature, it has also uncovered a number of areas for future work that have yet to be explored.

**Theoretically Grounded Studies.** Despite a large body of work supporting the current meta-analytic findings, much of that work was more pragmatic in nature (i.e., examining sexual functioning as a secondary outcome in studies of physical illness) than conceptually focused. Thus, the effects extracted from those studies were typically tangential or completely unrelated to the primary focus of the manuscripts and were often not even discussed within the results narratives. As a result, the current findings offer an important first step toward developing a theoretically grounded program of research in this area, highlighting the EVSA and ASA as potential conceptual frameworks for future studies and therefore suggesting a number of directions to be explored in future studies.

**Examining Mediators.** The mechanisms linking sexual health to relationship quality remain unclear. The EVSA model (see Figure 1A) suggests a host of potential adaptive processes that could be examined as possible mechanisms in future studies (e.g., sexual communication, relationship conflict, demand-withdraw behaviors, partner responsiveness, social support, attributions for partner behavior, mindfulness, and psychological flexibility). Given the atheoretical nature of the vast majority of the research on sexual health, the links between sexual health and these relevant relationship processes have yet to be examined, much less treated as possible mechanisms within larger models of relationship functioning. Future studies could therefore conceptually extend this work by examining models and specific constructs or processes informed by the EVSA or ASA models. For example, positive, consistent, and high-quality sexual experiences might strengthen romantic relationship quality by promoting more compassion, responsiveness, and emotional support within those relationships. Of course, such experiences could even be modeled as a mechanism. For example, a future study could examine how an enduring vulnerability like negative body image might adversely impact romantic relationship quality by lowering the quality and consistency of pleasurable sexual experiences. The EVSA model therefore provides a framework for integrating the correlational findings on orgasms into a variety of conceptual models to be tested.

**Biological Mechanisms.** Although somewhat outside of the scope of the current review, a growing body of work has uncovered possible neurochemical mechanisms linking orgasms to emotional bonding. Thus, studies have shown that around the time of orgasm, there is a cascade of changes in cerebral blood flow in the brain including deactivation in left prefrontal cortex and left temporal lobe (e.g., Gerorgiadis et al., 2009; Georgiadis & Kringelbach, 2012; Holstege & Huynh, 2011; Levin, 2014), as well as activation in the cerebellum (Gerorgiadis et al., 2009; Holstege & Huynh, 2011; Meston et al., 2004a; Levin, 2014), right prefrontal cortex (Holstege & Huynh, 2011; Tiisonen et al., 1994), and hypothalamus (Komisaruk & Whipple, 2005; Meston et al., 2004a; Meston et al., 2004b). Specifically, activation in the hypothalamus results in the release of oxytocin, referred to as the “feel good hormone” which facilitates social bonding in both men and women (e.g., Carmichael et al., 1987; Carter, 1992; Murphy et al., 1990; Murphy et al., 1987; Ogawa et al., 1980; Pickering, 2003; Uvnas-Mober, 1998). Since evidence suggests that oxytocin is fundamental in bonding, this could help explain how couples who have orgasms together feel closer. Thus, in addition to process-oriented models examining psychological and interpersonal processes as mechanisms, future work could extend the current findings by also clarifying and quantifying the biological links between sexual health and well-being.

**Examining Moderation.** Another conceptual possibility suggested by both the EVSA and ASA models is that sexual health might function as a moderator within models of relationship and individual functioning. For example, drawing from the EVSA model (Figure 1A), a future study



could examine how experiencing consistent and high-quality orgasms or pleasurable sexual activity (as a dynamic state-like process) might serve as an adaptive relationship process, buffering those relationships from the adverse effects of enduring vulnerabilities and stressful life events. Of course, more pervasive sexual health difficulties (e.g., chronic sexual pain, chronic difficulties with lubrication/erection, or being completely anorgasmic at the more stable trait-level) could be conceptualized as an enduring vulnerability that could create stress within the relationship and could shape the tone of other dyadic processes (i.e., moderating the impact of conflict and support behaviors). Drawing from the ASA model (Figure 1B), future studies might examine how experiencing consistent and high-quality orgasms, or pleasurable sexual activity, might buffer individuals from perceived threats triggering or activating their attachment systems, thereby ameliorating the impact of attachment insecurities on relationship and individual functioning. Within that same framework, chronic and pervasive difficulties with sexual health could be expected to potentially make individuals more reactive to perceived threats, lowering the threshold for attachment system activation and prompting greater levels of deactivating (e.g., withdrawal, avoidance, denial) and/or hyperactivating (e.g., demand, rumination, hypervigilance) behaviors, particularly for individuals with greater levels of attachment insecurities. At more of a dynamic state or event level, having negative sexual experiences or sexual health difficulties during a specific intimate encounter could serve as a threat to the relationship within the ASA framework, triggering hyperactivating and/or deactivating behaviors by activating an individual's attachment insecurities. Extending that logic back to the EVSA framework, future studies could even explore how the quality of sexual health and/or consistency of pleasurable sexual experiences might interact with other relationship processes (e.g., conflict, support, responsiveness) to help shape the course of romantic relationships over time.

**Examining Predictors of Sexual Health.** Finally, the EVSA model sheds light on how more stable and enduring aspects of individuals can be incorporated into comprehensive models of functioning in future studies. Although the current review focused on attachment insecurities as the only enduring vulnerability examined, previous work has examined a variety of predictors of sexual health including enduring traits like sexual education (e.g., Farnam et al., 2008; Brody & Weiss, 2010), negative body image (e.g., Dosch et al., 2016; Quinn-Nilas et al., 2016), knowledge of own body (e.g., Wade et al., 2005), and sexual attitudes like erotophilia (e.g., Hangen & Rogge, 2021; Hurlbert et al., 1993), sociosexual orientation (e.g., Stern et al., 2020; Velten & Margraf, 2017; Wongsomboon et al., 2019), and sexual sensation seeking (e.g., Burri, 2017). The EVSA conceptual framework therefore offers researchers a method of integrating those predictive links to sexual health into broader models of individual and relationship functioning. Future studies could therefore build on the current findings and the broader predictive findings within the sexual health literature by expanding beyond just running analyses to sexual health. Specifically, future studies could examine how a broad array of enduring vulnerabilities might not only (1) predict the quality of sexual health and consistency of pleasurable sex or orgasms, but also (2) might generate stressful events for couples to navigate, and (3) interact with stressful life events to influence both sexual health and other relationship processes to shape the course of relationships over time.

**Tracking the Impact of Sexual Health Over Time.** While much research has been conducted on sexual health dimensions and its correlates, the vast majority of this work (96% of the records) has been cross-sectional (with none of the records predicting residual change to ensure that baseline associations would not inflate prediction) leaving the directions of causality unclear. Longitudinal research would greatly inform this field of study. Specifically, analyses in multi-wave longitudinal designs could clarify directions of associations. These designs could include short-term intensive studies such as daily diaries or ecological momentary assessments to examine immediate and daily effects of sexual health dimensions. Previous findings within a daily diary study of 96 couples have suggested that sexual activity leaves a lingering “afterglow” of positive effect on sexual and marital satisfaction for roughly 48 hours (Meltzer et al., 2017). In one of the few records to examine orgasms on daily basis, Burleson and colleagues (2007) collected 36 weeks of daily diary assessments from 58

women. Their lagged analyses supported reciprocal links between orgasming and positive mood even after controlling for rates of intercourse and physical affection, thereby providing initial evidence of bi-directional causality for those two constructs. Future work could examine the daily correlates of sexual health dimensions with the full range of correlates examined in this meta-analysis as most of those links remain largely unexamined. Future work could also extend the timeframe of diary assessments by using weekly diaries, potentially capturing slightly more lasting effects on relationship and individual functioning. In addition to tracking daily or weekly correlates of sexual health dimensions, long term designs (e.g., spanning months or years) could also prove informative for examining how this aspect of a couple's sexual relationship might interact with other relationship processes over the broader course of romantic relationships. For example, it would be interesting to track sexual behavior and orgasms along with other common relationship processes (e.g., social support, negative conflict behavior, forgiveness, aggression) in newlywed couples over the first few years of marriage. As a small but growing body of studies have demonstrated that sexual activity and orgasms offer unique predictive variance (e.g., Costa & Brody, 2007), it is likely that they could play unique roles across the early years of marriage. Thus, a newlywed couple engaging in high levels of sexual activity in which one of the partners experiences a low rate of sexual satisfaction, desire, or orgasms could very well have a very different trajectory of marital functioning than a couple engaging in lower levels of activity but with a far higher satisfaction, desire, or orgasm rate as a result of those activities. This example highlights how orgasms and other aspects of sexual health might serve to moderate or interact with other relationship processes like sexual activity, physical affection, emotional support and even conflict behavior. As a result, such studies would help clarify the impact of possible sexual health gaps on relationship functioning during that high-risk stage of early marriage.

**Examining Orgasm Specificity.** A series of studies (e.g., Brody, 2010; Brody & Costa, 2009) has focused on emphasizing the distinct differences between types of orgasms (i.e., vaginal orgasms without clitoral stimulation compared to orgasms with clitoral stimulation) and their sources (i.e., through penile-vaginal intercourse (PVI), partnered masturbation, or solitary masturbation). For example, some findings have suggested that PVI frequency may be a stronger predictor of greater sexual satisfaction, relationship satisfaction, mental health, and life satisfaction (e.g., Body and Costa, 2009). Similarly, orgasms from PVI without clitoral stimulation have shown strong links to greater positive affect (e.g., Tavares et al., 2017). However, these studies have been criticized for potential deficits in: scientific rigor, theoretical grounding, and replication by independent researchers (Levin, 2007, 2012a; Prause, 2012a, 2012b; Therrien & Brotto, 2016). The emphasis on distinguishing between type of orgasms has also been criticized as lacking utility given that the clitoral structure envelops the vaginal opening, and is therefore not only stimulated via PVI regardless of direct stimulation of the clitoral glans, but also the resulting orgasms are largely indistinguishable for most women (e.g., Levin, 2007, 2012b; Prause, 2012). The exclusive focus on PVI within this line of work also excludes the study of sexual health in sexual and gender minority groups. Given these concerns, the vast majority of the research in this area has yet to fully explore this specificity. Consequently, there were too few published results to support the estimation of meta-analytic effects for specific types or sources of orgasms. Future research could continue to explore the potential specificity of benefits from various types of orgasms from various forms of sexual activity. However, given the critiques of the early work in this area, future studies should seek to use more rigorous methods (e.g., more comprehensively assessing sexual health), seek more diverse populations (e.g., expanding to include sexual and gender minorities), and ground those studies within larger conceptual frameworks.

**Studying Sexual Health as a Dyadic Relationship Process.** Most of the records reviewed examined sexual health within individuals, collecting data from just one individual from each relationship for the individuals in relationships. When records do include partner data, analyses are typically examined for actor (i.e., within-person) effects, rather than examining how one partner's experiences may affect the other partner's experiences (i.e., partner effects). This primarily conceptualizes sexual health as a predominantly individual experience. However, as sexual health

dimensions are often part of sexual activity with another person, and much of that sexual activity occurs within the context of romantic relationships, it is reasonable to propose that having satisfying and painless sex or orgasms (or unsatisfying or painful sex without orgasms) within a sexual coupling could very likely have a meaningful impact on the romantic or sexual partner in that couple. In fact, sexual activity with another person can be an emotionally charged experience (e.g., Fahs & Plante, 2017; Salamon et al., 2005), laden with expectations from both partners (e.g., Aubrey et al., 2003) and offering the possibility of intense intimacy (e.g., Gewirtz-Meydan & Finzi-Dottan, 2018). Any failures to meet those expectations or achieve fulfilling pleasure could therefore be troubling to one or both partners in that sexual coupling. Thus, by conceptualizing sexual health as a dyadic relationship process, relationship research could capture the dynamics of what can be an extremely intense experience within models of relationship functioning. It will also allow researchers to explore links between sexual health and other relationship processes, such as support, conflict, or even intimate partner violence.

One of the meta-analyzed records moved the examination of orgasms closer to a dyadic level by demonstrating links between *simultaneous* orgasms and relationship quality for both men and women (Brody & Weiss, 2010). Similarly, another recent survey of 38,747 heterosexual men and women in 3+ year relationships from the United States shifted the focus toward the dyadic nature of orgasms by showing positive ties between an individual's reports of their partner's orgasm consistency and that individual's own sexual satisfaction (Frederick et al., 2017). Notably, those pseudo-partner effects (pseudo, as they are still only reported by a single individual) remained significant even after controlling for sexual activity and sexual communication. Although both of those records take important steps toward recognizing the dyadic nature of orgasms during sexual activity with a sexual/romantic partner, they were both limited by collecting data from only one individual in each relationship.

Within the current systematic review, only five records examined the links between sexual health dimensions and relationship functions by specifically collecting data from both romantic partners (Frederick et al., 2017; Gewirtz-Meydan & Finzi-Dottan, 2018; Guo et al., 2004; Jones et al., 2014; Klapilova et al., 2015). However, of these five records, only three (Gewirtz-Meydan & Finzi-Dottan, 2018; Jones et al., 2014; Klapilova et al., 2015) analyzed the partner data dyadically (i.e., actor-partner interdependence modeling, APIM; e.g., Cook & Kenny, 2005). For example, analyses in a sample of 128 Israeli heterosexual couples, Gewirtz-Meydan and Finzi-Dottan (2018) demonstrated that individuals' orgasmic consistencies were linked to higher sexual satisfaction (and lower attachment insecurities) for those individuals and their partners. Future work could advance our understanding of the salience of sexual health in the lives of couples by taking a similarly dyadic approach to studying it.

**Investigating Sexual Health as a Developmental Process.** Given the cross-sectional and largely incidental nature of the research linking sexual health to well-being, this work has been fairly atheoretical in its approach, often focusing on practical questions within clinical populations (e.g., to what extent is chronic pelvic pain linked to depressive symptoms and reduced orgasms; Aubin et al., 2008) rather than developing testable theories. However, given the central role that sexual activity and sexual health can play in peoples' lives and in their relationships, the current findings begin to suggest that various aspects of sexual health (i.e., learning about and growing comfortable with our bodies, embracing our sexual desires, exploring intimate activity, learning to communicate sexual needs, and developing the ability to have orgasms) could be conceptualized as a fundamental skills to be obtained as individuals become sexually active. Many records included in the current meta-analysis have measured orgasms as an ability/inability to have orgasms (e.g., Barrientos & Páez, 2006; Davidson & Hoffman, 1986; Haavio-Mannila & Kontula, 1997; Zhang et al., 2015). Records like these have identified a population of women in their 40's, 50's, and 60's who have never experienced orgasms despite engaging in sexual activity (e.g., Fabre et al., 2013; Zhang et al., 2015), illustrating that some women have not and may never experience orgasms. Although biological issues might prevent some women from being able to experience orgasms or even pleasurable sex in general, for

many women, sexual health difficulties could simply arise from a lack of knowledge of and comfort with their own bodies, and the associated skills needed to embrace sexual desire, communicate sexual needs, or achieve orgasms (either alone or during sexual activity with a partner). Thus, while many women are able to quickly learn those skills across their early sexual experiences, for many others, these skills might take years or decades after a sexual debut to acquire, delaying their abilities to achieve consistent, reliable, and satisfying sexual pleasure. Given the findings that childhood and adolescent sexual education can influence the achievement of these skills (e.g., Brody & Weiss, 2010), it is possible that sexual health functioning could be considered a developmental process beginning in adolescence and extending through young adulthood and beyond. This process would not only include the physical development and sexual maturation of individuals' bodies, but also the cognitive and emotional development of those individuals as they develop and embrace their own sexual identities, grow to know their own bodies, develop comfort and understanding of their own sexual interests and needs, establish their own sexual attitudes, and develop schemas and scripts for how sex fits into their lives and into their relationships. Although researchers have briefly commented on these ideas in previous work (e.g., Chatterji et al., 2017; Giordano & Rush, 2010; Laan & Rellini, 2011), this remains a largely unexamined area of research on sexual health, and especially orgasms. We would posit that these developmental factors will influence the quality of an individual's sexual health both within and outside of committed relationships, most likely serving as enduring vulnerabilities and adaptive processes within the EVSA model. Thus, future work could take a more developmental and holistic perspective by assessing these various developmental processes over time appropriate developmental timeframes (e.g., during those formative years in adolescence) to place an individual's current experience of sexual health functioning within a larger socio-emotional developmental context. Models based on such a developmental approach would likely offer novel insights to individual functioning across the lifespan.

**Linking Sexual and Physical Health.** The comprehensive review uncovered 9 previous studies linking orgasms to improved physical health. For example, analyses in a sample of 117 Turkish women linked sexual satisfaction, desire, lack of pain, vaginal lubrication, and consistency of orgasms to greater physical health on the SF-36 (Artune-Ulkumen et al., 2014). Similarly, analyses in 76 Dutch women with a history of vulvar cancer and radiotherapy, the same sexual health dimensions were linked to greater physical health (Hazewinkel et al., 2012). Another study has linked men's sexual intercourse frequency to greater longevity (Palmore, 1982). Extending these studies, analyses in 143 Scottish men and women demonstrated a link between orgasms and greater resting heart rate variability, an indicator which is indicative of not only better mental health and emotion regulation, but also greater physical health and longevity (Costa & Brody, 2012), thereby highlighting a possible mechanism for the current findings. Although the path models tested in the current review conceptualized sexual health predicting physical health, it is likely that those forms of health are reciprocally related. In fact, in the case of chronic illness, it is more likely that physical health might function as the causal factor reducing the quality of sexual health and functioning over time. Future work could therefore extend the current findings by examining links between physical and sexual health in multi-wave longitudinal studies, thereby allowing those reciprocal directions of causality to be modeled. Future work could further extend the current body of work by examining the links between sexual health dimensions and other more concrete daily health outcomes, such as the number of colds, visits to a physician, and missed days at work, thereby extending these findings to nonclinical populations.

**Embracing Relationship and Sexual Orientation Diversity.** As most records in the current meta-analysis have only looked at heterosexual respondents, and presume monogamous relationship structures, it is difficult to ascertain whether these findings are applicable to sexual minorities or to those in non-monogamous relationships. Although each of sexual health components are likely to be important for individuals of all sexual orientations and in all forms of relationships, we would posit that it is also possible that these findings may vary across those groups. Given findings highlighting possible differences in the frequencies of sexual activity and orgasms across gay and lesbian



relationships (e.g., Frederick et al., 2018; Spitalnick & McNair, 2005), it is also possible that the salience of sexual activity and orgasms might take on unique meanings within specific populations. Consistent with this, another body of work on relationship diversity has explored the characteristics of individuals in fundamental classes of monogamous and nonmonogamous relationships (Hangen et al., 2019). Findings in a diverse sample of 1,658 adult men and women suggested that although certain forms of nonmonogamy demonstrated comparable levels of individual and relationship functioning to monogamous relationships, the individuals in nonmonogamous relationships reported markedly different sexual attitudes from individuals in more traditional monogamous relationships, reporting higher socio-sexual orientations (i.e., comfort with and interest in casual sex) and higher sexual sensation seeking. Thus, it is likely that each of the sexual health components might take on different salience in nonmonogamous relationships. To extend the current findings, future work would therefore benefit from seeking greater diversity in the populations sampled and examining the correlates of sexual health components in non-heterosexual individuals and within nonmonogamous relationships.

**Examining Correlates of Exaggerating Sexual Pleasure.** The sexual health gender gap continues to be well documented in the United States (e.g., Armstrong et al., 2012; Blair et al., 2018; Frederick et al., 2018; Regan & Atkins, 2006; Stephenson et al., 2011), suggesting that women generally experience orgasms and sexual desire at notably lower rates than men, as well as sexual pain at higher rates than men. Given the intense expectations that can surround partnered sexual activity, orgasm difficulties (particularly those in women) likely exert pressure on individuals to exaggerate their own pleasure or even fake their orgasms. This is most commonly done in an effort to protect the feelings of a sexual partner (e.g., Fahs, 2014; Muehlenhard & Shippee, 2010; Salisbury & Fisher, 2014), especially since greater amounts of sexual activity has been linked to lower relationship satisfaction for men whose female partners orgasm at low rates (Muehlenhard & Shippee, 2010). The phenomenon of exaggerating pleasure fell beyond the scope of the current meta-analysis, but it remains a closely related process to orgasm difficulties and a growing body of studies have investigated this phenomenon. Although both men and women have reported having exaggerated pleasure or faked orgasms during intercourse, this appears to be much more prevalent in women than in men (e.g., Muehlenhard & Shippee, 2010). In one of the first published records to link faking orgasms to relationship functioning, Ellsworth and Bailey (2013) found that greater frequency of women's faking orgasms was linked to lower relationship satisfaction, fewer self-reported orgasms, and greater reports of past infidelity in current relationships, highlighting the potential risks of faking orgasms. Extending this work, a number of labs have developed scales to assess common reasons for faking orgasms (e.g., Cooper et al., 2014; Goodman et al., 2017; Seguin et al., 2015), as well as examining predictors of faking orgasms (e.g., Kaighobadi et al., 2012; Mialon, 2011), and the possible impacts of faking orgasms on romantic relationships (e.g., Denes et al., 2019). As the current meta-analytic findings highlight the correlates of orgasms across multiple domains of functioning, the current findings could be extended meaningfully in future studies by examining the associated phenomenon of faking orgasms and the motives underlying such behavior.

### *Conclusion*

The current meta-analytic review was the first of its kind to quantitatively integrate 49 years of research examining the correlates of sexual health across a wide range of literatures. As the vast majority of that work was pragmatic rather than theoretically driven, the current review also sought to develop conceptual frameworks to theoretically integrate disparate lines of research into more comprehensive models of individual and relationship functioning. The meta-analytic results demonstrated links between sexual health components and physical, emotional, and relationship health and well-being, laying a foundation of support for the proposed models. The review also revealed a number of promising directions for future research: (1) examining mechanisms linking sexual health to individual and relationship functioning, (2) examining sexual health components as possible mediators and moderators with the EVSA and ASA models, (3) integrating predictors of



sexual health as enduring traits within the EVSA model, (4) examining possible directions of casual influence using multi-wave longitudinal studies, (5) examining the specificity of various types and sources of orgasms, (6) collecting dyadic data to fully model sexual pleasure as a dyadic interpersonal process, (7) modeling sexual health and more specifically the ability to achieve orgasms as developmental processes involving a discrete set of skills and stages, (8) deepening our understanding of links between sexual and physical health, (9) embracing diversity in relationship commitment structures and sexual orientations, and (10) extending work on exaggerating pleasure or faking orgasms to hide orgasmic difficulties from a romantic or sexual partner. Thus, the current meta-analytic review not only synthesizes quantitative findings, but also offers concrete guidelines for extending the past 49 years of research on the correlates of sexual health in a theoretically grounded manner.

**Data Availability Statement:** The data used in the current analyses will be made available upon request via the osf.io platform.

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